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**OF**  
**THE SECOND**  
**Indian Industrial Conference**

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NOTE:—In the above index, reference has been made to the "Report of Industrial Conference work" merely as "App." quoting the number of the page and reference to the several appendices (altogether 11) has been made as App. I, II, etc., with their separate page number. Mr. Mukerjee's paper on the "Birds eye view of the Silk Industry" is attached at the end of this volume as a supplement and has paging of its own.

P. R. C.

## INTRODUCTION.

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"We are at a crisis in our national history. The time has come, when we must make arduous and united endeavours for securing our industrial independence, or we shall sink again perhaps for centuries to come. We must struggle and maintain our ancient position among the industrial nations of the earth, or we shall be betraying a sacred trust, and be false to our posterity."—*H. H. The Maharajah Gaekwar*; (P. 33.)

"There is no economic fallacy in that Swadeshi creed that aims at improving the indigenous arts. The genuine Swadeshi ought to secure the maximum of production at the minimum of cost. Patriotism demands that the greater cost and the slight discomfort of using indigenous goods should be carefully put up with at the outset. But remember that no such movement can be permanently successful unless it involves a determined effort to improve their quality and cheapen their cost, so as to compete successfully with foreign products. The most rigid economist will then have no flaw to find in your Swadeshi armour."—*H. H. The Maharajah Gaekwar*. (P. 28.)

The Second Indian Industrial Conference was held at Calcutta on the 29th and the 31st December, 1906.

The arrangements made for it were more elaborate than those for the first session at Benares, and in several respects it was even a greater success. A larger number of delegates representing more public bodies attended it and altogether a more notable gathering assembled at its opening by His Highness the Maharajah Gaekwar than was present the preceding year. It will be invidious to mention names where so many distinguished men gathered together, but exception should be made in the case of India's Grand Old Man. There is no name which excites the same feeling of love and reverence in the breast of every Indian as that of the venerable Dadabhai Naoroji. Whether as a man or as a patriot, his is an utmost sacred personality, and his presence at the Conference must be regarded as an event in itself for which its promoters cannot be too thankful. It will, it is hoped, not be

regarded as out of place if we express the deep sense of relief and thankfulness which all our countrymen feel at the recovery of Mr. Dadabhai Naoroji from his recent serious illness and at his return to India to spend what remains to him of earthly life in the dear and holy motherland to whose faithful and unselfish service he devoted all his powers and faculties. May Almighty God, the giver of all good, spare him to his country and countrymen for still several years, is the prayer of all who know him and who are interested in India's welfare.

The Conference was fortunate in the association with it of His Highness the Maharajah Gaekwar. To those who had read his notable utterance four years before at the Ahmedabad Industrial Exhibition and who knew what an ardent and informed apostle of progress he was, the memorable address the Gaekwar delivered at the Conference, did not come as a surprise. But before referring to the salient points in it, a few words must be said of the able speech of Mr. P. N. Bose, on whom, as Chairman of the Bengal Provincial Committee of the Conference,—under whose auspices the session was held—fell the duty of opening its proceedings. Mr. Bose was in the Geological Survey Department when in Government service, and has always evinced an active interest in the industrial movement. His publications—“*Hindu Civilisation under British Rule*” and “*Essays and Addresses on Indian Subjects*”—must be known to educated Indians. After retirement, he was for some time State Geologist to the Maharajah of Mayurbhanj and Honorary Principal of the Bengal Technical Institute. As H. H. the Gaekwar reminded the Conference, it was Mr. Bose “who discovered suitable iron ore for Mr. Tata's Scheme.” We should also like to mention that Mr. Bose is a son-in-law of our first President, Mr. R. C. Dutt.

Mr. Bose's speech (pp. 5—15) contains a good survey of the industrial position, and will amply repay perusal. His warning that the good old times when mere manual skill sufficed had gone by never to return and that we must move



with the times or perish, was by no means superfluous. Every Indian would associate himself with the words of appreciation, which Mr. Bose spoke, of those Englishmen "who, rising superior to circumstance, not only sympathise with us, but are also ready to work hand in hand with us" (p. 9). Mr. Bose spoke of the necessity of technical education and of the step recently taken in this direction, and wound up by a reference to the industrial awakening of India.

The inaugural address of His Highness, the Maharajah Gaekwar, (pp. 15—50) was in every sense a great performance. As the President, the Hon'ble Mr. Vithaldas Thackersey, said, he addressed to the Conference "words of ripe wisdom from his experience of many lands and his study of many systems," and all Indians will profit from laying to heart the many lessons conveyed by the Scholar-Statesman through this memorable utterance. Having warned his hearers that "our activities in all different departments of life, political, social and industrial, are so correlated that we shall never make any marked progress in one without making similar progress in all", His Highness rapidly surveyed the past history and the present situation of Indian industries. It is unnecessary to tarry over the past. Speaking of the present, the Maharajah Gaekwar struck a true note when he said that "the triumph of machinery is the triumph of our age." The most important of Indian manufacturing industries is the weaving industry, and India has made good progress in it, but much remains to be done.

"The Bombay Mills give daily employment to about 170,000 factory operatives, while so many as 30,000 more are maintained by the ginning presses. Some forty years ago, we had only 13 Cotton mills in all India. The number rose to 47 in 1876, to 95 in 1886, to 155 in 1895, and 303 in 1904: and to-day the number of our cotton mills is still larger. We had less than 4,000 power looms, forty years ago: the number was over 47,000 in 1904. We had less than 300,000 spindles, forty years ago: the number exceeded five millions in 1904. These are insignificant figures compared with the huge cotton industry of Lancashire; but they show that we have made steady progress, and that we may fairly hope to make

greater progress in the future, if we are true to our aims and our own interest. Our annual produce of yarn is nearly six hundred million pounds in weight and it is interesting to note that out of this total outturn, about 30 per cent. is used mostly by your handloom weavers."

"Thus though there is reason for congratulation in the rise of our textile industries, there is yet greater reason for continued toil and earnest endeavour. We are still at the very threshold of success. Our Cotton mills produced less than 600 million yards of cloth last year, against over 2,000 million yards which we imported from other countries. Here is scope for indefinite expansion. We exported cotton of the value of 213 millions to foreign countries and imported in return for this raw material, cotton manufactures of the value of 390 millions. We are thus producing only a fourth of the mill-made cloth which the nation requires. And we should not rest till we are able to manufacture practically the total supply needed by our countrymen" (pp. 20—22.)

Taking all the principal industries carried on mainly by steam, this is how we stand :—

"In some industries like cotton, we are only at the very threshold of success, and produce only about a fourth of what we ought to produce. In other industries like woollen and jute, we are indebted almost entirely to European capital and enterprise, we ourselves have scarcely made a beginning as yet. In a third class of industries like sugar and tanneries, we have actually lost ground within the last ten years. While in a fourth class of industries like iron, we are still almost wholly dependent on Europe, the produce of our own foundries scarcely supplying any appreciable proportion of the requirements of India. I repeat, therefore, what I have already said before :—There is ground for hope but not for joy or elation ; there are strong reasons for earnest and continued endeavour in the future to secure that success which we are bound to achieve if we are true to ourselves." (pp. 25—6).

While it is the fact there can be no industrial development under modern conditions without the use of machinery and steam and improved scientific appliances, it represents only a portion of the case as "the labourers who can possibly be employed in mills and factories, form only an insignificant proportion of the industrial population of India. A very much larger portion of that industrial population is engaged in indigenous industries carried on in village-homes and

bazars. "India is, and will always remain, a country of cottage industries." Said His Highness :—

"Where hundreds of thousands can work in mills and factories, millions and tens of millions work in their own huts; and the idea of greatly improving the condition of the labourers of India, merely by to mills and factories, is only possible for those who form their opinions six thousand miles away. No, gentlemen, any comprehensive plan of improving the condition of our industrial classes must seek to help the dwellers in cottages. It is the humble weavers in towns and villages, the poor braziers and copper-smiths working in their sheds, the resourceless potters and iron-smiths and carpenters who follow their ancestral vocations in their ancestral homes, who form the main portion of the industrial population, and who demand our sympathy and help. It is they (more than the agriculturists, or the mill and factory labourers) that are most impoverished in these days, and are the first victims to famines; and if your *Swadashi* movement has brought some relief to these obscure and unnoticed millions and tens of millions in India, as I have reason to believe it has done to a perceptible extent, if it has created a larger demand for their manufactures, widened the sphere of their labours, and brought some light to their dark and cheerless homes, then the movement, gentlemen, has my cordial sympathy. Help and encourage the large industries, but foster and help also the humbler industries in which tens of millions of village artisans are engaged, and the people of India, as well as those who are engaged in the work of administration, will bless your work" (pp. 26—27.)

India is called upon to compete with the advanced countries of the west under peculiarly unfavourable conditions due to our poverty and ignorance, and the danger of extinction with which our industries are threatened is imminent. If the calamity is to be averted, it can only be by Indians fighting their powerful, skilled and wealthy competitors with weapons of their own choosing.

"If the rush of the steam engine and the whiz of electricity combined with cheap and easy means of transport, have succeeded in dumping your bazaars with the cheap and attractive products of foreign marts, rise to the occasion and learn how to withstand this inroad with intelligent anticipation and skilful adaptation. Learn to force nature into a corner; accost her and bring out her inmost resources. Harness her powers, tackle her energies, and make of her a handmaid unto man.

Work nature to the relief of man's estate. Any competition between skill, capital and organized enterprise on the one hand, and ignorance, idleness, and poverty on the other, can only have one result. Learn to combine and co-operate; learn the value of time and the use of money, and the chances of a fairer fight will eventually requite all your efforts." (pp. 27-8.)

Indians do not know how to supply their own wants and have to depend upon foreign skill, foreign capital, and foreign enterprise.

"Our serfdom to foreign capital and to foreign enterprise can scarcely be more complete. Our railways are financed by capital from Europe, our mines are exploited by Savants from America; and even in our daily household needs, our dependence upon products of foreign marts continues from day to day. We are being fed and clothed, diverted and entertained, lighted and washed, warmed and comforted, carried and housed, by the foreign artisan' (pp. 30-1.)

Surely this ought not to continue much longer. Indians must make a determined effort to rehabilitate industrial India. In doing so, the right way to proceed would be to select, to begin with, those industries "for which there is a large demand in our home markets, and whose raw material we have, at present, been exporting in ship-loads for working them into finished products abroad."

His Highness the Gaekwar in discussing means to promote industries, naturally gives the first place to education. It is not likely that any one will differ from him when he says that "no ultimate solution of our problem will be reached until schools have been provided in every village, and education is taken to the very threshold of the people; until, in fact, education, at least in its primary grades, has been made free and compulsory throughout the land." The illustrious speaker's description of the systems of education in force in other countries (pp. 36-9) will no doubt be read with interest and profit. The Gaekwar's suggestions to introduce manual training and industrial education in the ordinary schools are opportune and, it is to be hoped, will go to some extent to shape the course of instruction that will be imparted

in at least private schools to start with. Here is an opportunity for those who take a commendably keen interest in national education. They may well set an example to the institutions which are controlled wholly or in part by Government. A not less important point is that "you must send youngmen to Europe, America and Japan for that complete industrial training which they cannot get and receive at home." In this connection His Highness made a generous acknowledgement of the splendid work of the Association for the Advancement of Industrial and Scientific Education of Indians, of which the Hon'ble Babu Jogendra Chandra Ghose, the worthy son of a worthy father, is the energetic Secretary.

The following passages culled from the address contain much food for reflection :—

"The nation that despises its humblest classes, that provides for them no opportunity to rise in the social scale and in self-esteem, is building its house upon the sand" (pp. 44.)

"Without a permanent and stable economic policy, no civilisation, however enlightened, can long endure. This is the message of ancient Greece to modern India. Be careful of large expenditures, either individually or collectively, which are unproductive. Bid her people forget their caste and tribal prejudices in the common effort to uplift the fortunes of India; bid them find expression for their religious enthusiasm in practical co-operation for the uplifting of humanity, the human spirit in the temple of God. Bid them be free men, economically, socially, and intellectually; and no power under heaven can long keep them in servitude" (pp. 44—5.)

"No permanently sound and stable development can occur unless we take pains to educate the masses of our people to a sense of their paramount importance and dignity in the social structure. I conceive it to be the prime duty of the well-to-do and enlightened amongst us to rouse to stimulate and to educate the lower classes. We should help them to help themselves. But ever let us beware of paternalism. Not charity but co-operation is the crying need of the hour" (p. 45.)

"Make industrial pursuits the property of the nation, instead of the exclusive possession of castes; let sons of Brahmans and of learned Moulvies learn the use of tools in their boyhood; let every graduate, who feels a call towards mechanical work, turn to that pursuit in life, instead of hankering after salaried posts; and I am convinced the national

genius will prove and assert itself in industries and inventions as well as in literature and thought" (p. 46.)

"We need to devote large sums to the founding of chairs of economics in our colleges, and to the training of our young men in the subtle problems of finance. Let the brightest of our young patriots be sent to Western Universities to master the principles of economic policy" (p. 47.)

"In so far as India's religious ideas tend to keep many of our brightest and best minds out of practical affairs, out of the scientific, political and commercial movements of the time, by so far do those religious philosophic systems stand in the way of her progress towards economic independence. Why have the people of India been tardy in grasping the scientific principles of Western industrial organizations? I shall not presume to answer the question at any length but content myself with suggesting that we must, as a people, look well to the religious and social foundations of our national life" (p. 48.)

"Break the monopoly of caste prerogatives and social privileges. They are self arrogated, and are no more inherent in any one caste than commercial predominance or political supremacy in any one nation. Learn the luxury of self-sacrifice; elevate your brethren of the humbler castes to your own level; and smooth all artificial angularities. Always appraise action more than talk and ever be ready to translate your word into deed" (p. 48.)

"It may be the mission of India, clinging fast to the philosophic simplicity of her ethical code, to solve the problems which have baffled the best minds of the West, to build up a sound economic policy along modern scientific lines, and at the same time preserve the simplicity, the dignity, the ethical and spiritual fervour of the people. I can conceive of no loftier mission for India than this, to teach philosophy to the West and learn its science; impart purity of life to Europe and attain to her loftier political ideal; inculcate spirituality to the American mind and imbibe the business ways of its merchant" (p. 50.)

His Highness had a few words to say of the organisation and working of the Conference. Having referred in generous terms to the work of the year, he proceeded :—

"Gentlemen, all this is a good outturn of a first year's work—but you should not be satisfied with this. A greater progress is expected from you in future years. The weak point in the conference organisation seems to me that the Central office is not in sufficient touch with the Provincial Committees, and is not able to render sufficient help to those Committees to develop the industries of the different provinces. Besides Provincial Committees, you require District and even Town Associations

for closer touch with the masses. India is a country of vast distances ; and it takes more than a day and a night to travel from Amraoti to some of the provinces. While the Central Office at Amraoti can do much to help the out-lying provinces, the provinces can do more to help themselves. By such harmonious co-operation towards a common object, I hope to see the work of the Industrial conference show a continued progress from year to year. A central organisation is needed to co-ordinate all the endeavours that are being made in all parts of India to promote home industries, and the Industrial Conference with its central establishment and Provincial Committees was not established a day too soon"

The Hon'ble Mr. Vithaldas Damodher Thackersey's Presidential Address (pp. 60—83) is hardly less remarkable than His Highness the Maharajah Gaekwar's. Mr. Vithaldas modestly said of himself that, while feeling he could not do much justice to the position, yet allowed kindly to be persuaded into accepting the Presidentship, "by the consideration that the Conference, being devoted to the advancement of industries and commerce, may be pleased to give indulgent hearing to one who is engaged in these activities, and who may, therefore, be expected to know the more practical aspects of some of the many problems which this Conference may help to solve." That this choice was most happy was amply proved by Mr. Vithaldas himself by the ability with which he guided the deliberations of the Conference and the valuable address he delivered as its President. As mill-owner and head of a large and flourishing business, Mr. Vithaldas is conversant at first hand with the practical side of the industrial problem ; while his election as President of the Bombay Mill Owner's Association, and lately as the representative of the Bombay Chamber of Commerce and the Millowner's Association on the Factory Commission, is proof of the great regard in which he is held by the business community. Besides, Mr. Vithaldas is President of the Bombay Corporation and a member of the Bombay Legislative Council. Altogether the choice of the members of the Conference for the high office of its President, could not fall on a worthier man.

No one, we venture to think, will rise from a perusal of the President's address without being profited by it. His observations are marked throughout by an informed common-sense and a grasp of what is practical, which are wanting in many of the utterances on industrial questions one comes across in these days. Mr. Vithaldas, it must be owned, has remarkably succeeded in avoiding the pit-falls of the doctrinaire on the one hand and the narrow-minded expert on the other. Again, on questions the most controversial, he has offered opinions which if not unreservedly acceptable are certainly deserving of being treated with respect by dispassionate men among Anglo-Indians as well as Indians, as being both sober and sensible. Take the observations on the question of foreign capital as an instance in point. It is a mistake to think that because certain capital used in India is foreign, it therefore *must* do harm to the country. What really matters is that we ought not to pay too high a price for it. Says Mr. Vithaldas (p. 63):—

"Let us take the instance of Japan, an Asiatic people, who have risen to greatness on account of their practical genius, whose industrial conditions are similar in many respects to our own, and whom we are all naturally anxious now-a-days to emulate. All the great statesmen and patriots of Japan are eager to attract foreign capital to their country for the purpose of industrial development. It is because they feel that, notwithstanding their skill, enterprise and ability, they are greatly handicapped owing to want of capital. At the same time, when they speak of attracting foreign capital, they do not mean to allow all the profits of the industry to go out of the country. They will not pay more than a reasonable price for it. Their position as an independent State, of course, enables them to regulate the conditions under which foreign capital will be free to engage in the development of the country. But in our country, where the open door policy prevails to the fullest extent, and where already there is a very large amount of foreign capital invested, and, I admit, there is a very large field for it, it is necessary for us to form a general conception of the limits within which its application is beneficial."

As an instance of the right use of foreign capital, the President mentions the Indian Railways. He deals with the harm done by it in the following passage:—



"But when we turn to the petroleum industry in Burma, the gold mines of Mysore, the coal mines of Bengal, the tea and jute industries, the carrying trade by sea and the financing of our vast foreign trade by foreign banks, we come upon another and a less favourable aspect of the question of the investment of foreign capital. It is impossible to estimate accurately the amount of wealth that goes out of the country in this manner, though an approximate idea can be had of it from the excess of our exports over our imports, after omitting Government transactions. It must be remembered that so much of this amount as represents merely the interest or borrowed capital should not be regarded capital, should not be regarded in the light of a drain from the country. It is to such investments as these that we find cause for complaint. In such cases, I cannot but think that it would be to the permanent good of the country to allow petroleum to remain under-ground and the gold to rest in the bowels of the earth, until the gradual regeneration of the country, which must come about under British rule, enables her own industrialists to raise them and get the profits of the industries. The price paid is much too great for the advantages accruing from them to the country" (p. 65—6.)

At the same time one cannot get over the fact "that indigenous capital will not be quite enough for financing the enormous and ever-expanding trade of the country and for accelerating the progress of our material and industrial regeneration," and that "no country in the world can make much progress in industrial directions without plenty of capital." Mr. Vithaldas briefly states the problem of India as follows:—

"Our immense trades, our comparatively small capital, the fixed open-door policy of our Government, and the absence of power to control our financial policy, these are the main factors of the situation, and the question is how best we can under these conditions develop our industries. We cannot do without foreign capital; it will be extremely short-sighted to reject it on sentimental grounds. We must avail ourselves of it, but we ought to take care that we do not pay more for it than other nations" (pp. 66—7.)

The speaker is of opinion that Joint-Stock Banks started in India "offer the only means of bringing foreign capital into the country, at easy interest." These banks, if started with large enough capital, can "extend their operations to foreign exchanges, and thus take advantage of foreign capital as the other Exchange Banks are at present doing." We want such

banks in order that the present situation may be ameliorated. An eminently reasonable suggestion which Mr. Vithaldas makes in this connection is stated in the following passage :—

“ It may happen in many cases that although we may not be able to provide all the capital required for a new industry, we may yet be able to supply a portion of it, and so save some portion of the profits of the industry from leaving the country. But few foreign Companies ever give a chance to Indian capital. They like to do all the financing themselves and do not even place their shares in the Indian market. This is unfair, and I would suggest that the Legislature should make it obligatory on every industrial concern floated by foreign Companies that the same opportunities should be given to Indian capitalists, that the prospectus should be published simultaneously in both countries, that the time for applications for shares should be the same and that allotment must be made at the same rates and on the same principles. This is the least that our Government should do under the present circumstances” (p. 68.)

Speaking of agriculture, the President of the Conference made an appeal to the Zemindars of Bengal to devote their time and resources towards developing it. Said he :—

“ Gentlemen, if the Swadeshi spirit inspires these great landed magnates to introduce science and system into agriculture, so as to make it yield the highest profit of which it is capable, then, believe me, you will be in sight of large manufactures financed, controlled and worked by our own countrymen. It is a common fallacy to suppose that the arena of great achievements lies far afield of our every day lives. It is never so. Few people talk of the Swadeshi movement in connection with agriculture. But really that is the industry which most requires the application of the true Swadeshi spirit, for on it are based all our possibilities of manufacturing industries. If the mill industry flourishes in Western India, it is because the Guzrati is acknowledged on all hands to be the most efficient cultivator of cotton in India” (pp. 70—1.)

The Hon'ble Mr. Vithaldas next turned his attention to the mining industry and while at it, he urged that Government should establish an up-to-date Mining Collège in India, so as to “ make this country a great centre of mining instruction, training our own students to take charge of the higher posts in the Geological Department.” The speaker referred then to the necessity of utilising the bye-product of mineral industries to make several of these paye

In treating the subject of cotton industry, Mr. Vithaldas was as it were, at home in his field. His remarks display shrewd business acumen and practical sagacity, the characteristic of the whole address. He shares in full the enthusiasm and ambition of other Swadeshists, but does not labour under any illusions. He knows, and says, that success cannot attend the endeavours to do away with foreign cloth unless several conditions are satisfied which is not the case at present. And the movement for the 'boycott' of foreign commodities being directed principally against the imports of cotton goods, it would be well if his apposite observations are borne in mind. His first point is that "so long as cotton of superior staple is not produced here, it is hopeless to expect the manufacturer to improve the quality of his cloth" That he (the manufacturer) is doing his best is clear from the fact that the official returns show that every year finer qualities of cloth are manufactured to an increasing extent. When an adequate supply of long-stapled cotton is assured, then "the conditions of the Indian Cotton Industry will be revolutionised, and India will be able to supply a very large portion of her demand for superior kinds of cloth. Then will be the time for the realisation of the Swadeshi ideal in respect of our clothing. Until then, for superior varieties of cloth, we must depend on the foreign producer."

What the President rightly calls the all-important question of the supply of labour does not escape attention. And Mr. Vithaldas' remarks are worth quoting.

"True, we have a large population; but owing to illiteracy and the prejudices concomitant to it, every industry in the land feels the difficulty arising from not having an adequate supply of labour. In order to convert our vast population into an effective labour-force, we have first of all to instil into them the rudiments of knowledge, which will widen their mental out-look, fill them with new aspirations, and enable them to know what opportunities await them in the industrial world, and to take advantage of them for their own and their country's benefit. Plague has in many part of the country played sad havoc with the labour supply and,

speaking from the purely industrial and commercial point of view, I beg to express the earnest hope that Government may be pleased to create more centres of investigation, so that the discovery of a remedy may be accelerated" (p. 80.)

The last subject dwelt upon in this admirable speech is technical education. Mr. Vithaldas rightly characterised the present Government grant as "insignificant, considering the vast extent of the country and our large population." "Technical education on a large scale is one of our primary needs", while a wide spread of commercial education "which at present is practically neglected by the State," is not less important.

The remaining speech of the first day of the Conference waiting to be noticed is Mr. R. C. Dutt's, made while laying before it the annual report for 1906, which includes a comprehensive record of general industrial activity in the country during the year. Mr. Dutt, a master of lucid exposition as he is, clearly brought out the most salient features of the report, which is appended to the present publication.

As Mr. Dutt has said, one of the objects of the Industrial Conference is "to collect a body of expert opinions on the different industries of India in a series of papers which would be useful to all of us for reference and for guidance." (pp. 53—54.) In fulfilment of this object the organizers of the first Conference at Benares "invited gentlemen who had devoted their time and attention to the study of special subjects to favour [them] with their views and opinions, and [their] invitation met with a most cordial response." The series of papers which will be found in the first Report "are written by some of the ablest men in India,—Government servants and private gentlemen,—and" Mr. Dutt proceeds, "I know of no other handy and popular work, published in India, which contains within the same limits such valuable and practical suggestions relating to Agriculture and Agricultural Banks, Mining and Minerals, Cotton Cultivation and Mills and Handlooms, Industrial Education and Indian Indus-

tries." (p. 54). The same, we venture to think, may be said of the valuable and instructive papers contributed to the proceedings of the Second Indian Industrial Conference by highly qualified persons, which are embodied in this Report. Indeed, it might without impropriety be claimed to this Conference that there is no other Indian non-official body which collects and disseminates so much useful information on subjects of the utmost importance for the material advancement of India. And if the Conference has achieved no other result than bring together a body of such excellent literature, it has amply justified its existence. We trust the papers printed in the following pages will be read and re-read by educated Indians as a preliminary to their taking intelligently directed action for the working of the many industries, for which the conditions of India offer so fruitful a field. May not some enterprising Indians be found in the several provinces for translating the most important of these papers into the principal languages of the land.

Mr. K. Perraju, a leading citizen of Cocanada and sometime an elected member of the Madras Legislative Council, writes on "Agricultural and Industrial Progress of India" (pp. 88—91). Mr. Perraju is known in Southern India as a close and careful student of economic questions, and his paper is an informing one. He is of the opinion, which will not be dissented from, we think, by any one, that "Substantial State aid and initiative are absolutely necessary" for the improvement of Indian agriculture. Descending to particulars he says—

"Out of the Imperial funds, the State shall maintain agricultural schools, experimental farms, and demonstration and example plots in all the districts. Then the field of action may be sufficiently extensive for travelling professors and instructors to be supplied by the department of Agriculture for the diffusion of agricultural knowledge to the peasantry of the various parts of the country. The Department of Agriculture shall include Bureaux for (1) Agricultural education, (2) Veterinary education and veterinary services and police, including all measures for the preven-

tion of cattle disease: (3) Encouragement to agriculture, cattle-breeding, agricultural associations and shows; (4) Agricultural statistics as in England" (p. 87.)

The Government of India with its 260 district, consisting of an area exceeding one million square miles and a rural population of 210 millions, ought to set aside at least two millions sterling for a similar purpose" (p. 88.)

"The State must be determined to make all grades of education in India, pre-eminently agricultural and industrial, as perfect as they can be made. It is only great schools in India that can make the Indian nation great. If the State does not feel it to be its duty, the people must themselves undertake the task, for otherwise, there will be no foundation for a great self-reliant nation" (pp. 88—90.)

"The teaching of 'hands' is most essential in a country like India" (p. 89.)

"What is wanted here is a sufficiently large number of schools that turn out technically trained men, year after year, and the tuition ought to be the least costly, if not quite free" (p. 90.)

Sir Guilford Molesworth deals with "The effect of Import Duties on Industrial Development." (pp. 91—117.) While thinking that the Swadeshi movement is a step in the right direction, the writer fears that it will prove a failure unless it is backed up by a policy of fiscal reform. "It must necessarily be limited in action, confined as it will be to a comparatively small number of the educated and patriotic classes of India, but it cannot reach the masses and consequently can produce no practical results, unless combined with the policy of import duty" (p. 91). Accordingly, Sir Guilford suggests that the Conference should urge the Government of India "to inaugurate a carefully considered policy of moderate import duties, which will not only yield a revenue that will relieve the land of the dead weight of taxation, but will also protect the industries of India from unfair and unrestricted foreign competition," (p. 103). Apart from the suitability of the advice to the conditions of India, which, it is well known, has often been advocated by several Indian thinkers and public men, we believe, the general opinion would, as matters stand

at present be that to urge this step on the Government is as useful as to beat one's head against a stone wall.

The third and fourth papers are by Mr. K. C. De, I.C.S., Registrar of the Co-operative Credit Societies in Eastern Bengal and Assam, on his own subject of Co-operative Credit Societies and on the necessity of a central bank to finance them. (pp. 118—30 and 130—34). We need not say that Mr. De treats the subjects with a great deal of ability. We will quote one passage from his first paper :—

"Wherever these societies have worked with success, (a new world has been called into existence to redress the balance of the old.) I look forward with hope to the time when these societies will work wonders in elevating the social and the moral tone of the village communities in this province besides providing and organising the village finance. The time will come when the people of a village, who in the former times used to take scarcely any interest in anything outside their own threshold, who used to spend their scanty savings in extravagance, litigation or purchase of unnecessary articles of luxury, or to hoard them profitlessly, will learn how to save and employ the surplus funds for their own profit and for the benefit of their fellow-villagers. It will create (a new world—a world of brotherly love and mutual help where every one is the protector and assistor of his neighbour.) The principles underlying credit and trust will infuse a new spirit in the careless and thriftless villager and kindle in him the desire for standing well in the eyes of his neighbours. One may hope, that, as in other countries, under the influence of these societies, the idle man will become industrious, the spendthrift thrifty, the drunkard will reform his ways and become sober, and the illiterate will learn to read and write." (pp. 129—30).

Mr. De invites "the active co-operation of the intelligent and educated community to make Co-operative Credit Societies a common national institution in every village, a luxurious growth spreading into the remotest corners of the Empire." (p. 131.)

In his second paper Mr. De. convincingly argues that a large Provincial Bank is needed to finance the Co-operative Credit Societies of each province. (p. 134.)

Rai Parvati Sankar Chaudhuri, the public-spirited Zemin-dar who expounds the scheme of Dharmagolus or Co-opera-

tive Grain Banks in the next paper (pp. 134—55), is the pioneer of such institutions in Bengal. It is to be hoped that at least some among educated Indians, including the Zemindar class, will catch the spirit of unselfish enthusiasm as Rai Parvati Sankar, and that his hope that *Dharmagolas* will be established throughout the country will be even partly realised.

In commending, particularly to the agricultural classes, the next paper on 'The Paddies of Bengal' (pp. 156—73), we cannot but lament the sudden and premature death of its talented writer. In the late Mr. N. G. Mukerji, India has lost one of her most useful sons. Mr. Mukerji was a voluminous writer on agricultural and industrial subjects, and his treatises are uniformly noted for the care, labour and thought bestowed upon them by their always painstaking author. Mr. Mukerji was an ornament of the Bengal Agricultural Department, and it is a matter of melancholy satisfaction to his admiring and sorrowing countrymen that his worth and work were suitably acknowledged by the Government he had so faithfully served, in an obituary notice published in the *Calcutta Gazette*. It is only necessary to remember how few are the men who can be compared to the friend we mourn in point of knowledge and devotion to duty to realise the magnitude of the loss we have sustained. Mr. Mukerji's special subjects were Agriculture and Sericulture, and he wrote on both subjects for both the Benares and Calcutta Conferences. His treatment of the subjects is so full that it is not easy to summarise his papers. They must be read in their entirety and they will not be read without profit.

In his first paper he treats of fourteen varieties of paddies—(1) the draught-resisting paddies; (2) the two flood-resisting varieties (those which increase in height with the increase of flood, and those which can remain sunk in water in a tide state for a week or more); (3) paddies which can grow on hill-sides without terracing; (4) autumn paddies which contain white, fine and fragrant rice; (5) prolific paddies which are also fine and fragrant; (6) paddies with special



nourishing value; (7) paddies reputed to have medicinal properties; (8) paddies suitable for making *muri*, *khoi* (popcorn) and *cheera*; (9) absorbent paddies, *i.e.*, paddies suitable for making *pulao*; (10) autumn paddies that grow in water; (11) winter paddies that can be grown on sea-side places unprotected by embankment, *i.e.*, in highly saline land; (12) paddies containing two grains of rice in each, paddies with four to six grains in each spike-let instead of one or two paddy of which the whole plant is fragrant, black paddy the leaves of which also are black, and paddies containing rice which does not require boiling; (13) wild paddies, and (14) the best paddies of Bengal.

The paper on Sericulture (pp. 1-33 sup.) is equally a mine of information. It is as its name tells us, a bird's-eye view of Indian Sericulture. Great interest has been taken in the subject of Sericulture by the Governments of British India and the Native States as well as by private individuals within recent years, and considerable progress is to be seen in different local areas, which makes it incumbent on us to consider the question of a more general adoption of improved methods, and to get a clearer view of the situation as it stands at present. It is necessary to understand the subject and to remedy defects, if the cocoon-reaving industry is to be benefited. It is very necessary, therefore,—we quote Mr. Mukerji—that a succinct and clear account of Sericulture should be at hand which would obviate the necessity in the first instance of reading up various books and reports that have necessarily sprung up with the recent activities.

"When I call these activities 'recent' (wrote Mr. Mukerji), they are at least twenty years old, and more progress might have been achieved if the improvements had been introduced with sufficient knowledge of the subject. A rude shock is sometimes received, when a party, which has been rearing the Eri silkworms, finds out he ought never to have attempted the task in the particular climate, or where a man who has been trying to introduce the Japanese mulberry, finds out that the tree he has been using is not mulberry, at all, but a so-called 'paper mulberry' which silk worms never eat, or where a man who has been using the

microscope for years in eliminating Pebrine finds out that there is no Pebrine at all to eliminate, or when for years seed, which has been accepted as rigorously 'cellular' and free from disease, is found out to be really full of Pebrine. The history of the application of scientific methods in various parts of India, is replete with such examples of mistakes.

"I do not disparage by any means the literature that has grown up within recent years, and I may say, the bulk of it is from my own pen; but it is necessary to keep the main points in view with regard to the development of the mulberry, the *tusser* and the *eri* silk industries, and this is my plea for adding another 33 pages to the already existing literature on the subject" (p. 1-2 seep.)

It is only necessary to read these 33 pages to recognise the public service rendered by our late lamented friend by writing the paper. It is brimful of suggestions which we bring together in the 'Summary of Proposals' which accompanies this Introduction.

We now come to Mr. Henry H. Ghosh's paper on 'Rice Manufacture' (pp. 173-80). Mr. Ghosh rightly complains that so extensive an industry as rice manufacture is in India has so far received very little attention. According to the 'Agricultural Statistics of India', about 29 million tons of rice valued at £190 millions are annually prepared in this country, and "the preparation of rice is therefore the most valuable manufacturing industry in India. Mr. Ghosh says that the system of separating the agriculture and manufacture of a great produce has been adopted in India with regard to wheat, and thinks that there are sufficient grounds for introducing it in the case of paddy. In America, Burma and Siam it is worked as a manufacturing industry "which is the more correct system, as the processes relating thereto are quite distinct from the agricultural operations connected with paddy." (p. 173.) Mr. Ghosh in his paper describes, "in the briefest outline, a fairly efficient and economic system by which rice manufacturing may be initiated in this country. This system is very similar in most of its processes to either the Rangoon or the American system" and Mr. Ghosh adds that he "attained rather satisfactory results from it." He concludes that

“by the introduction of the Rangoon and American systems of manufacture, the price of the greatest staple food of our country will be reduced by about four annas on the maund and an enormous quantity of labour will be set free for more profitable industries.”

Mr. N. N. Banerji of the Bengal Agricultural Department writes on “The Jute crop of India.” (pp. 180—95.) The importance of jute in the sphere of commerce may be gauged from the fact that the exports of raw and manufactured jute constitute one-fifth of India's total exports. Not only has there been an increase in production, but the industry itself has developed enormously in this country; the number of looms at work having increased from 9,841 in 1896 to 23,884 in 1906, and the actual consumption of jute by the mills has doubled during the last ten years. In Mr. Banerji's opinion.

“There is still ample room for the extension of jute cultivation and there is decidedly a necessity for improving its quality. Complaints have been frequent of late regarding the deterioration of jute fibre, and it is for the cultivator to rise to the occasion and to remove this defect. Otherwise, the industry is likely to suffer in the near future. If the manufactures of Europe and America do not get better stuff than what is being sent to them at present, they will surely turn their eyes to other markets than ours. At present, the seller seems to be quite certain of a market for this fibre, even though it is of inferior quality and adulterated, but he should open his eyes to the fact that in Java, French, Indo-China and West Africa, continuous and in some cases successful efforts are being made to introduce the cultivation of jute”. (p. 182—3.)

Mr. Banerji gives some hints and suggestions “which will be of help to those already employed in jute cultivation in turning out better crops. They also provide sufficient instructions to those who may feel disposed to take up the growth of jute as a fresh industry.”

Of the varied uses of the jute plant Mr. Banerji tells us the following :—

“The jute plant is utilized in this country for many different purposes, besides being permanently used for the manufacture of its fibre. It is supposed to be a very good antidote to a noxious weed *bhadulia* which

is very destructive to the rice crop, and *vaiyats* often grow jute to eradicate this weed.

The leaves and tops of jute plants is a favourite pot-herb in the season, of every Bengali kitchen. The leaves also occupy an important place in Indian Pharmacopoeia. As a green manure crop, jute holds its own against other crops. The stems are used for fuel and for fencing, especially in betel leaf gardens. Jute also supplies sticks for country-made matches. The roots of the crop are valuable in the manufacture of paper. An oil for burning purposes can be extracted from it. Its cake also makes a useful though perhaps not a very nutritious food for live stock.

As a fibre, it is used for the manufacture of cordage, cloth and paper which under different conditions and circumstances assume very different names. As cordage, the manufacture ranges from the thinnest twist to the thickest ropes for hawsers. Gunny cloths of different thicknesses are largely made. The coarsest kind which is very loosely woven is commonly used for sails for country boats." (p. 194),

Mr. D. N. Mookerji, Assistant Director of Agriculture, Bengal, writes on "Cotton Cultivation in Bengal" (pp. 195—204.) The transcending importance of the subject need not be pointed out in these days of the Swadeshi movement. But "the cotton area in Bengal is steadily contracting. It used to be fairly common within the memory of men still living. But it has completely vanished from many districts within a few decades." According to Mr. Mookerjee, the reason why Bengal does not grow much cotton is on the surface, "It is because the soil and climate are suitable for more remunerative crops." And he "cannot see any sense in advising the ryot to take to cotton in place of jute." He contends that it is not necessary for our ryots to grow cotton in place of a more remunerative crop as it can be imported from the other provinces as used to be done before. He "could understand the present excitement over cotton cultivation, if the idea was to grow a better crop than is found in the country generally, with the object of regaining our lost markets".

"India has at present about 19 million acres under cotton, against 28 million acres in the United States. Yet while the latter produce 10 million bales of cotton per year, we produce only 3 million bales. Or in

other words, while the United States acreage exceeds ours by barely 50 per cent., her annual outturn exceeds ours by something like 250 per cent. The average yield of an acre in India is about a maund of 80 lbs., that in the United States is 200 lbs. What is more, American cotton is of superior quality and fetches a much higher price in the market." (p. 198.)

And the outturn of Egyptian cotton is on an average 500 lbs. per acre, and it is so superior to both Indian and American cotton "that there is practically no comparison between them." Mr. Mookerjee asks:—

"Now can we grow American cotton in Bengal? Can we grow Egyptian or Sea Island cotton? Can we improve the quality and yield of our indigenous cotton by breeding and selection? Can we by suitable manuring so increase the outturn and profits of cotton cultivation as to make it worth the attention of our raiyats, if not in the Eastern districts, at any rate in Chota-Nagpur and the adjoining districts?" (p. 198.)

There are difficulties in the way which rendered previous efforts infructuous, and "one may seem too bold to recommend their renewal; but the science of agriculture has advanced a very great deal since the days the American planters worked and failed.

"When their rule of thumb did not avail them, they were left completely helpless. But it ought not to be impossible now by selection and breeding to produce a plant to suit our conditions. We may take courage by the example of America herself in overcoming the difficulty with the acclimatization of Sea Island cotton, the finest cotton in the world. \* \* \* Not only has Sea Island cotton been acclimatized in the United States but what is more, it has been so improved by careful selection as to be double the value of the original variety." (p. 203.)

Mr. Mookerjee's conclusion is hopeful:—

"We may, therefore, refuse to accept as final the failure of the parties. In our light, loamy soils, specially in the high lands, we possess a better equipment for the finer grades of cotton than the stiff clay commonly known as the black cotton soil of Central and Western India. Again, in the fine weather we enjoy from October, when the balls open and the cotton is picked, we enjoy the *Sine qua non* of cotton cultivation in the matter of weather. The unfavourable features of the climate previously mentioned, though serious, do not seem to be insurmountable." (p. 204.)

It is in the fitness of things that we pass from cotton

cultivation to hand-loom weaving. The writer is Rai Bahadur Raeji Bhai Patel, whose paper on the same subject read at the Benares Conference was so widely appreciated. The present paper (pp. 204—15) is as suggestive and as full of instruction as that. In his first paper Mr. Raoji Bhai tried to show that, if certain improvements be made in the handlooms and preparatory machines, the increased production would exceed the total imports of cotten piece goods into the country. He makes the idea clear by the following further calculation :—

“The production of hand-looms working in the country is estimated at 165 crore yards. The looms work at an average effective speed of twenty picks per minute, and if this can be increased to 50 picks, the increased production of the same number of looms would be 247½ crore yards. This increase more than equals the total cloth imports of the country. As this increase can be produced by the same number of men as now engaged on the looms, the price per yard will be cheaper than at present, and their ability to withstand foreign competition will so far be increased.” (p. 205.)

Of the four classes of cotton goods consumed in India—very coarse goods, coarse mediums, mediums and fine—the bulk of the very coarse classes is woven on Indian handlooms from Indian mill yarn; the main bulk of the coarse medium class is made up of imported shirtings and Indian mill-made shirtings, chadders, T-cloths etc.; competition in the third class is between the foreign looms and the Indian handlooms, both using foreign yarn, and the production of the fine class is restricted to handloom and foreign power looms. In respect of the third class Mr. Raoji Bhai thinks that “a cheap machine, cheap home labour and the production of stronger cloth on account of proper dressing of yarn, are in favour of the handloom workers, which the power-loom cannot work so fast on this yarn, as on the coarse medium”; while “the speed at which the power-loom can work on fine yarn being still further restricted, the hand-loom ought to be supreme in this class of work. “The enquiry into the details leads the writer to the conclusion that four factors have stood the greatest

friends of the Indian weaver: (1) his slow speed of work; (2) cheap machine and home labour; (g) light sizing and proper dressing of yarn, and (4) production for local consumption. "In any efforts to improve his lot these should not be lost sight of, and yet the speed of his work should be increased in order that he may live and successfully compete." Mr. Raoji Bhai thus summarises the results of his enquiry:—

"The sphere of hand loom influence being to some extent limited, an effort should be directed towards the increased production of very coarse, medium and fine counts weaving, and of mixed, coloured and check designs of all classes of goods, having the weaving of coarse medium class to the power-loom.

"2. For this work, cheap looms should be constructed with proper taking-up motion and allowing easy working at a steady 10 miles an hour shuttle velocity or 80 picks per minute on 45 cloth to 40's counts, without undue breakages.

3. "The best looms for Indian use would be those that can be adopted to general purposes of weaving and not such as can be used for only simple cloth or twill.

4. "This speed should be maintained with a full pirn of 6 inches, taking about 840 yards of 40s. or half that length of 10s. counts.

"5. Cheap beaming machines for properly beaming country dressed warps should be adopted.

"6. Proper pirn-winding machines to wind from conical pirns are necessary."

"7. All efforts at producing sizing and warping machines should be directed to preserving the use of the country system of sizing and dressing, and to accelerating the speed of work, sizing machines of the slasher type being entirely unsuited to handloom work."

The best looms and appliances should be fixed by experts after trial, and the next question will be how to introduce them to the weavers and extend their use as quickly as possible. The most practical ways that suggest themselves to Mr. Raoji Bhai are, (1) weaving schools with factories attached, (2) object lessons and monetary help. At least one school with a factory attached should be started in every district at an approximate cost of Rs. 2,000. "At least one large well-equipped institution in every province for training of teachers

and designers is also an absolute necessity." The specific recommendations of Mr. Raoji Bhai will be found in the "Summary of Proposals."

Mr. J. N. Banerjee writes a brief paper on Plantain Fibre (pp. 216—9). "It is opening a new source of agricultural wealth. There is no special expense to be incurred for fibre industry." Mr. Banerjee explains a means of extracting fibre, and says that "planters, Zemindars and especially the villagers who have plantains growing on their estates and in the gardens might with the aid of this machine, very easily and without much expense obtain all the fibre necessary to make cord and ropes for their own requirements."

Messrs. A. E. Jordan and H. Vençoba Rao write on the Sugar industry. (pp. 221—30 and 231—9). Mr. Jordan's points are that the countries exporting sugar to India do not make raw sugar at all, but manufacture the white sugar straight from the cane-juice and the beet-juice by the sulphurous-acid-gas process, and without the use of animal char (p. 221); that Mr. Hadi's process of sugar manufacture will have to be considerably improved for it to be commercially successful (p. 223); that the same up-to-date methods as have been found successful in other countries must be adopted in India also (p. 225); that the cane sugar factory in this country might be a combination of factory and refinery, making white sugar from the canes grown in its vicinity and yellow crystals from the *gur* made by the cultivators in outlying districts, so that the factory may work all the year round (p. 226); that small steam plants similar to those he has recommended for the sugar cane centres, but without the cane crushing mill where there is no cane cultivation, should be established in the centres of the date tree cultivation (p. 227): Mr. Jordan evidently does not hold the Government responsible for the large annual imports of foreign sugar, but he thinks blame attaches to it for not obtaining experts in the manufacture of sugar as well as experts in cultivation, for, to his mind, showing how the enormous wastage of sugar in the



country could be avoided and how greater profits could be obtained from the present crops, is of much more importance than showing the cultivators how to grow the cane and convert the sugar into a material only fit for the distillery. Says Mr. Jordan :—

“ In the Punjab and even in Calcutta, the boycotting of imported sugar has taken place, but the boycotting of sugar is only an expression of the people's impotency regarding sugar manufacture and no amount of boycotting will help the development of Indian sugar.

“ If there is any desire to develop what should be the foremost agricultural industry of the country, and to have the indigenous product take the place of imported one, then sugar must be made as elsewhere, in the most economical manner possible, and without employing any material that will make its consumption obnoxious to the people.” (p. 229.)

German *Savants* appear to Mr. Vencoba Rao to be the Viswamitras of the *Kali* age well versed in the art of duplicating nature.

“ Their ire seems to be particularly directed against us just as Viswamitra's was directed against Vasishtha. They invited artificial indigo to suppress our lac dye and other natural colours. \* \* German Scientific skill has been able to put up on the world market, at very cheap prices, a natural sugar which has become a formidable rival to cane-sugar.” (pp. 232—3.)

Mr. Vencoba Rao suggests that the Indian Industrial Conference should bring about a special conference of sugar-cane growers and sugar manufacturers in India at some centre where sugar manufacture is carried on a large scale ; preferably Allhabad.

“ We have an extensive home market which is expanding but which is being exploited not by us but by Germans and Austrians. The whole country should first be mapped on showing the zones of activity of foreign and native sugar and the prices of the respective sugars at several stations in these zones. The present areas of cane cultivation and other areas which possess facilities for cane cultivation should be similarly mapped out. So also the most convenient places for the establishment of big factories by virtue of their having canal, railway, river or sea communications with the other part of the country or the out side world.” (p. 235.)

Mr. Haridas Chatterji of Khandesa and Indore, writes at

some length on "Development of Indian Sugar Industry coupled with Agriculture." (pp. 239—52.) He goes into detail and writes with authority born of experience and practical knowledge on the value of the extensive date forests of wild and luxuriant growth "in some districts of the Central Provinces and parts of Central India. It will be remembered that Sir Daniel Hamilton had something to say of this in his paper on Indian Agriculture laid before the Benares Conference. It is Mr. Haridas Chatterji's opinion "that the industry of manufacture of sugar only, from date or cane or both, cannot possibly stand alone. It must be coupled with and be made a subsidiary adjunct to agriculture." (p. 244.) These date forests are a source of great potential wealth which enterprising Indians possessing the requisite capital and knowledge will do well to make the most of.

Mr. David Hooper the able and esteemed head of the Industrial Section of the Indian Museum, Calcutta, has a paper on Indian Essential Oils (pp. 253—69) full of the most interesting and useful information which cannot well be commended. It has to be read entirely: Mr. J. N. Banerjee (p. 270) calls attention to various kinds of grass which grow luxuriantly in some parts of Bengal "from which we can easily extract the essence of Lemon and Peppermint, at a trifling cost.

Mr. Alfred Chatterton's paper on Chrome Tanning (pp. 271—96) is of characteristic thoroughness and cannot but be appreciated by any one who reads it for the fund of information it contains. The leather industry at Cawnpore "has grown under the stimulus of demands from the Military Department and its flourishing condition is due not only to the expansion of military requirements but also to indents from other Government department which in the aggregate require considerable supplies of leather goods". (p. 272.) Here is an instance of what Government can do to push the industrial-movement. "In recent years, a considerable internal demand has grown up for cheap machine-made boots and shoes

and it is probable that the Swadeshi movement, especially in Bengal, has benefited local manufactures of such goods."

Excluding boots and shoes the value of which is not given separately, the trade returns show that from 25 to 30 lakhs of rupees worth of leather or leather goods are imported into India yearly.

"The bulk of this trade is probably in dressed skins for book-binding and upholstery work, in high class leather for belting and machinery and to some extent in fancy leather goods. It is hardly probable that the whole of this not inconsiderable import business could be captured by native manufacturers but there is absolutely no reason, except want of enterprise on the part of the manufacturers, why India should not produce dressed skin equal in quality to any made in Europe and America. The bulk of the leather consumed in the country is very poor stuff and the methods of tanning are so crude that vast quantities of fairly good hides are converted into most inferior leather. The inefficiency of the indigenous tannery is notorious, and in the aggregate, the annual waste of material amounts to a sum which can only be estimated in crores of rupees." (p. 272.)

Mr. Chatterton explains how this enormous waste is to be prevented and a valuable industry developed.

Mr. Alakh Dhari, Secretary, Upper India Glass-Works, Ambala City, writes on Glass-making. (pp.296—309.) "It will, perhaps, be news to many that the manufacture of glass is not a new industry in India, for we find Pliny and other historians of yore making mention of glass articles having been found in India." After dealing with the making of glass, Mr. Alakh Dhari says that ["our hope of success must rest on our training up of our own men, and for this purpose, they should go abroad every year." (p. 306.) Care must, however, be taken to send the right quality of men.

"There appears to be a tendency, at present, to send boys fresh from colleges. They usually get no commercial education before they go, and while their advanced literary (non-industrial) education enables them to learn the technical portion of the industries tolerably well, the business or commercial aspects of the same (viz., the adaptability to the Indian soil and resources, as well as to the tastes and conditions of our people) remain in a great part unstudied, and on their return home they can not turn their knowledge to full advantage. Many a concern has come to grief in

India, because its conduct happened to lay in the hands of intellects that were commercially inefficient and on principles that were economically unsound." (p. 307.)

Then we have Rai Saheb Upendranath Kanjilal's informing paper on "The Best Indian woods for the Manufacture of Matches and Match-boxes. (pp. 309-19.) If samples be required of woods that are not locally available, Mr. Kanjilal says that application should be made for them to the Imperial forest Economist, Imperial forest College and Research Institute, Dehra Dun, who can arrange to have them forwarded from the nearest source.

Mr. Sadhu Ramesubbiah of Mandalay writes on "Tobacco Culture and Cure"; (p. 319-35.) Mrs. Hironmoyi Devi Mukerji in the part women can take in industrial work "A Possible source of Wealth, (pp. 335-9) Mr. R. M. Kelkar on Co-operative Credit Societies (pp. 344-7) Mr. Devasahayam Pellai on the "*Development of Industries*" Mr. A. Ramanna of Mysore writes a very interesting and well informed paper on the sandalwood industry of that state and Mr. T. N. Atre in his admirable paper puts in a plea for standard weights, measures and coins (pp. ?-?).

Mr Theodore C. Maller of Amritsar has a useful contribution on "The present state and future Prospect of Indian Art Industries." (pp. 339-44.) Mr. Maller (S. C.) thinks that the primary cause of the delay of indigenous arts and handicrafts is undoubtedly the lack of interest shown by wealthy and intelligent Indians in home productions. "It is only the European who keeps alive the last remnants of these once flourishing industries. There is scarcely a European house in India that does not contain a collection of choice specimens of native work-manship, and it seems as if solely the Europeans appreciate the originality and beauty of native-made art wares. This is not as it should be. For centuries past, rich Indians have taken legitimate pride in the possession of Indian art treasures, and there is no reason why the wealthy natives of the country should not continue to patronise and

encourage the art industries of this country (p. 340). "The writer makes several shrewd observations and useful suggestions, and the paper repays perusal.

The Resolutions passed at the Conference deal with such important subjects as Technical and Commercial education, the purchase of stores by the Government, the industrial survey of India, and the steps that the people themselves can and ought to take for the development of indigenous industries. The proposals of the Conference are by no means ambitious; they are all within the range of practical politics, and their adoption by the Government as well as the people is only a question of time. Several excellent speeches were made in support of the Resolutions and we have no doubt the readers will peruse them with much benefit to themselves.

We desire to say a word in acknowledgment of the useful work done by Mr. M. Venkanna Pantulu, Teacher, Maharajah's College, Vizianagram, in preparing the excellent Index to this Report. It was pointed by several friends last year that an Index would add to the value of the Report by facilitating reference, and we have been able to carry out the suggestion in issuing the present publication only because of Mr. Venkanna Pantulu's co-operation.

## Summary of Proposals.

### A.—*Organization and Work of the Conference.*

1. The Central Office of the Conference must be more in touch with the Provincial Committees and render help to them to develop the industries of the several provinces. (*H. H. the Maharajah Gaekwar*, p. 35.) There should be a greater degree of co-operation between the Central Office and the Provincial Committees. (*Mr. R. C. Dutta*, p. 35.)
2. Besides Provincial Committees there should be district and even Town associations for closer touch with the masses. (*H. H. the Maharajah Gaekwar*, p. 35.)
3. The Conference should appoint an expert committee to thoroughly test the improved handlooms before the public on the lines suggested in his paper, and publish a report. (*Rai Bahadur Raoji Bhai Patel*, p. 213.)
4. The Indian Industrial Conference should bring about a special conference of sugar-cane growers and sugar manufacturers in India at some centre where sugar manufacture is carried on on a large scale; preferably at Allahabad. (*Mr. H. Venkoba Rao*, p. 233.)

### B.—*Investigation.*

5. The Commercial Department should have its counterpart in each province, the duty of the provincial department being to devote its attention to the industrial and commercial possibilities of the province and keep in touch with its economic problems. (*Hon. Mr. Vithaldas D. Thackersey*, p. 79.)
6. An industrial survey of the country must be carried out by provincial agencies to be appointed by the Provincial Governments. (*Do.* p. 79.)

### C.—*Education.*

7. Schools should be provided in every village an education taken to the very threshold of the people. (*H. H. the Maharajah Gaekwar*, p. 36.)

8. Education at least in its primary grades should be made free and compulsory throughout the country. (*H. H. the Maharajah Gaekwar*, p. 36.)

9. Introduce some Manual Training in the ordinary Schools. (*H. H. the Maharajah Gaekwar*, p. 40.) The teaching of 'hands' is most essential. (*Mr. K. Perraju*, p. 89.)

10. Technical schools must be established. (*H. H. the Maharajah Gaekwar*, p. 40.) Technical education being one of our primary needs, Government must be liberal towards it. (*Hon. Mr. Vithaldas D. Thackersey*, p. 81.) What is wanted is a sufficiently large number of schools that turn out technically trained men year after year, and the tuition ought to be the least costly if not quite free. (*Mr. K. Perraju*, p. 90.)

11. A wider spread of Commercial Education is essential. (*Mr. K. Perraju*, p. 81.)

12. We need to devote large sums to the founding of chairs of economics in our colleges, and to the training of our young men in the subtle problems of finance. Let the brightest of our young men be sent to Western Universities to master the principles of economic policy, (*H. H. the Maharajah Gaekwar*, p. 47.)

13. You must send your young men to Europe, America, and Japan for that complete industrial training which they cannot yet receive at home. (*H. H. the Maharajah Gaekwar*, p. 47.)

14. The Government should establish an up-to-date Mining College in India, and train our own students to take charge of the higher posts in the Geological Department, (*Hon. Mr. Vithaldas D. Thackersey*, p. 72.)

15. The State must make all grades of education in India, pre-eminently agricultural and industrial, as perfect as they can be made. (*Mr. K. Perraju* pp. 88—9.)

16. Evening School instruction like what is given in England should be introduced for the benefit of the working classes in India. (*Mr. K. Perraju* pp. 90—1.)

17. Weaving Schools with factories attached, where all preparatory processes and weaving in various branches suited to Indian conditions can be practically taught, should be started in every district. Both theory and practice should be taught and proper attention paid to designing, (*Rao Bahadur Raoji Bhai Petel*, p. 214.)

18. At least one large well-equipped institution in every province for training of teachers and designers (in weaving) is also an absolute necessity, (*Rao Bahadur Raoji Bhai Patel*, p. 214.)

19. Trained and well qualified men should be sent to foreign countries for learning glass-making. (*Mr. Alakh Dhari* pp. 306—7.)

#### D.—Capital.

20. Joint stock Banks should be started in India with large enough capital for extending their operations to foreign exchanges, and thus take advantage of foreign capital as the other exchange banks are at present doing. (*Hon. Mr. Vithaldas D. Thackersey*, p. 67.)

21. The Legislature should make it obligatory, on every industrial concern floated by foreign companies that the same opportunities should be given to Indian capitalists, that the prospectus should be published simultaneously in both countries, that the time for applications for shares should be the same, and that allotment must be made at the same rates and on the same principles. (*Hon. Mr. Vithaldas D. Thackersey*, p. 68.)

22. A large Provincial Bank must be started in every province to finance Co-operative Credit Societies. (*Mr. K. C. De*, p. 134.)

#### E.—Labour.

23. No limit should be put on the hours of adult male labour in factories. (*Hon. Mr. Vithaldas D. Thackersey*, p. 77.)



*F.—Fiscal Policy.*

24. The Government of India should inaugurate a carefully considered Policy of moderate import duties, which will not only yield a revenue that will relieve the land of the dead weight of taxation, but will also protect the industries of India from unfair and unrestricted foreign competition. (*Sir Guilford Molesworth, p. 103.*)

*G.—Agriculture.*

25. The Zemindars of Bengal should devote their time and resources towards developing agriculture by introducing science and system into it, so as to make it yield the highest profit of which it is capable. (*Hon. Mr. Vithaldas D. Thackersey, p. 70.*)

26. Out of the Imperial funds, the State should maintain agricultural schools, experimental farms, and demonstration and example plots in all the districts. (*Mr. K. Perraju, p. 87.*)

27. Travelling professors and instructors should be supplied by the Department of Agriculture for the diffusion of agricultural knowledge to the peasantry of the various parts of the country. (*Mr. K. Perraju p. 87.*)

28. The Department of Agriculture should include bureaux of (1) agricultural education; (2) veterinary education and veterinary services and police, including all measures for the prevention of cattle disease; (3) encouragements to agriculture, cattle breeding, agricultural associations and shows; (4) agricultural statistics as in England. (*Do. p. 87.*)

29. The Government of India should set aside yearly at least two million pounds sterling for rendering aid to agriculture (*Do. p. 88.*)

30. The intelligent and educated community should actively assist in the formation of co-operative Credit Societies, (*Mr. K. C. De. p. 1300.*)

31. Dharmagolas (Co-operative Grain Banks) should be established throughout the country. (*Rai Parvati Sankar Chaudhuri*, p. 135.)

32. Impress upon cultivators, the fact that they simply waste seed by putting in half a dozen or a dozen plants at each spot, instead of one, while transplanting paddy. They ought to be very carefull in economising seed, (*Mr. N. G. Mukerji*, p. 172.)

33. The conditioning, husking and cleaning of paddy should be separated from its cultivation as in America, Burma and Siam, and as in the case of wheat in India, and the manufacture of rices should be treated as a distinct business. (*Mr. Henry H. Ghose*, p. 173.)

34. Jute does very well after pulse crops on uplands and this rotation is recommended; the growing of jute without any intervening crop is to be condemned. (*Mr. N. N. Banerji*, p. 126.)

34. Care should be taken to pulverise the land thoroughly, as a deep and fine tilth is most essential for the proper growth of the crop. At the final sowing, care should be taken that all weeds are up-rooted and removed. (*Mr. N. N. Banerji*, p. 287.)

35. Cowdung has been found to be the best and cheapest manure for the jute crop. Green manuring with Sun-hemp or some other leguminous crop is also strongly recommended. (*Mr. N. N. Banerji*, p. 187.)

36. The paramount importance of selecting the most vigorous and best developed plants for seed (for jutes) cannot be too strongly impressed upon agriculturists. (*Mr. N. N. Banerji*, p. 187.)

37. Attempt should be made to grow better cotton in Bengal as several favouring conditions exist and as the unfavourable features do not seem to be insurmountable (*Mr. D. N. Mookerji*, p. 204.)

38. To develop the plantain fibre industry as suggested by the writer is to open a new source of agricultural wealth. (*Mr. N. N. Banerjee*, p. 217.)

39. The quality of the sugar-cane grown should be improved. The percentage of sugar in the cane can be improved by the use of suitable manure. (*Hon. Mr. Vithaldas D. Thackersey*, p. 78.)

40. A scheme for the development of the agricultural industry in the date forest villages of the Central Provinces and Central India, to go on along with the development of the date sugar industry, outlined by *Mr. Haridas Chatterji*, pp. 250—2.

#### *H. Manufacturng Industries.*

41. The manufacture of ammonium sulphate and other chemical industries is necessary to make several of the mineral industries paying, and other colliery owners should follow the example of the East Indian Railway Company and the Calcutta Gas Co. in making use of their bye-products. (*Hon. Mr. Vithaldas D. Thackersey*, p. 73.)

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42. Improved handlooms should be cheap, simple in construction, and capable of being easily repaired by the village carpenter, while at the same time, the out-put should be larger than that of the existing ones. (*Hon. Mr. Vithaldas D. Thackersey*, p. 75.)

43. The sphere of handloom influence being to some extent limited, all efforts should be directed towards the increased production of very coarse, medium and fine counts weaving, and of mixed, coloured and check-designs of all classes of goods, leaving the weaving of coarse-medium class to the power-loom. (*Rao Bahadur Raoji Bhai Patel*, p. 212.)

44. For this work, cheap looms should be constructed with proper taking-up motions and allowing easy working at a steady ten miles an hour shuttle, velocity or 80 picks per minute on 45" cloth to 40's. counts, without undue breakages. (*Rao Bahadur Raoji Bhai Patel*, p. 212.)

45. Cheap beaming machines for properly beaming country dressed warps should be adopted. (*Rao Bahadur Raoji Bhai Patel*, p. 213.)

46. Proper pirn-winding machines to wind firm conical pirns are necessary. (*Rao Bahadur Raoji Bhai Patel*, p. 213.)

47. All efforts at producing sizing and warping machines should be directed to preserving the use of the country system of sizing and dressing, and to accelerating the speed of work, sizing machines of the slasher type being entirely unsuited to handloom work. (*Rao Bahadur Raoji Bhai Patel*, p. 213.)

48. In every weaving centre, nay, in every village with a considerable number of weavers, men trained in weaving schools should be set up with improved appliances to weave the class of cloths that may be the speciality of the place. (*Rao Bahadur Raoji Bhai Patel* pp. 214—5.)

49. This can be done by every Swadesher with a small capital, not as a philanthropic work, but as a business. A few improved looms with a beaming machine can be set up either on his own account or lent to local weavers on condition that they would pay for them by instalments after perfectly satisfying themselves as to their usefulness. (*Do.*, p. 215.)

50. Local capitalists and associations can do a great deal in this direction. They can advance money for looms and improved appliances, for yarn, stores etc., and take the cloth produced for sale. In this way, while helping the weavers, they would help themselves in earning a very good interest on their capital. (*Do.* p. 215.)

51. The people of the united Provinces of Agra and Oudh should take early steps to organise the sugar industry on modern lines (by the introduction of modern machinery) as those provinces have the largest area of land under sugarcane. (*Hon Mr. Vithaldas D. Thackersey*, p. 78.)

52. Proprietors of sugar refineries should manufacture sugar instead of spirits. (*Mr. A. E. Jordan*, p. 222.)

53. As raw sugar cannot be made into white sugar without the employment of animal char, it should be converted into a high class yellow Sugar instead, which does not require the use of animal char, by using the most up-to-date machinery, whereby the maximum amount of sugar and the minimum of molasses will be obtained from it. (*Do.* pp. 223—4.)

54. Mr. Hadi's method of Sugar manufacture will have to be considerably improved to make it commercially successful, which can only be done by employing steam plant as in other countries. (*Do.* pp. 223 and 225.) The method of manufacture of Sugar in central factories, as is done in other countries, must be adopted in India as well. (*Mr. H. Venkoba Rao*, 235.)

55. Co-operation on the joint stock system is wanted in order to obtain the necessary capital to purchase the plant (*Mr. A. E. Jordan*. p. 225.)

56. In villages where the canes are crushed independently by the cultivators, small steam plants should be established to deal with from 50 to 100 acres per season at a cost of about Rs. 16,500, without a vacuum pan, which would cost another Rs. 5,500 say, to which the cultivators would send their canes, These would then be able to give more attention to improving the cultivation. (*Do.* pp. 225—6.)

57. The cane sugar factory in this country might be a combination of factory and refinery, making white sugar from the canes grown in its vicinity and yellow crystals from the ~~sug~~ made by the cultivators in outlying districts, and so would be able to work all the year round. (*Do.* p. 226.)

58. The date tree *gur* should also be made into a high class yellow Sugar, which does not require the use of animal char in its manufacture. (*Do.* p. 227.)

59. Small steam plants similar to those recommended for the Sugar cane centres, but without the cane crushing mill, where there is no cane cultivation, should be established in the centres of the date tree cultivation. (*Do.* p. 227.)

60. This must be done on the joint-stock system for, like the cane cultivators, the men who collect the juice have neither knowledge nor capital. (*Do.* p. 228.)

61. Government should obtain experts in the manufacture of sugar as well as experts in cultivation, to show the cultivators how the enormous wastage of sugar in the country could be avoided and how greater profits could be obtained from the present crops. (*Do.* p. 229.)

62. Indian capitalists and others interested in Indian industries should investigate where to establish factories, how to secure lands for planting canes, how to secure lands for planting canes and how to mass labour there on. The probable market for Indian sugar should be likewise investigated. The whole country should first be mapped out, shewing the zones of activity of foreign and native Sugar, and the prices of the respective sugar in these zones. The present areas of cane cultivation and other areas which possess facilities for cane cultivation should be similarly mapped out. So also the most convenient places for the establishment of big factories, by virtue of their having canals, railway, river or sea communications with the other parts of the country or the outside world. (*Mr. H. Vencoba Rao*, p. 235.)

63. To introduce and to develop the industry of date sugar manufacture in the Central Provinces and in Central India, the first essential condition is to impart the knowledge of the Bengal system of tapping the date trees. (*Mr. Haridas Chatterji*, p. 240.)

64. The industry of manufacture of sugar only from

date or cane or both, must be coupled with and be made a subsidiary adjunct to agriculture. (*Do.* p. 244.)

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65. Bengalis should develop the jute industry. (*Hon. Mr. Vithaldas D. Thackersey*, p. 78.)

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66. The silk industry may be introduced in several parts of the country. (*Do.* p. 78.)

67. One important step which can be taken for ameliorating the condition of the tusser silk-industry, which is going down on account of disease, is to use large and hard cocoons for seed, after extracting the chrysalids from the cocoons and keeping them exposed or buried in saw-dust. The use of genuine wild cocoons for seed is another step. (*Mr. N. G. Mukerji*, pp. 5—6 sup.)

68. One of the chief improvements that could be introduced into the Indian industry is the introduction of *M. taevigata* or some other similar superior variety of mulberry, suitable not only for rearing the poor Bengal cocoons, but also the superior *B. mori* cocoons. (*Do.* p. 12 sup.)

69. Keeping the worms thin and clean, and the room well ventilated and free from dust, is necessary from the first, as neglect in this matter results in the worms dying in large numbers. (*Do.* p. 18 sup.)

70. Cocoon-rearing is best done when the temperature is about 75° and fairly uniform. That is why the November bund or crop is the best crop and the March bund the next best. Using large mulberry leaves and taking these two good crops is better than using shrub mulberry and taking eight in different ones (even the two good crops being subject to infection when four or eight crops are attempted. (*Do.* pp. 19—21 Sup.)

71. As the demand for the *Khangen* silk shows an upward tendency and the demand for the Superior European silk shows a downward tendency, it is not worth while for our country reelers to follow the European system and produce a smaller quantity of superior fibre. Go in for quantity for *the present*. (*Do.* p. 24 Sup.)

72. A separate organization of having a grainage and hibernating station at Dalhousie may be tried. (*Do.* p. 26 Sup.)

73. It is essential to have a number of nurseries in each silk district and Bengal, where the system of microscopic selection will be rigorously followed and the cocoons obtained from selected eggs seed for seed purpose, or where a stock naturally free from pebrine is reared. (*Do.* p. 29 Sup.)

74. The paper industry should be started in Burma. (*Hon. Mr. Vithaldas D. Thackersey*, p. 78.)

75. Leather is another industry for which there is a large field in India. (*Do.* 79.)

76. The gradual extension of the chrome-process will do much to improve the methods of realising the real value of hides and skins. (*Mr. Alfred Chatterton*, p. 286.)

77. Manufacture essential oils from the raw materials described and mentioned by the writer. (*Mr. D. Hooper*, pp. 253—69.)

78. Extract the essence of lemon and peppermint at the trifling cost from the various kinds of grasses which grow luxuriantly in some parts of Bengal. (*Mr. J. N. Banerjee*, p. 270.)



79. If a match factory be established in Calcutta or its neighbourhood, trial should first be given to such local trees as *Simul*, *Amra*, *Genwa* for matches, and to *Badam* and *Pithali* for match-boxes; as, if these prove suitable, the expense of obtaining Firs and Poplars from the hills will be saved. (*Rai Saheb Upendaanath Kanjilal* p. 319.)

80. It is neither necessary nor advantageous that the same industries should be established in all parts of the country. This may not be possible in the first place. Even where it may be possible, it may be found that the production of wealth will be better assisted by leaving provinces to promote the industry for which they have special facilities. (*Hon. Mr. Vithaldas D. Thackersey*, p. 79.)

#### I.—Art Industries.

81. The export of quantities of badly finished articles is not the way to revive languishing art industries, but a certain means of extinguishing them entirely. (*Mr. Theodore C. Maller*, pp. 340—1.)

82. Indian art wares will have a sufficient market in this country, if steps are taken to develop the latent possibilities of native talent and if Indian gentlemen will make it a point of encouraging native handicrafts in preference to foreign art-ware. (*Do.* p. 341.)

83. The Schools of Arts should cultivate all the arts and handicrafts indigenous within their geographical province, they should freely supply designs and patterns to artisans and, last but not not the least, they should make it a point to give free advice to any craftsman who may be desirous of information or assistance. (*Do.* p. 341.)

84. With the active assistance of existing Schools of Arts, an all India Society for the Promotion of Indian Arts

could do a great deal in preserving and developing indigenous art industries. (*Do.* p. 342.)

85. An All India Arts Exposition should be held once in five years at provincial capitals, to enable the public to make themselves familiar with the productions of all the Indian art industries and to judge of the progress made after each period. (*Do.* p. 343.)

86. Government should give an annual subvention in aid of the above mentioned Society. (*Do.* p. 343.)

87. The production of Delhi and Agra embroideries; embroidered pashmina chudders; carved and inlaid furniture; printed cotton hangings; ornamental silver and metal work; rugs, carpets and ornamental floor coverings, among many other art industries, could be developed into a flourishing export trade, by simply introducing certain mechanical contrivances for giving a superior finish to the wares. (*Do.* pp. 343—4.)

88. In order to enable artisans to bear the cost of such imported tools and machinery, they must first be helped to produce and sell articles of artistic and commercial value. (*Do.* p. 334.)

89. The wealth of our country will be greatly increased if women could be trained in art industries, etc. (*Mrs. P. Mukerji*, p. 339.)

#### *J.—Weights, Measures and Coins.*

92. Standard weights, measures and coins should be introduced in British India and the Indian states. (*Mr. T. N. Atre*.)

# Resolutions passed at the Second Indian Industrial Conference held at Calcutta on the 29th and 31st December 1906.

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## I.—TECHNICAL AND COMMERCIAL EDUCATION.

*Resolved.*—That this Conference re-affirms the resolutions passed at the Conference of last year on the subject of Technical and Commercial Education, and requests the Government to establish a sufficient number of Secondary Technical and Commercial Schools, a superior Technical College for each Province, and one fully equipped first class College of Technology for all India. And that a Committee consisting of the President, the General Secretary, Messrs. R. C. Dutt, D. E. Wacha, G. V. Joshi, G. Subramania Iyer, Lajpat Rai, P. N. Bose, A. C. Sen, Deva Prasad Sarvadhikari, and Dr. Nil Ratan Sircar, be appointed to prepare a memorial on the above lines for submission to Government by the President and the General Secretary.

[Proposed by V. Krishnaswami Iyer, Esq., (Madras), Seconded by Deva Prasad Sarvadhikari, Esq., (Calcutta) supported by Babu Ambica Charan Moitra (Pabna, Bengal) and G. A. Natesan, Esq., (Madras), and carried unanimously.]

## II.—THE INDIAN STORES COMMITTEE.

*Resolved.*—That this Conference conveys its thanks to the Government of India for appointing a Committee for making recommendations for the use by Government departments of indigenous articles in preference to foreign goods, and requests that they be pleased to direct the early publication of the Report of the Committee so that the public and the traders

in India may have an opportunity of considering it before final orders are passed on the subject.

[Proposed by Sir Bhalchandra Krishna, Kt. (Bombay), Seconded by K. Natarajan, Esq., (Bombay), supported by Moulive Mahammad Nisamuddin (Lucknow) and Shapurji Bhicaji Patel, Esq., (Bombay), and carried unanimously.]

### III.—INDUSTRIAL SURVEY.

*Resolved.*—In view of the importance of having an Industrial survey of India made by Government, and having regard to the recommendation made by the Committee on Industrial Education to that effect, this Conference requests Government to make such a survey, and empowers the president and the General secretary to submit a memorial on the subject.

[Proposed by Rao Bahadur R. N. Mudholkar (Amraoti), Seconded by Bipradas Pal Chaudhuri, Esq., (Calcutta), supported by S. C. Mukerji, Esq. (Calcutta), and carried unanimously.]

### IV.—SUGGESTIONS TO THE PUBLIC.

*Resolved.*—That this Conference specially invites the attention of the public to the great importance of introducing the use of improved handlooms among the weavers of India, of promoting technical education by the establishment of schools and classes, and of starting laboratories for the purpose of determining the industrial value of Indian products.

[Proposed by Dewan Bahadur Ambalal S. Desai (Ahmedabad), Seconded by Vishwanath P. Vaidya, Esq. (Bombay), supported by Dr Nil Ratan Sircar (Calcutta) and Shet Damodardas Khibraj (Beawar), and carried unanimously.]

### V.—THE CONFERENCE PROVINCIAL COMMITTEES.

*Resolved.*—That the Provincial Committees already established be asked, besides taking steps to promote industries in their several provinces, to compile useful facts and suggestions for submission to the next Industrial Conference, and to raise suitable funds for carrying on their work.

[Proposed by Dewan Bahadur L. A. Gavindaragharva Iyer (Madras), seconded by Babu Ambica Charan Ukil (Calcutta), supported by A. Ramanna, Esq., (Mysore), and carried unanimously.]

**VI.—APPOINTMENT OF OFFICE-BEARERS AND PROVISION  
OF FUNDS FOR THE YEAR 1907.**

*Resolved.*—That this Conference re-appoints Rao Bahadur R. N. Mudholkar as General Secretary and Mr. C. Y. Chintamani as Assistant Secretary, and empowers the President and the General Secretary to appoint an Additional Assistant Secretary and establishment on suitable pay, so that the Assistant Secretary may be free to visit the different provinces and help the Provincial Committees in all matters in which they may require assistance. And this Conference allots a sum of Rs. 10,000 for meeting the expenses for next twelve months and also for issuing a quarterly bulletin of industrial information under suitable management.

[Proposed by R. C. Dutt, Esq., C. I. E., (Baroda), seconded by Rai Bahadur P. Ananda Charlu, C. I. E. (Madras), and carried unanimously.]

## THE SECOND INDIAN INDUSTRIAL CONFERENCE.

THE Second Indian Industrial Conference was held in the Pavilion of the Twenty-second Indian National Congress at Calcutta on Saturday, December 29, 1906. A large and distinguished gathering was present when, punctually at 2-30 P. M., Mr. P. N. Bose, B. Sc. (London) F.G.S., rose to welcome the delegates and distinguished visitors on behalf of the Bengal Provincial Committee of the Conference.

The following is the speech delivered by Mr. Bose as Chairman of the Committee:—

Maharajas, Ladies and Gentlemen.

I deeply appreciate the honour which the Bengal Committee have done me by appointing me their President, and as such I have much pleasure in welcoming the delegates and visitors from different parts of India. I must frankly confess my welcome is a trifle tinged with selfishness. In the matter of industrial enterprise, we have more to learn from our guests than they from us. We shall have to subject them to a process which is excessively (though vulgarly) called "pumping"; and if we are mindful of our interests we should "pump" them dry before they leave us. We have met to attempt the solution of a problem the most important that can engage the attention at the present day. It is a very complicated problem, the most complicated of all the problems with which we are at present confronted. But there is one salient feature which distinguishes it from good many of the other problems: however difficult it may be, it is one which, if we are determined, we can solve ourselves with the help of the Government if it be forthcoming—and the present attitude of the Government encourages the hope that it will be forthcoming—or even

without such help if it be not forthcoming, at least to the extent desired by us. Our brethren in other parts of India, and notably in the Bombay Presidency, have already made some advance towards the solution. The numerous, flourishing, gigantic cotton mills of Bombay and Ahmedabad may well serve as so many object-lessons to us. They are mostly owned, managed and officered by Indians. I have of late made several trips to the Western Presidency, and last October penetrated into the heart of Kathiawar. Wherever I went I noticed enterprise and industrial activity—not yet, it is true, to an extent desirable for a complete solution of the problem, but certainly to an extent incomparably greater than what we have hitherto met with in Bengal. I say hitherto, because now, my Bengali friends are beginning to attack the problem with a vigour and an earnestness which promises great results in the future. There is, however, still observable in them a special predilection for petty industries which partake more or less of the nature of handicrafts and stand in little need of labour-saving machinery—industries which can be started with very small capital and therefore hardly require any co-operation. There can be no question that such industries are useful in their way, and that the possibilities of such industries should be developed to the fullest extent goes without saying. But we must bear in mind, that they will not go very far towards meeting the exigencies of our situation. In an address which I had the honour to deliver as President of an Industrial Conference held in this city in 1891, I said: “The good old times have passed away. We may sigh for them, but they will never return. We must move with the times or perish. The progress of natural science has effected a revolution in industrial methods. The day of mere manual skill is gone by; and, rest assured, will never return.” I regret to have to repeat and even emphasize these words after the lapse of fifteen years. Those of my friends who are so sanguine as to expect to dislodge Western manufactures from the strong position held by them in our markets with such weapons alone as the primitive furnace,

the "charka" and the handloom however improved, would do well to visit the great mills and factories of Northern and Western India, or failing that to extract as much wisdom as they can from our visitors.

Some of my compatriots of Bengal are probably regretting having made me their spokesman. So I hasten to say, that though our Province has hitherto evinced a deplorable dearth of commercial and industrial enterprise, she has excelled in other spheres of activity. We have in this city as many as five daily newspapers conducted entirely in English and owned, managed and edited by Bengalis; but, so far as I am aware, my compatriots of Bombay cannot boast of even one! This, however, is a form of activity which may be considered by some to be hardly deserving of commendation under existing conditions. The gentlemen of the Press must not misunderstand me. I have not been a public man; and I do not know whether I am pachydermatous enough to survive a shower of their sharpest missiles. What I mean to say is, that indigenous journalistic activity of the sort have in Bengal (while there has hitherto been no very marked display of activity in spheres where it is more urgently needed) may be held by some to be a point of questionable superiority on our part. But there are other achievements to which no such exception can be reasonably taken. I doubt if all the other Provinces put together could produce such an illustrious array of social and religious reformers, authors, legal luminaries, and last by no means the least, orators, than that turned out by Bengal during the British rule. Several of the most important movements of modern India have had their origin here. The latest of these—the Swadeshi movement—did not originate in Bengal. But Bengal has given it an impetus which I doubt if it could have got elsewhere. The development which it has recently attained has been an agreeable surprise to me. In a magazine article entitled "A Plea for a Patriotic Movement" published in May 1903, I wrote as follows:

"A movement has been going on for sometime past in different parts of India which is known as the Swadeshi (or



patriotic) movement. Its object being protection of indigenous industries, it is not much favoured by the generality of the more highly educated Indians who are imbued with the doctrine of Free Trade imparted with English Education. When they, however, awoken to a sense of the fallacious nature of that doctrine when applied irrespective of surrounding circumstances, as I have no doubt they will soon, they will not only cease to look askance at this hitherto obscure and little recognised movement, but will perceive in it the germ of great organisation which, if well directed, may effect the industrial regeneration of India. A great central organisation with branches in all important towns having for its object the promotion of the interests of indigenous manufactures will go a long way towards at least a partial solution of the complicated problem of Indian Industrial development.... The idea of such an organisation may at present appear to many as chimerical. But there is really no reason why it should not be realised if a few earnest, capable, self-sacrificing men make it the mission of their lives. What is needed is a clear conception of its urgent necessity, and a firm conviction, that without the fostering care and watchful vigilance of some such organisation, the infant enterprise of Young India will be unsuccessful and infructuous."

Little did I dream at the time I penned these lines, that within two years the movement for which I pleaded with such diffidence was to become so popular. Though no indication of any proper organisation is as yet perceptible in it, there can not be a shadow of a doubt that it has made for progress. Here again, our strong and weak points have manifested themselves. While we, Bengalis, have been writing, talking and agitating our more practical brethren of the other provinces have been quietly filling their pockets. I was conversing with a big Parsi merchant in Bombay last February when he observed in connection with the only conspicuous tangible result of the Swadeshi movement at the time in Bengal, a result over which our newspapers were most jubilant—the Banga Lakshmi Cotton Mill—“Why do you not start a new cotton mill on a large scale?”

The one you are going to acquire is an Indian concern already, why not have another?" ]

I hope our guests will be as frank in their criticism as this Parsi gentleman. We must not be impatient of honest criticism, but should rather welcome it if we really mean to improve.

I must accord a special welcome to those of our Western friends who are extending a helping hand to us. We are very grateful to them. We expect a deal of light from them. They are so far ahead of us in respect of industrial development, that for many years to come we shall have much to learn from them. We should not be under any delusion. There is no sign yet of the approach of the millenium. Human nature in the civilized world is much the same now as it was two or three thousand years ago. A clear recognition of this truth, which, I must say, is generally occluded by the glamour of occidental civilisation, would save us a deal of unnecessary expenditure of time and energy. This, however, by the way. The industrial interests of the West are not generally identical with those of the East: nay, in not a few cases they are altogether antagonistic. The day is not far distant when there will be a great industrial war between the Orientals and the Occidentals. The war is inevitable, and our brethren of the West must be well aware of it. Constituted as human nature still is, we cannot expect that they should all place in our hands weapons which they know would sometime or other be directed against them. But the fact, that we have some sincere, earnest friends among them who rising superior to circumstance not only sympathise with us, but are also ready to work hand in hand with us, shows that chivalry has survived the deadening influence of the most material of civilisations the world has ever seen. All honour to those chivalrous, benevolent gentlemen. They are the salt of the earth.

Two years ago I had the good fortune of camping with an illustrious American expert. I used to have many pleasant and informing conversations with him. One day our conver-

sation turned upon the phenomenal industrial development of the West. I asked him what its goal was. My friend—the practical man that he was—said he did not know what the goal was ; all that he knew was that the wheels must go on crushing whom it may. But, gentlemen, while he knew this, he was at the same time ready to advise us as to how we might arrest the progress of the wheels of Western Industrialism and avoid being crushed. The knowledge that we have such friends in the West—especially in Great Britain and America—buoy us up with hope for the future.

Here I would like your leave to set right a matter about which there has been some misunderstanding. Our Anglo-Indian friends generally profess sympathy with the Swadeshi movement. An English gentleman proposed to me the name of Swadeshi for a company he wanted to float in order to attract Indian capital. But volleys of indiscriminate abuse are occasionally directed against the leaders of the Swadeshi movement. The last notable instance of such a fusillade was at an important annual function in this city. That there have been some excesses is undeniable. But, they are mostly peccadilloes of nonage and are unavoidable in a movement which becomes at all popular. Mr. Morley in his last India Budget speech said : "Great thoughts come from the heart, but must go round by the head." This should no doubt be the case with the wise men of the world, but the pity of it is, there are so few of them ! With the mass of the people thoughts seldom take the circuitous route prescribed by philosophers, but go direct out of the heart. As a consequence, all movements taken up by them social, religious or political—have always been characterised by features such as we would expect when passions and emotions are but little controlled by reason. But, would you rather wish that great ideas lay confined within a small circle of wise men, than that they should spread among the masses and elevate them although in so doing they lose their original purity ? The water which is imprisoned in the clouds up above is pure. But would you rather that it lay there than

that it should descend to the earth and fructify it and afford drinking water to its thirsty millions although in descending to it and while there it absorbs various impurities, sometimes to the extent which renders it positively noxious?

Gentlemen,

My next very agreeable function is to ask H. H. the Maharaja Gaekwar of Baroda to deliver his inaugural address. I feel the greatest pleasure in doing this, not because he happens to be a ruling chief of the first rank—no—but because, though a great Prince, I know of no one else in this assembly who is better entitled to speak authoritatively on subjects to be dealt with by this conference. In His Highness' case, it may be truly said, that it is the man that honours the rank and sheds lustre on the crown. In him we have the rare combination of a gifted and benevolent ruler, a true patriot, and an ardent though cautious reformer. As long ago as 1890, His Highness established the Technical Institute of Baroda, an institution the utility of which is so highly appreciated that it attracts students even from the distant Central and United Provinces—an institution the like of which—be it said to our shame—we have not had in this Province until only six months ago when the Bengal Technical Institute was founded, thanks to the liberality of some of my large-hearted compatriots foremost among whom is my esteemed friend Mr. T. Palit. Now, the State of Baroda has a population in round numbers of two millions. I find there are as many as thirteen districts in Bengal each of which contains more, and several considerably more than that population, and three districts each of which has a population only slightly less. Imagine, gentlemen, each of these sixteen districts possessing a technical institute of the same type as that of Baroda, but adapted of course to local conditions. Why, the economic and social condition of Bengal would then be quite different from what it is now.

Gentlemen, technical education has been very sadly neglected. Our Government must have long been fully aware of the gradually increasing importance of such education; and

its urgency has been repeatedly pressed upon their attention during the last 20 years. But the machinery of the Government moves very slowly, and when it does move it does not always move in a way which commends itself to our humble judgment. As long ago as 1886, a scheme was suggested by which the Sibpur Engineering College could be made to impart superior technical training in various subjects at but comparatively small additional cost. But it is only since the beginning of this year that a serious attempt has been made by the Government in that direction. Provision has now been made for the teaching of mining in Bengal—half a century after the starting of coal mining in that Province! During the last two decades voluminous reports on industrial matters have been turned out by the Government Press—reports which would fill a small library and which are replete with the most useful information. But our people have not had the necessary training to turn it to account. It is our occidental friends who have benefited most by the researches of those departments of our Government which are directly or indirectly connected with the development of the resources of our country. A Commission appointed by the Government of India in 1902 reported upon the condition of industrial education in India the next year and made some excellent recommendations. I am not aware, however, that the Government has yet done anything to speak of, to carry out those recommendations. In fact, the history of the progress of technical education in India during the last twenty years is practically a blank.

I rejoice to say, however, that steps have of late been taken which promise good results in the future. But, gentlemen, we must be just and impartial. I do not think it would be fair to cast all the blame upon the shoulders of the Government. We are to blame also,—I should say, blame even more than the Government. Situated as we are and under the existing conditions of the ethical development of the civilised world, it would not be reasonable on our part to expect much from our Government. After all, one must work out his own salvation.

himself. The very attempt to do that, if it be earnest and insistent, will call forth and develop qualities which must ensure ultimate success. Our Government is not in the happy position of a talented, benevolent autocrat like H. H. the Maharaja Gaekwer who has not only inaugurated an effective system of technical instruction, but has also initiated—and very wisely initiated—industries for the fructification of such instruction. As long ago as 1883-84, His Highness established a cotton mill, and now there are no less than three large weaving and spinning mills in his state, all of them organised and managed by private indigenous agency. His Highness has also pioneered the sugar industry in his State. Already, the impetus given by him to industrial development has resulted in the starting of numerous ginning presses, and of dyeing, chocolate, rice, rectified spirit, and match factories; and the Baroda state promises to be a great industrial centre in the near future. But for various reasons, it would not be desirable for a Government like ours to engage in commercial undertakings. All that we can rationally expect of them is the dissemination of technical education. Even then it would be hardly wise, as we have learnt from the experience of the last twenty years, to depend upon them entirely or even mainly. Technical education, however, is of no use—absolutely no use—unless we have industries to utilise it. Technical training and industrial enterprise must go hand in hand. But, gentlemen, we have hitherto shown a most lamentable lack of enterprise, except, be it noted to their credit by our brethren of the Bombay Presidency in the matter of Cotton manufactures. Hitherto, our economic resources have been exploited mainly and in the case of the minerals almost exclusively by Western enterprise. Within the 24 years (1881-82 to 1904-05) the number of jute mills has nearly trebled (8 to 22) that of mills for wool, silk, and hemp has increased more than ten times (3 to 31); that of paper mills has increased five fold (1 to 5); and that of Sugar factories has more than doubled (4 to 9). Within the ten years (1894 to 1903), the output of manganese ore

increased about 15 times (11,410 to 165,006 tons), that of petroleum more than sevenfold (11,452,649 to 87,859,069 gallons), that of mica nearly quadrupled (285 to 1077 tons) that of gold nearly trebled (210,412 to 603,214 ounces), and that of coal more than doubled (2,823,907 to 7,438,386 tons). But alas! indigeous enterprise has had very little share in this industrial expansion.

I am fully aware of the formidable obstacles which confront us. We are handicapped by our excessive poverty, by our sad deficiency in scientific and technical education, by our social system, by our civilization which is of an essentially non-industrial character, and by the absence of that State Protection which infant enterprise in all countries stands in need of. But at the same time, I see no reason why an intelligently directed, well organised and persistent effort to overcome the difficulties in our way should not be crowned with success.

It seems as if such an effort is going to be made now. There are hopeful signs of an industrial awakening on all sides. This Conference and the Exhibition across the way are among such signs. They show, that the industrial movement which has been going on slowly for the last quarter of a century has at last been taken up by that great body of my educated and patriotic countrymen who constitute the Congress. I humbly beg leave, however, to say one word by way of caution to my Congress friends. The machinery and the method of work adopted by them for the Congress will not quite answer the purposes of this Conference. This platform affords us an excellent opportunity for the discussion of important industrial subjects and for an interchange of ideas. But the more important part of our work will have to be done silently and strenuously in the study, the laboratory, the field, the work-shop and the factory. The subjects dealt with by the National Congress are mainly of a nature which precludes the possibility of strong fruitful action. Year in and year out, therefore, they have had to content themselves for the last twenty years with advocating reforms and recommending measures the execution of which

depends upon a will which is not their own. The Industrial Congress however, presents to us a very wide field for action calculated to lead to momentous results in the immediate future; and we need not, and in my humble opinion, should not urge a single measure which we are not prepared to carry out gradually ourselves either independently or with the help of the Government.

This very assembly is an indication of the industrial awaking of India—and a very significant indication too. It is, I believe, the first of the kind in India. For the first time in our history, two ruling Princes have got over the barriers interposed by immemorial custom, and have condescended not only to grace this meeting by their presence, but also to take an active part in its proceedings. I see around me representatives of the landed, legal, and mercantile aristocracy, owners of such capital as we have in this country; I see around me representatives of the different sections of our middle class who are to supply us with workers; and I see around me high officials of the Government who have it in their power to help us in a variety of ways. If they cordially join hands, and work shoulder to shoulder, we shall not be long in solving the difficult problem we have taken in hand. Verily, there is some hope for a cause which has brought together such a distinguished and such a representative gathering; and there is some hope for a Conference which is to be opened by such an enlightened and such an accomplished Prince as H. H. the Maharaja Gaekwar of Baroda.

#### GAEKWAR'S INAUGURAL ADDRESS.

His Highness the Gaekwar of Barod, who on rising was received with an enthusiastic ovation, then delivered his inaugural address but before doing so he made the following preliminary remarks:—

Before I begin my speech, I should just like to say a few words which may appear to you rather out of order. But still I thought that it would be more convenient to dispose of



the matter now than to try your patience after my speech is over. Mr. Bose has referred to my administration and my acts. So far as my Kingdom is concerned, I may tell you that the compliment he has paid to me has touched me deeply. I do not believe that every fact that he has stated is deserved by me. It must stand as an ideal for my officers to work up to; and if they fulfill any of the expectations formed by my countrymen, I shall consider myself most fortunate, as one who has the means of solving the problem (Cheers) to a very small extent. Gentlemen, I should like to state one more fact, you have heard the most eloquent and most learned speech not only so far as language is concerned but also thoughts and suggestions of which it is full; and after that speech I think it would be tiring you to a great extent (cries of no, no,) if I were to read my speech at length. I therefore, propose with the permission of your Chairman to read only passages out of it and the rest you can read and cogitate over at your leisure. I do not say that you will find in it that will throw light on the subject. But I may assure you of the spirit of sincerity with which these words are addressed.

His Highness then read only extracts from his speech of which the following is the full text of the address:—

Mr. President, Delegates to the Conference, Ladies and Gentlemen.

i. It was only last month, on my return from a tour in Europe and America, that your able and energetic Secretary, Rao Bahadur R. N. Mudholkar, called on me, and conveyed to me the Industrial Committee's unanimous request that I should attend this Conference, and deliver an Inaugural Address. I naturally felt some hesitation in acceding to this request, partly because of the pressure of administrative work owing to my recent return from a foreign tour, and partly because I am aware that there are others who are better qualified than myself to advise you in the noble work which you have undertaken.

2. But, Gentlemen, your Secretary was not to be put off by these reasons. He pressed me to accede to the request of the Industrial Committee, and was good enough to assure me that by so doing I would be rendering some service to the great cause which we all have at heart. To this argument I felt it my duty to yield. I feel very strongly that to help in the industrial movement of the present day is a duty which devolves on all of us equally.

3. Whatever be our vocations in life, we cannot be untrue to this duty without being untrue to ourselves and our country. And I feel to day, as I have always felt and declared, that our interests are one and the same;—

whatever helps and elevates you helps and elevates us:— whatever retards your progress retards ours. And further more I am strongly convinced that our activities in all different departments of life, political, social and industrial are so correlated that we shall never make any marked progress in one without making similar progress in all.

4. The three seemingly divers currents of intellectual activity converge towards the same head-works and feed the same main stream of life. Unless we extend our horizon and take a less parochial view we can ill understand the value and place of each of these component parts in the great machinery of progress.

Component parts in the machinery of progress.

#### *Past History*

5. Gentlemen, I do not propose to take much of your time with an account of the industries of India in the ancient times, but a brief reference to some notable facts will perhaps not be unsuitable on an occasion like this. You are all aware that India was famed for her cotton fabrics from very ancient times; and antiquarians tell us that Indian cotton found its way

Industries of India in ancient times.

to Assyria and Babylon in the remote past. Indigo, which is peculiarly an Indian produce, has been detected by the microscope in Egyptian mummy cloths, and Indian ivory and other articles were probably imported into ancient Egypt. There can be little doubt that the old Phœnicians carried on a brisk trade with India, and much of the spices and precious stones, ebony, gold and embroidered work, with which they supplied the Western world, came from India.

6. The Greeks rose in civilization at a later date; and Herodotus, generally called the Father of History, speaks of Indian cotton as "wool growing on trees, more beautiful and valuable than that produced from sheep."

7. A brisk trade between India and the Western world was carried on during the centuries preceding the Christian Era; and as Rome rose in power and importance, and Alexandria became a flourishing mart, the trade increased in volume. Silk threads, sapphires, indigo and cotton fabrics were exported from the mouths of the Indus; and the important sea-port town of Broach, then called Bharukatcha by the Hindus, and Barygaza by the Romans, imported gold, silver and other metals, glass, corals and perfumes; and exported precious stones, muslins, cotton fabrics, ivory, ebony, pepper and silk.

8. The Roman Empire declined after the third century. An Eastern Empire was founded with its new capital at Constantinople, and that place attracted to itself much of the Asiatic trade which used to flow before through Alexandria.

9. India was the scene of frequent invasions during the centuries succeeding the Christian era, and Scythians and Huns desolated her western provinces. But a great chief and warrior, known to our literature under the name of Vikramaditya, at last turned back the tide of invasion, and

India was virtually free from foreign raids from the sixth to the tenth century. It was within this period that Chinese travellers, Fa Hian, Houen Tsang, and others visited India as religious pilgrims, admired her arts, industries and manufactures, and wrote on the Hindu temples and Buddhist monasteries, which existed side by side in every large town. Hindu traders founded settlements in Java and other islands; and it was in a Hindu ship, sailing from Tamralipti or Tamlook, that Fa Hian left India. Those of you who have been to Europe, and visited the Continental towns, may have seen images of Hindu Gods and Goddesses in the Museum of Leyden, taken there by the Dutch from Java, where Hindu religion and learning were introduced by traders and settlers from India.

10. Venice was the channel of trade with India after the close of the dark ages; but the glory of Venice departed with the discovery of a new route to India round the Cape by Vasco-de-Gama about the close of the fifteenth century, and Portugal rose in power and commercial enterprise as Venice declined. In the sixteenth century, all the southern seaboard of Asia as far as China, was practically under the commercial control of Portugal. But the Dutch replaced the Portuguese in the seventeenth century, and like the latter enriched themselves by the Indian trade. Likewise the English appeared on the scene a little later, and wrested from the Dutch a large share of the Eastern trade in the eighteenth century. It is remarkable that, within the last thousand years, nation after nation in Europe has risen to power and to great wealth mainly through the Eastern trade. Constantinople, Venice, Portugal, Holland and England, have successively been the carriers to Europe of the rich manufactures of India, as the Phœnicians and the Arabs were in the ancient times.

11. When England obtained territorial possessions in India in the eighteenth century, her commercial policy towards India was the same as her policy towards Ireland

How the English wrested a share of the Eastern trade in the 18th century.

England's commercial policy.

and her American colonies, Her aim and endeavour was to obtain raw produce from her dependencies, and to develop manufacturing industry in England. She repressed manufactures elsewhere by unequal tariffs in order to develop her own manufactures. The American Colonies freed themselves from this industrial servitude when they declared their independence; but both Ireland and India suffered. Industries in both these countries steadily declined early in the nineteenth century; manufacturing industries progressed by leaps and bounds in England; and the invention of the power-loom completed her industrial triumph.

12. Since then England has slowly adopted a fair and equitable commercial policy, and repealed Navigation Acts and unequal tariffs. England as a free trader. And to-day England stands forth a pre-eminent free trader to all the world; and this brings me, gentlemen, to the industrial history of India of our own times.

*Present situation.*

13. The triumph of machinery has been the triumph of our age; the victory of steam and electricity will always be memorable among the decisive battles of the world. The rise of power-looms, for instance, has been stealing a march over the handloom workers, and the numbers employed in cotton weaving in India have declined by 23 per cent even within the last decade. Even the ginning and the pressing of cotton has so extensively participated in the use of improved machinery that its hand-workers have dwindled by fully 68 per cent. And yet it is this textile industry itself which shows how with intelligent adaptation to the improved methods of art, our Indian industries can compete with the manufactures of Europe. The Bombay Mills give daily employment to about 1,70,000 factory operatives, while so many

as 30,000 more are maintained by the ginning presses. Some forty years ago we had only 13 cotton mills in all India. The number rose to 47 in 1876, to 95 in 1886, to 155 in 1895, and 203 in 1904 : and to-day the number of our cotton mills is still larger. We had less than 4,000 power looms forty years ago : the number was over 47,000 in 1904. We had less than 3,00,000 spindles 40 years ago : the number exceeded five millions in 1904. These are insignificant figures compared with the huge cotton industry of Lancashire ; but they show that we have made steady progress, and that we may fairly hope to make greater progress in the future if we are true to our aims and our own interest. Our annual produce of yarn is nearly six hundred million lbs. in weight : and it is interesting to note that out of this total out-turn, about 30 per cent is used mostly by our hand-loom weavers.

14. Gentlemen, it is with a legitimate pride that the Indian

Mill and hand-loom industries of India are the largest industries of this land.

patriot marks this silent progress in the mill and handloom industries of India, which, next to agriculture, are the largest industries in this land. New mills have

been started in Ahmedabad and Bombay within the last two years as a result of the *Swadeshi* movement. In the poor State of Baroda too, this progress is marked. For more than twenty years the State worked a cotton mill in the Capital town to give an object lesson to the people, and to encourage private companies to start similar mills. The call has now been accepted, and a private company has at last been formed, and has purchased the State mill from our hands with the happiest results. Recently a second mill has been completed, and is about to start work, and a third mill is now under construction. More than this, the number of ginning factories, and other factories, using steam, has multiplied all over the State, and the number of hand looms has doubled in some towns. All the coarser counts of yarn in the Indian markets are now mostly of local spinning ; an insignificant fraction alone being imported from abroad. In the case of

yarn of higher counts, however, the local manufacture falls much below the supply of the foreign mills. Muslin and finer fabrics can be imported much more cheaply, and in a more pleasing variety of design and colour, than can yet be locally produced; and the hand looms of the East, once so far-famed for the *finesse* of their fabrics, have now dwindled into small importance. Prints and *Chintz* from France, England and Germany are still extensively imported to meet not only the demand, but also the demand of markets across the Indian Frontier in Persia and Afghanistan.

15. Thus though there is reason for congratulation in the rise of our textile industries, there is yet greater reason for continued toil and earnest endeavour. We are still at the very threshold of success. Our cotton mills produced less than 600 million yards of cloth last year, against over 2,000 million yards which we imported from other countries. Here is scope for indefinite expansion. We exported cotton of the value of 213 millions to foreign countries and imported in return for this raw material, cotton manufactures of the value of 390 millions. We are thus producing only a fourth of the mill-made cloth which the nation requires. And we should not rest till we are able to manufacture practically the total supply needed by our countrymen.

16. Gentlemen, the remarks I have made about the cotton industry of India apply to some extent to the other industries which require the use of steam. Bengal is known for its Jute industry, which I believe is increasing year by year; and the number of jute mills has increased from 28 in 1895 to 38 in 1904. Northern India and the Punjab have some six woollen factories, whose produce has increased from  $2\frac{1}{2}$  million pounds in weight in 1895 to  $3\frac{1}{2}$  million pounds in 1904, and I have every hope that our countrymen, who have been so successful in cotton industry, will broaden the sphere of their operations and take to jute and woollen industries also.

17. The silk industry is one of the most ancient industries of India, but declined like other ancient industries under the repressive commercial policy of the eighteenth and early nineteenth century. Some faint signs of improvement are, however, visible now. Tassar silk is manufactured in many parts of India, and quantities of it are exported to Europe. In Assam, silk still continues to be the national dress of women, and each family weaves silk *sarees* for its own use. In Bengal some improvements have been recently effected by the adoption of scientific methods of testing the seed. In the Punjab the attempt to reintroduce the cultivation of silk worms has not been attended with marked success. In Kashmir the industry is indigenous, and the State is endeavouring to develop it. Much attention is paid to this industry in the advanced and enlightened State of Mysore. And in the State of Baroda I have been endeavouring to spread and develop the industry. The number of these filatures in India in 1904 was only 75, and the number of silk mills was only 11; but much silk is also produced as a cottage industry.

18. Gentlemen, so far I have confined myself to the textile industries; and I have scarcely time to refer at any length to the other industries of India. Brass and copper have been used for vessels in India from ancient times, but have been threatened lately by the cheap enamelled iron-ware of Europe. Alluminum is a new industry, and we are indebted to Mr. Chatterton of Madras for greatly developing it in India.

19. Recent Geological surveys and investigations have brought to light the rich ore of iron which was laying concealed so long in Central India; and there is a great scope for the development of the iron industry. Veins of iron ore are believed to exist in several places besides those where they have been yet explored; and if only a few more enterprising companies, like my friend Mr. Tata's, spring up and prospect



these mines, they have a hopeful future before them. If the quality of the the indigenous coal is only improved and means of communication made more easy and cheap, so as to considerably reduce the cost of transport, it would appear more profitable to smelt our iron in our own furnaces, rather than import large quantities from abroad. I am glad to find that the able Geologist, who discovered suitable iron ore for Mr. Tata's scheme, Mr. P. N. Bose, has been selected by you Chairman of the Reception Committee of this Conference. The scheme is still under the consideration of Mr. Tata's son, whom I had the pleasure of recently meeting in England. There were 89 iron foundries in India in 1904, and it is to be hoped that the number will rapidly increase in the near future.

20. Bengal is rich in coal fields, and out of the 8 millions of tons of coal, worth about 2 crores of Rupees, raised in all India in 1904, no less than 7 millions of tons were raised in Bengal. These will seem to you to be large figures,—but what are 8 millions of tons compared with considerably over 200 million tons annually raised in England? Our countrymen are engaged to some extent in coal-mining, though greatly hampered in the endeavour both by want of capital and want of technical knowledge; and I am glad the Indian Government have granted scholarships to some young Indians to learn practical coal-mining in England. The importance of coal consists in this, that its abundance makes every other industry on a large scale possible. Coal and iron have been the making of Modern England, more than any other causes.

21. These are the principal industries of India carried on mainly by steam; and for facility of reference I have put down the figures relating to them and a few other industries

Principal industries carried on mainly by steam.

in a tabular form below:—

	1895	1904
Cotton Mills ... ..	148	203
Jute Mills ... ..	28	38
Woollen Mills ... ..	5	6
Cotton ginning cleaning and press-Mills	610	951
Flour Mills ... ..	72	42
Rice Mills ... ..	87	127
Sugar Factories ... ..	247	28
Silk Filatures ... ..	89	75
Silk Mills ... ..	28	11
Tanneries ... ..	60	35
Oil Mills ... ..	163	112
Lac Factories ... ..	138	128
Iron and Brass Foundries ... ..	64	89
Indigo Factories ... ..	825	422

22. These figures will show you at a glance our present situation in relation to the principal industries carried on by steam in India. In some industries like cotton, we are only at the very threshold of success, and produce only about a fourth of what we ought to produce. In other industries like woollen and jute, we are indebted almost entirely to European capital and enterprise, we ourselves have scarcely made a beginning as yet. In a third class of industries, like sugar and tanneries, we have actually lost ground within the last ten years. While in a fourth class of industries like iron, we are still almost wholly dependent on Europe, the produce of

our own foundries scarcely supplying any appreciable proportion of the requirements of India. I repeat, therefore, what I have already said before :—There is ground for hope but not for joy or elation ; there are strong reasons for earnest and continued endeavour in the future to secure that success which we are bound to achieve if we are true to ourselves.

23. And there is one more fact which I would like to impress on you in concluding this brief survey of our present situation. A great deal of attention is naturally paid to the mill industries of India, and to tea, indigo, coffee and other industries in which European capital is largely employed. We know however, that the labourers who can possibly be employed in mills and factories form only an insignificant proportion of the industrial population of India. Very much larger portion of that industrial population is engaged in indigenous industries carried on in village homes and bazars. India is, and will always remain, a country of cottage industries. Where hundreds of thousands can work in mills and factories, millions and tens of millions work in their own huts ; and the idea of greatly improving the condition of the labourers of India, merely by adding to mills and factories, is only possible for those who form their opinions six thousand miles away. No, Gentlemen, any comprehensive plan of improving the condition of our industrial classes must seek to help the dwellers in cottages. It is the humble weavers in towns and villages, the poor braziers and copper-smiths working in their sheds, the resourceless potters and iron-smiths and carpenters who follow their ancestral vocations in their ancestral homes, who form the main portion of the industrial population, and who demand our sympathy and help. It is they, (more than the agriculturists, or the mill and factory labourers) that are most impoverished in these days, and are the first victims to famines ; and if your *Swadeshi* movement has brought some relief to these obscure and unnoticed millions and tens of millions in India, as I have reason to believe

it has done to a perceptible extent, if it has created a larger demand for their manufactures, widened the sphere of their labours, and brought some light to their dark and cheerless homes, then the movement, gentlemen, has my cordial sympathy. Help and encourage the large industries, but foster and help also the humbler industries in which tens of millions of village artisans are engaged, and the people of India, as well as those who are engaged in the work of administration, will bless your work.

*Difficulties and how to overcome them.*

24 Gentlemen, in saying all this, I do not by any means ignore or minimise our difficulties. We have to recover the ground which we have lost during the last two centuries. We in our ignorance and poverty have to compete with some of the richest, best trained, and most skilful nations on earth. We with our ancient methods have to habituate ourselves to modern ways, to adopt modern inventions, and then to beat modern nations who made those inventions. It is a duel with Western nations with weapons of their choosing; and with those weapons with which we are still unfamiliar, we must face and conquer those who are past masters in their use. With the produce of our infant mills and our infant iron foundries we must oppose the overwhelming flood of manufactured goods which England, Germany and America are pouring into India.

25 The danger of extinction with which our industries are threatened is therefore imminent. Keep to your conservative methods, cling to your orthodox ways of work and your industries must perish. Such is the inexorable law of the survival of the fittest, and such the admonition which a true Swadeshi movement ought to give you. If the rush of the steam engine and the whiz of electricity, combined with cheap and easy means of transport, have succeeded in dumping

Duel with Western Nations with weapons of their own choosing.

Threatened danger of extinction.

your Bazaars with the cheap and attractive products of foreign marts, rise to the occasion and learn how to withstand this inroad with intelligent anticipation and skilful adaptation. Learn to force nature into a corner; accost her and bring out her inmost secrets. Harness her powers, tackle her energies, and make of her a handmaid unto man. Work nature to the relief of man's estate. Any competition between skill, capital and organised enterprise on the one hand, and ignorance, idleness and poverty on the other, can only have one result. Learn to combine and co-operate; learn the value of time and the use of money, and the chances of a fairer fight will eventually requite all your efforts.

26 Swadeshism can be a genuine economic force under the above conditions. It can be a potent weapon of usefulness if properly understood. There is no economic fallacy in that Swadeshi creed that aims at improving the indigenous arts. The genuine Swadeshi ought to secure the maximum of production at the minimum of cost. Patriotism demands that the greater cost and the slight discomfort of using indigenous goods should be cheerfully put up with at the outset. But remember that no such movement can be permanently successful unless it involves a determined effort to improve their quality and cheapen their cost, so as to compete successfully with foreign products. The most rigid economist will then have no flaw to find in your Swadeshi armour.

27 A single instance of the pitiable straits to which our industries have been reduced, on account of the difficulties mentioned above, will suffice. The export trade of Indian cane-sugar has now become almost a matter of past history. The invasion of German and Austro-Hungarian beet root sugar has driven away Indian sugar from its own stronghold. In spite of the imposition of countervailing duties and extra tariffs the bounty-fed sugar from Europe beats the Indian

refiner hollow on his own field; and it is curious to observe how the cane sugar of India has suffered in the struggle. The reason is not far to seek. Laws can cure only artificial anomalies; the levy of extra duties can countervail only the adventitious advantage of bounties and subsidies; but what can remedy causes of mischief that lie deeper, ingrained in the very constitution of the Indian grower and inherent in the very conditions under which the Indian refiner has to work? The demand for consumption of Indian sugar is large enough; it is even larger than the local refiners can supply, yet the cost of production is so excessively inflated that it pays more to import the cheap beet sugar, grown fat on foreign bounties, than to bring the products of her own growing into her markets. The growers and refiners pursue a process involving extravagant waste of raw material; and ignorant of the latest inventions of science or art, they adhere to the methods inherited from their sires with a hide-bound orthodoxy.

28 The same deficiency in improved methods and perfected machinery has also led to the ruin of the tanning industry of Madras. The curing and tanning of skins by an improved process in America has been found more suitable and more economical than the purchase of skins tanned in India. Similarly the manufacture of synthetic indigo, like other coal tar preparations, has effected a revolution in agricultural chemistry; and the quantities of artificial indigo that the German factories have dumped into the markets of the world at very cheap rates, have a very depressing influence on the indigo trade of Bengal. The exports of indigo which in 1895 amounted to about 53 millions in value, dwindled down to the low figure of 6 millions 10 years later, and the decline has been so rapid that it has been a cause of alarm to an optimist of even a thorough Micawber type. Dyes of no less value than 75 lakhs of rupees were poured into the Indian vats from Germany, Belgium, and Holland in 1905; and these

products of aniline and alizarine dyes have completely ousted the Indian dyes from their own markets.

29 It thus becomes imperative on all of us to endeavour to minimise this helplessness and enrich the industrial resources of our country. The trade returns of India are an instructive study. They tell us that in 1905, fully 69 per cent of our exports were represented by bulky agricultural produce, which gave no employment to local skill and capital, save that employed in tillage. With regard to the total imports in that year, on the other hand, fully 59 per cent of the entire amount represented manufactured articles, with reference to which we did not know how to supply our own wants, and had to depend upon foreign skill, foreign capital, and foreign enterprise. A fair criterion of the industrial development of a country may safely be sought in the proportion of its exports of manufactured goods to the export of raw material from the country; and secondly in the proportion of its imports of raw material to the imports of made up or finished goods. The industrial prosperity of a country may be said roughly to vary directly with its exports of manufactures and imports of raw material; and inversely with its exports of raw produce and imports of manufactured goods. This is a safe and reliable canon of industrial economics. One more sad and prominent feature of the foreign trade of India is the constant excess of export over imports which is not conducive to the prosperity of the people.

30 Our serfdom to foreign capital and enterprise can scarcely be more complete. Our Railways, are financed by capital from Europe; our mines are exploited by savants from America, and even in our daily household needs our dependence upon products of foreign marts continues from day to day. We are being fed and clothed, diverted and entertained, lighted and washed, warmed and

comforted, carried and housed, by the foreign artisan. Our arts and industries are standing to-day on the brink of a precipice, and are threatened with imminent extinction. The problem of saving the country from this perilous plight, and emancipating her from economic slavery to the nations from the West has become the one topic of absorbing interest; and to find out a cure for this malady has become the one anxious thought of every patriot, and of every statesman. You, gentlemen, have already bestowed your earnest attention to this subject, and I need therefore only make mention of the industries which appear to me to be capable of great progress in the immediate future. The list is appended below:—

1. The textile industry.
2. Carpentry and other wood work.
3. Iron, copper and brass works.
4. Work in gold and silver and jewellery.
5. Masonry and stone works.
6. Pottery and brick and tile making.
7. Dyeing.
8. Tannery and leather works.
9. Rope weaving.
10. Cane and bamboo works, mat making & basket weaving.
11. Glass works.
12. Turnery and lac works.
13. Horn and ivory carving.
14. Embroidery.
15. Sugar rehinery.
16. Tobacco curing and
17. Oil and flour Mills.

31. Out of these industries we might select, to begin

Raw material sent abroad for finished products. with, those for which there is a large demand in our home markets, and whose raw material we have been at present exporting in ship loads for working them into finished



products abroad. In the place of large exports of raw vegetable products our endeavour should be to send out large cargoes of manufactured and finished goods. In 1905 we exported oil seeds of the value of 106 millions of rupees, and imported oil of the value of 22 millions. Our oil factories in the Bombay Presidency are said to have supported only 76 operatives at the last census. There is an indefinite scope for the expansion of this manufacturing industry in the country. Oil pressers have diminished by 47 per cent during the last decade, as it was found more profitable to export oil seeds, and import pressed oil from abroad, than to press it at home by crude and antiquated processes. Besides, as Dr. Voelcker has pointed out to us, to export the entire oil-seed is to export the soil's fertility.

32. Moreover every year we export large quantities of wheat and other grain to be ground in foreign mills and import large quantities of flour for our use; while the wheat grinding mills in the Bombay Presidency afford no employment to more than 78 operatives as the figure for the last census informs us. These are instances of the low state of our industries and of the difficulties under which they suffer. It should be your aim and endeavour to face and conquer these difficulties, and a wise and sympathetic legislation should help your effort and lead you to success.

33. Four years ago, I made some remarks at Ahmedabad which with your permission I will repeat to day.

“ Famine, increasing poverty, wide-spread disease—all these bring home to us the fact, that there is some radical weakness in our system, and that some thing must be done to remedy it. But there is another and larger aspect of the matter,—and that is that this economic problem is our last ordeal as people. *It is our last chance.*

Fail there, and what can the future bring us? We can only grow poorer and weaker,—more dependent

on foreign help. We must watch our industrial freedom fall into extinction and drag out a miserable existence as hewers of wood and drawers of water to any foreign power which happens to be our master. Solve that problem, and you have a great future before you, the future of a great people, worthy of your ancestors and of your old position among nations."

34. These are words which I spoke at Ahmedabad ; and I repeat them to-day, because we feel the importance of them, perhaps more than we felt four years ago. We are at a crisis in our national history. The time has come, when we must make arduous and united endeavours for securing our industrial independence or we shall sink again perhaps for centuries to come. We must struggle and maintain our ancient position among the industrial nations of the earth, or we shall be betraying a sacred trust, and be false to our posterity.

35. I am sure you will not accuse me of exaggerating the gravity of the present situation. I am sure you all feel, as I feel, that if we do not, at the present critical time, free ourselves from that industrial serfdom into which we have allowed ourselves to sink, we have no hope for the future. This, as I said before,—is *our last chance*.

#### *Exhibitions and Conferences.*

36. And now, gentlemen, you will permit me to say a few words with regard to the work you Exhibitions and Conferences have had an educative effect. have undertaken, and the methods by which it can best be done. At a critical juncture in our country's industrial history, the Indian National Congress conceived the *happy* idea of having an Industrial Exhibition in connection with their annual gatherings. From the very first, the Indian and the Provincial Governments rendered every assistance in their power to

make these Industrial Exhibitions a success; and I may add that all classes of the Indian population,—Hindus and Mahomedans, Englishmen and Parsees, merchants and manufacturers, graduates, rich land-lords and humble citizens have worked harmoniously towards this common object. These annual exhibitions fulfil a double purpose. First they inspire manufacturers with healthy emulation, and enable them to make the products of the different provinces known to all India; and in the second place they enable traders and dealers in articles of daily use to obtain accurate information, and collect articles from all parts of India for the use of purchasers in every province and town. These Exhibitions have been a success; but let us not deceive ourselves. Compared with the wealth, the variety, the magnitude of Western products as I have seen them abroad, the results we have achieved here are meagre, indeed. An Exhibition like this simply serves to emphasize our backwardness in utilizing the resources at hand. Let us never be satisfied until we attain a standard of perfection that will bear comparison with the Western world. With the sympathetic co-operation of the Government, and the quick intelligence of our people, there is no reason why such a result may not be achieved within a generation or two.

37 Last year, gentlemen, you took a new departure. Not content with these annual Exhibitions, you held an Industrial Conference, and the First Conference was held under the guidance and Presidentship of my Revenue Minister, Mr. R. C. Dutt. The Conference arranged that its work should proceed all through the twelve months instead of being transacted once in the year. It appointed Provincial Industrial Committees at Calcutta, Bombay, Madras, Allahabad, Lahore and Nagpur. And it also appointed a permanent Secretary and Under-Secretary with Head Quarters at Amraoti to compile information, to carry on correspondence, and to help the Provincial Committees in their work;

Last year's work of the Industrial Conference.

all through the year. I am glad to find that this central establishment has not gone to sleep over its work; within this closing year the Secretary and Under-Secretary have collected subscriptions which have more than covered the year's expenditure; they have published in a handy form a Report of the Conference, embodying all the valuable and instructive papers which were read at the time; and they have compiled a Directory,—not complete or exhaustive by any means but a fair beginning,—describing the different industries in the different parts of India. They have also published a very interesting Report of the work done during this year in all parts of India.

38 Gentlemen, all this is a good out-turn of a first year's work,—but you should not be satisfied with this. A greater progress is expected from you in future years. The weak point in the Conference organization seems to me that the Central Office is not in sufficient touch with the Provincial Committees, and is not able to render sufficient help to those Committees to develop the industries of the different Provinces. Besides Provincial Committees, you require District and even Town associations for closer touch with the masses. India is a country of vast distances, and it takes more than a day and a night to travel from Amraoti to some of the Provinces. While the Central Office at Amraoti can do much to help the outlying provinces, the provinces can do more to help themselves. By such harmonious co-operation towards a common object I hope to see the work of the Industrial Conference show a continued progress from year to year. A central organization is needed to co-ordinate all the endeavours that are being made in all parts of India to promote home industries; and the Industrial Conference with its Central Establishment and Provincial Committees was not established a day too soon.

Weak points in the Conference organization.

*General Education.*

39. And now Gentlemen, I desire to place a few practical suggestions before you, such as, from my own knowledge and experience, occur to me. The first and the most important means of promoting our industries is to spread general education amongst the masses. Great and far-reaching changes might be made in the educational system of the country, and I am of opinion that no ultimate solution of our problem will be reached until schools have been provided in every village, and education is taken to the very threshold of the people: until, in fact, education at least in its primary grades has been made free and compulsory throughout the land. I am indeed gratified to learn that the Government of India has already under consideration the policy of making primary education free.

*Compulsory Education.*

40. The experiment of free and compulsory education is a novel one in this country; and yet its novelty must not scare us from our duty. I am not, indeed, prepared at this time to recommend the example of some of the socialistic communities of the West in providing free breakfasts, free baths, free boots, and everything else but free beds. I have, however, endeavoured to introduce compulsory education throughout the State of Baroda, and hope to see my people benefitted by it. The measure was being worked with satisfactory results in one part of the State for a number of years. Emboldened by the success of this experiment, I have decided to make primary education compulsory throughout the State, and absolutely free.

*Technical Education.*

41. Of scarcely less importance at this time of the day is need of Industrial Education. I must confess that it is my recent visit to Europe and to America that has impressed me most with the immense importance of technical education in promoting the Industries of nations. I may state without exaggeration that education has undergone a complete revolution in the West within the present generation. The great armaments of the Western nations, their vast armies and navies, do not receive greater attention and greater solicitude in the present day than that education in industrial pursuits which befits them for the keener struggle, which is continually going on among nations for industrial and manufacturing supremacy.

42. Among the nations on the Continent of Europe, Germany takes the lead in industrial enterprise; and among the many technical institutes of that country the King's Technical High School at Berlin is the most famous. A large staff of professors teach over 1500 students, and applied chemistry in oils and colors as well as dyeing, bleaching, printing on cloths and silks, and leather tanning are taught on a scale unequalled in any other country on the Continent.

43. France is endeavouring to foster her industries and manufactures in numerous industries. The *Musee des Arts et Metiers* of Paris has an extensive collection of machines and models of machines, and Science and Arts classes are held there on important technological subjects. The French Government manage the Sevres Royal Porcelain Factory and the Gobelines Tapestry Manufactory; and frequent exhibitions are held every year in the Grand and Petit Palais of Paris.

44. Austria is not far behind, and Vienna has technical schools on a smaller scale each teaching some branch of a technical art. Italy has her technical academies; and a polytechnic institute, planned after the Cassanova Institute at Naples, might serve anywhere to collect the best craftsmen and the most promising apprentices under the same roof and extend the moral influence of the teacher to the pupils. All the experts of art would be collected there, and interchange ideas about their trade deficiencies and trade difficulties.

45. In London the City and Guilds' Technical College, the County Council's Schools of Arts and Crafts, under Principal Lethaby and the several Polytechnics, are among the many institutions where a practical training in arts and industries is imparted to the people.

46. The new Universities of Manchester, Birmingham and Leeds pay special attention to technical education, as the older Universities of Oxford, Cambridge and London take up liberal and classical education. The Municipal school of Technology at Manchester is a monument of the enterprise of that great manufacturing town, and teaches Mechanical, Electrical, Municipal and Sanitary engineering, Technical physics, Industrial and General Chemistry, Bleaching, Dyeing, Printing and finishing of textiles, paper manufacture, Metallurgy and various other subjects. Some students from Baroda are engaged in the study of acids and alkali manufacture, and plumbing and sanitary engineering, in this school.

47. But of all the countries which I have recently visited it is America where I found the highest development of Industrial education. Every single State in the United States has a State College where technical education is given to students *absolutely free*. No fees are charged in these State Colleges, because the proper training

Technical schools  
of Austria & Vienna.

Schools of arts and  
crafts in London.

New Universities  
in England.

Highest develop-  
ment of Industrial  
education in America,  
State Colleges.

of citizens in technical arts is considered a matter of national importance, and lands and annual grants are assigned by the States for the maintenance of these colleges. Every State College teaches agriculture and engineering, and also gives some training to the students in military tactics. Other subjects are also taught according to the resources of these colleges.

48. Besides these State Colleges there are some 43  
Privately endowed  
Institutes all over the  
United State.      privately endowed Technical Institutes  
all over the United States, where Engineering  
is taught in all its branches; Civil,  
Electrical, Mechanical and Marine. Architecture, Drawing,  
Modelling and Textile Industry are also among the subjects  
taught. The great Institute of Technology at Boston with  
its 2,500 students, the Armour Institute at Chicago with its  
2,000 students, and the Pratt Institute at New York with its  
1,500 students, are the best known among these privately en-  
dowed Technical Institutes.

49. I need hardly add that the great Universities like  
Universities like Harvard, Yale and Columbia also teach  
Harvard, Yale and Columbia.      Engineering in all its branches; and  
what will surprise you more, almost every  
High School has classes for Manual Training, comprising  
carpentry, smithy and machine shop.

50. I have not yet visited Japan, but we all know what  
Triumph of Japan      Japan has done within the lifetime of  
industries,      one generation. Her victories in the  
battlefield have lately brought that wonderful land among  
the foremost nations on earth; but the victories of Nanshan  
and Mukden are not more brilliant than the triumphs of  
her industries achieved by a system of technical education  
which leaves very little to be desired.



*Manual Training.*

51. My second suggestion to you is that, besides establishing Technical schools, you should endeavour to introduce some Manual Training in the ordinary schools. The training of the eye and of the hand at an early age is useful to all,—Even to those who have not to support themselves by manual industry in life. Early lessons in drawing and modelling, simple instructions in carpentry and smith's work, are good for all students in all ranks of life. Physicians and psychologists tell us that such exercises, by introducing a variety in the course of studies, really refresh and help the brain and make boys and girls more capable of acquiring both learning and arts. And moreover, to attach some industrial classes to our ordinary schools would have the healthy effect of giving a complete and not one sided education to our children. The richer classes would be brought more in touch with the humble industries; the poor classes would acquire that skill and facility in handling tools which can be only acquired at an early age; all people in all branches of life would be impressed with the dignity of manual labour more than they do now in India; and your great endeavour to promote the industries of the land would be greatly helped when the nation receives an elementary technical training in schools. At the same time it is necessary to bear constantly in mind that no amount of specialized training in manual arts can fill the place of that liberal education and general culture which should serve as the necessary substratum for all kinds of learning. Technical training is a supplement, but not a substitute, for general education, and should never be turned into a fad.

*Education abroad.*

52. I have tried to impress on you, gentlemen, the importance of founding Technical schools, and of introducing Manual Training in our ordinary schools, throughout India. Years will, however, pass before this can be done on an adequately extensive scale, so that India can take her legitimate place among the nations of the earth in industrial education and mechanical inventions. It follows, therefore, that, for years and perhaps generations, you must send your young men to Europe, America, and Japan for that complete Industrial training which they cannot yet receive at home. Make no mistake, and let no time-honoured prejudices deter you from travelling to other parts of the earth, and receiving that new light, that new culture, those new ideas, which even the most gifted and advanced nations always receive by mixing with other nations, and which India needs perhaps more than any other civilized nation. The healthy results of foreign travels, and of comparing notes with foreign nations, are already manifest in India in every department of life within the last fifty years. Nothing impressed me more upon my recent return to India than the changed attitude of many of my countrymen towards foreign institutions. Men of all ranks have been eager to learn my impressions of Western nations. Such a spirit of inquiry is always healthful if it proceeds from a sincere thirst for knowledge. I was much interested in learning while in America that some two or three thousand students every year go abroad to absorb the best of European methods in Education and in Commerce, while the National Government sends men to all parts of the world to study the products of other lands. England, Germany and France, with all their commercial prestige, do not hesitate to send inquires to foreign parts. Coming near home, we find that hundreds of Japanese young men complete their

education in France, Germany, England and America. Such is the desire for knowledge, and the whole-heartedness of the latter, that not only do they acquire a special education in whatever subject they may be engaged, but they also provide themselves with the means of livelihood, not shrinking from the humblest occupations of life.

53. Japan profited most by sending out her youths to Scholar statesmen of the seminaries of Europe. She owes her Japan. present greatness to that illustrious band of her scholar statesmen, who imbibed the first principles in the science of politics and the art of government at the Universities of Gottingen and Leipzig. She is to-day the mistress of the Eastern seas because of her student sailors, who acquired their first lessons in naval warfare in the docks of Tilbury and Portsmouth. Her battles are fought and won by her soldiers who got themselves initiated into the mysteries of manœuvring and the secrets of stratagem on the plains of the Champ-de-Mars and Rastadt. And she bids fair to assume the supreme place in the trade of the Orient on account of her scholar financiers, who have rubbed shoulders with bankers in the counting houses of London, Berlin and New York. Has the world ever seen a nobler instance of young men architecturing the fortunes of their mother-land? Can we conceive a higher example of patriotism for India's sons to emulate? Let us follow their spirit of self-sacrifice and devotion; let us hold up their ideal of national unity and social equality; learn their eagerness to acquire the newest methods in all walks of life; imitate their perseverance and patient toil; and we may yet save the fortunes of our country.

54. I have learnt with pleasure that an earnest and patriotic Organization of Mr. worker of this province, Mr. Jogendra J. C. Ghose's Scheme Chandra Ghose, the worthy son of a worthy me. father, has organized a scheme for sending young men to Europe and America for education; and that a large number of students have already been sent in accordance with this scheme. Nothing gave me greater pleasure, while

abroad, than coming in touch with several Bengalees who were studying in Europe and America. Although far away from India, they had the kindest and most patriotic feelings for their native land. India is to be congratulated in having such men. This policy has also been pursued by the State of Barada for many years past, and young men, educated in Europe at State expense, are now serving the State with credit, or finding profitable employment in other parts of India. Several young students have lately been sent to England and Germany, America and Japan; and a scheme is now under consideration to send a limited number of students at regular intervals, mainly to learn the methods of modern industry.

55. Gentlemen, India today is at the parting of ways, and possibilities before her are great possibilities before her, India. The people of Bombay for instance are looking forward to the use of Electricity generated in the Western Ghauts, for working their mills. The people of Madras are looking forward to the experiments made in "tree-cotton." All India looks forward to the happiest results from the Research Institute for which we are indebted to the late lamented Mr. Tata. There is stir in the air; and the people are showing signs of awakening. This is hopeful; but let us not forget that years of patient toil are before us, that it is only by patience and perseverance, that we can ever succeed in competing with the West in industrial pursuits. We need the spirit of determination, of courage, of confidence in ourselves and in each other; we need to distinguish between essentials and non-essentials, between the spirit that vivifies and the letter that kills. Let our energies be not distracted in small things.

56. I now desire with your kind indulgence, to add a word on the lessons that seem to me to arise from the experience of different nations—lessons which are pertinent to India at this juncture. Turning to ancient Egypt, once the centre of the most ad-

vanced civilization of the time, we discover that vast resources—agricultural and mineral—are not alone sufficient to produce a cultured and permanent civilization; though the foundation of all stable civilizations must fall back in the last analysis upon the natural resources of the country. Egypt in the ancient time had abundant resources, but, failing to note the value of human life, failing to conserve the interests of the working masses, she sank from the pinnacle of power and culture into political servitude and academic decay. The nation that despises its humblest classes, that provides for them no opportunity to rise in the social scale and in self-esteem, is building its house upon the sand. The wealth of a nation is the quality of its manhood.

57. Greece fell from her eminence not from any failure of philosophical or æsthetic or political insight; in these directions she has been the chief source of inspiration for the whole Western world. Pericles, Plato and Aristotle are still household names in the West. Athens faded away like a fragrant memory because she failed to look to the economic bases of her prosperity. Had she taken pains to utilize her splendid maritime location for the development of commerce and industry; had she confided her commercial affairs to her freemen instead of her slaves; had she applied the sagacity of her statesmen to the formation of a sound fiscal policy; the story of Athens might have had a different *denouement*. But she wasted her mineral resources, and expended large sums in the erection of great temples of worship and art and learning. Far be it from us to suggest any criticism against a civilization which has been the fountain head of all subsequent growth in the culture of the West. I would simply point out that without a permanent and stable economic policy, no civilization, however enlightened, can long endure. This is the message of ancient Greece to modern India. Be careful of large expenditures, either individually or collectively which are unproductive. Bid her people forget their cast

and tribal prejudices in the common effort to uplift the fortunes of India; bid them find expression for their religious enthusiasm in practical co-operation for the uplifting of humanity-of the human spirit in the temple of God. Bid them be free men, economically, socially, and intellectually; and no power under Heaven can long keep them in servitude.

58. Rome, too, has its lesson for India. In the complex

Rome: importance of independent industries. and far-reaching series of disasters, which led to the downfall of Rome, it would be difficult indeed to designate any one

factor as the premier cause of the catastrophe. But of this we may be sure, that the highly centralised and paternalistic Government which developed under the later Cæsars, was a potent cause of weakness to the Empire. Private initiative and individual responsibility gave place to State operation of manufactures and industry. Insufficient currency and military oppression drove the husbandman from his plough and the merchant from his counter. The people looked to the Cæsar for corn, and out of the public treasury the hungry were fed, if they were fed at all. The Emperor ruled by force of arms, manufactures were operated by a system of forced labour under the strictest surveillance of the State; the civilian was forced into idleness and vice; the masses into pauperism and dejection. The national spirit decayed, and Rome fell an easy prey to the ravaging hordes from the North.

59. At this crucial period in India's emancipation, we

Co-operation is the crying need of the hour. shall need to keep constantly in mind the failure of Rome. No permanently sound and stable development can occur

unless we take pains to educate the masses of our people to a sense of their paramount importance and dignity in the social structure. I conceive it to be the prime duty of the enlightened and well-to-do amongst us to rouse, to stimulate, and to educate the lower classes. We should help them to help themselves. But ever let us beware of paternalism. Not charity but co-operation is the crying need of the hour.

60. Let our people as rapidly as possible be educated in the principles of economics, and let special pains be taken for the development of an honest, intelligent, *entrepreneur* class, who will be content to organise and manage our new industries without sapping their life by demanding exorbitant profits.

61. Ancient India too has lessons for us. I have already spoken of India's rich products and her brisk trade with the West in ancient times. But her mechanical inventions were slow because mechanical work was left to hereditary castes, somewhat low in the scale of society. Our sculpture does not compare favourably with the sculpture and architecture of ancient Greece, and our mechanical progress does not keep pace with the mechanical inventions of modern nations, because our intellectual classes have been divorced, for centuries and thousands of years, from manual industry, which has been left to the humbler and less intellectual classes. In literature and thought we need fear no comparison with the most gifted nations on the earth. The genius for craftsmanship is also among the people, as is evidenced by the ingenuity and the skill of our artisan classes. Make industrial pursuits the property of the nation, instead of the exclusive possession of castes; let sons of Brahmans and of learned Moulvies learn to use tools in their boyhood; let every graduate, who feels a call towards mechanical work, turn to that pursuit in life instead of hankering after salaried posts; and I am convinced the national genius will prove and assert itself in industries and inventions as well as in literature and thought.

62. Turning to the Western World of modern times, we discover lessons of the utmost importance for India at this time. As I look back over the last several centuries which have raised the nations of the West from the darkness of mediævalism to their present high degree of civilization, it seems to me that four historical movements are plainly discernible as important factors in that development.

Four important movements of modern times.

63. The first movement to which I refer is the capitalistic programme of the last few centuries. I do not need to dwell before such an audience as this upon the advantages of a capitalistic organisation of industries, with its attendant system of credit banks and exchanges, with its economy of production and its facility of distribution. In the scientific application of capital we still have many things to learn from the nations of the West.

64. For this reason I am firmly convinced that we need to devote large sums to the founding of chairs of economics in our colleges, and to the training of our young men in the subtle problems of finance. Let the brightest of our young patriots be sent to Western Universities to master the principles of economic policy.

65. The second movement in the West is the taking of social, political and commercial affairs, which are purely secular in nature, out of the hands of the priests. In the 13th century the Church of Rome and her minions dictated not only matters of religious import but reached out in many directions to control all the relations of life, both individual and collective. For three centuries the popular will struggled against the secular tendencies of the Church, until led to open revolt by Martin Luther. Since that revolt the principle has been firmly established, and is held with special vigour in America, that the realm of the Church is in matters of moral and metaphysical import, and that social, political and commercial relationships must be left to the individual conscience of those who participate in them. And in this connection I merely desire to point out that in so far as India's religious ideas tend to keep many of our brightest and best minds out of practical affairs, out of the scientific, political and commercial movements of the time, by so far do those religious-philosophic systems stand in the way of her progress towards economic independence. Why have the people of India been



trading in grasping the scientific principles of Western industrial organisations? I shall not presume to answer the question at any length but content myself with suggesting that we must, as a people, look well to the religious and social foundations of our national life.

66. Break the monopoly of caste prerogatives and social prerogatives. They are self-arrogated, and are no more inherent in any one caste than commercial predominance or political supremacy in any one nation. Learn the luxury of self-sacrifice; elevate your brethren of the humbler castes to your own level; and smooth all artificial angularities. Always appraise action more than talk, and ever be ready to translate your word into deed.

67. I desire in the next place to call your attention to the development of development of national spirit. Throughout Europe of the last two thousand years there has been constant progress in the unifying and the solidifying of national life. Petty States and warring Principallities have given place to strong, compact and homogeneous nations, each possessing decided national characteristics, and each working through the patriotic impulses of all its people for the preservation of the national ideal. Now I find in my reading that the most frequent criticism is that we are disunited, many-minded, and incapable of unselfish co-operation for national ends. If this criticism is true, if it is true that India is a mass of small, heterogeneous peoples unfitted for independent national existence, then it behoves us as intelligent men and patriots to put in motion the principles of unity and co-operation. To this end I favour the adoption of a national speech and the inculcation of a national spirit.

68. And the last movement to which I would direct your attention is the development of Science in Europe during the last hundred and fifty years. The story of that develop-

ment reads like a romance of the olden time. Within that period have been developed railways, steamships, electric telegraphs, the telephone, friction matches, gas illuminations, knowledge of electricity in all its multiform applications, phonograph, Rontgen ray, spectrum analysis, anæsthetics, the modern science of chemistry, the laws of molecular constitution of matter, conservation of energy, organic evolution, the germ theory of disease, and many others of the utmost practical importance in modern life.

69. I submit, my friends, that India's part in this wonderful movement has been shamefully small.

India's failure in scientific lines. Can it be true, as one writer has said,

that some "strange feat of arrest, probably due to mental exhaustion, has condemned the people of India to eternal reproduction of old ideas?" I cannot believe that the intellectual power of India is exhausted, nor can I believe that her people are no longer capable of adding to the sum of human knowledge. We have an intense and justifiable pride in the contribution of our sages of by-gone days to the philosophic, the literary, and the artistic wealth of the world. It should be our chief pride, our supreme duty, and our highest glory, to regain the intellectual supremacy of the ancient days. The atmosphere of the West is throbbing with vigorous mental life. The pursuit of *new* truth is the first concern of every stalwart mind of the West, while the mass of our people are content to live stolid, conventional lives, blindly following the precepts of the fathers, rather than emulating the example they set of intellectual independence and constructive energy. I cannot do better than close my remarks with those fine lines of the Poet Mathew Arnold:—

"The East bowed low before the blast

In patient, deep disdain;

She let the thunder past.

Then bowed in thought again."

70. I would not for a moment have you think, my friends, that I return from the West a convert to Western ideals, or in any sense a pessimist concerning the future of India.

Evils of Western civilization to be avoided.

There are many defects in the Western civilization that no impartial student of affairs may ignore. The evils that have grown up in the centralizing of population in the great industrial cities constitute, in my judgment, a serious menace to the future of those races. There are weighty problems of morals, of administration, of public health, which the West, with all its ingenuity, has not been able to solve. There is the internal conflict between capital and labour which is becoming more acute as time goes on. Nor can one visit the great commercial centres of the West without feeling that the air is surcharged with the miasmatic spirit of greed. Everywhere the love of display and the sordid worship of material wealth and power, has poisoned the minds of the people against the claims of the simple, homely life, which the Indian, in his love for the things of the spirit, has cultivated since history began.

71. It may be the mission of India, clinging fast to the philosophic simplicity of her ethical code, to solve the problems which have baffled the best minds of the West, to build up a sound economic policy along modern scientific lines, and at the same time preserve the simplicity, the dignity, the ethical and spiritual fervor of her people. I can conceive of no loftier mission for India than this: to teach philosophy to the West and learn its science; impart purity of life to Europe and attain to her loftier political ideal; inculcate spirituality to the American mind and imbibe the business ways of its merchant.

*Vote of thanks to H. H. the Gaekwar.*

The Hon'ble Sir Chandra Madhub Ghose, in proposing a vote of thanks to His Highness the Gaekwar said:—I have been asked to perform here a very agreeable duty and that

is to propose a vote of thanks to His Highness the Gaekwar of Baroda (cheers). I must confess, however, that I feel somewhat nervous in addressing you on the present occasion, and the nervousness is due to one single fact. And that is this. His Highness has been so graciously pleased as to extol my son Jogendra Chandur Ghose in connection with the work he is doing in the field of industrial and scientific research. However, that may be, being called by my friends around me here to do a duty, I must discharge it to the best of my ability though I may say to you that I was not prepared for a speech because I did not know that I would be called upon to say anything. Gentlemen, I see around me vast crowds of people of all ranks and creeds and I believe that this concourse of people is owing to two circumstances—the first, the very great importance of this Conference and secondly the expected visit of His Highness the Gaekwar (cheers). Gentlemen, you have already heard—I suppose you must have read that His Highness returned from Europe only about the middle of November last and notwithstanding the many calls upon his time and attention in connection with the affairs of his state, as he himself has condescended to tell you, he has taken the trouble of coming up here at such a great sacrifice of time and labour (cheers); and you have heard the speech which he has made on the present occasion. The speech, if His Highness will permit me to say is not only instructive but is most exhaustive and patriotic. Every word that he said ought to be thoroughly considered and followed. Gentlemen, at this place, unlike the Congress, there cannot be a difference of opinion. To this place every one, whether he is a public servant or is only a private individual, is quite welcome to come, and I may tell you that it gave me the greatest pleasure when I received the invitation from your Chairman to come here to-day and also when I heard that the Gaekwar was going to speak on the present occasion. Gentlemen, I will not take up any more of your time. Indeed as I have already told you, I was not

prepared to make a speech. I would again ask you to weigh every word that His Highness has said to you on this occasion and do what you think best in the present state of the country. All that I would ask you to do is to join with me in the vote of thanks to His Highness which I propose and I would ask you all to rise up and carry the resolution with acclamation.

The audience rose to their feet and carried the resolution amidst much enthusiasm.

### ELECTION OF THE PRESIDENT.

His Highness The Maharajah of Mourbhanj, in proposing the Hon'ble Mr. Vithaldas Damodar Thackersey to the Presidential Chair said :—

Gentlemen, it has now devolved upon me to propose the election of the President of this Conference. The Gentleman whom I am going to propose holds an eminent and honourable position in the world of Commerce and Industry and no less in other spheres of activity. By his manifold virtues he is eminently qualified to preside over the deliberations of this important Conference. His name is well-known to all of us and I believe he stands in no need of introduction. Gentlemen, I beg to propose that the Hon'ble Mr. Vithaldas Damodher Thackersey take the chair.

The Hon'ble Mr. G. M. Chitnavis in seconding the resolution said :—

The Hon'ble Mr. Vithaldas is one of those commercial men of Western India who have made their mark in the Industrial world. His interest in Industrial matters is well known as could be seen from the marvellous success that has attended his endeavours in arranging that great Exhibition in BOMBAY two years ago. He has a large interest in the Mill Industry of the Western Presidency being the Proprietor of several Mills. He is one of those merchant Princes whose name is synonymous with everything that is successful in the Industrial enterprises in the Western Presidency and as such he eminently deserves to preside over this great assembly. I therefore gladly second the resolution.

*The motion was carried amidst acclamation.*

The President:—Before I proceed with the business of to-day I have to place before you a telegram which I received from the Hon'ble Munshi Madholal of Benares, in which he conveys his "sincere and hearty good wishes for the great success of the Conference. God help the Conference. Extremely regret for absence." I will now request Mr. R. C. Dutt, President of the last Conference to lay before you the report of the year's work of our Committees of the Conference.

#### MR. R. C. DUTT'S SPEECH.

Mr. R. C. Dutt who on rising was received with cheers, said:—

It is my pleasant duty to lay before you the Report of the First Industrial Conference, held last year at Benares. Along with it I wish to place before you a Report of work of the Conference during the year which is about to close. And lastly I ask your permission to present you also with a very useful Directory of Indian Industries and Indian goods which has been published by the Conference Office.

The First Industrial Conference was held in December 1905; and, as you are all aware, the first year is a critical year in the life of all institutions. The rate of infant mortality is, I am afraid, very high among our Indian institutions; but you will be glad to learn, our institution shows every sign of a strong, healthy and useful life. I ask you all, ladies and gentlemen, to join your good wishes with mine for the well being of this promising and hopeful child, whom I make over to-day to the fostering care of our new President the Hon'ble Mr. Vithaldas Thackersey.

Our object at the First Industrial Conference was three-fold. In the first place we wished to collect a body of expert opinions on the different industries of India in a series of

papers which would be useful to all of us for reference and for guidance. Our second object, was to make our institution, not merely a deliberative body,—discussing industrial questions during one day in the year,—but a working body, doing some useful work all through the year. And our third and last object was, not to try and do this work all over the vast Continent of India from one Central Office, but to create Provincial Committees in all the large Provinces to promote, organise, and supervise industrial enterprises, and to compile necessary information. In fulfilment of our first object we invited gentlemen who had devoted their time and attention to the study of special subjects to favour us with their views and opinions, and our invitation met with a most cordial response. The series of papers which you will find in this Report are written by some of the ablest men in India,—Government servants and private gentlemen,—and I know of no other handy and popular work, published in India, which contains within the same limits such valuable and practical suggestions relating to agriculture and Agricultural Banks mining and minerals, cotton cultivation and mills and hand-loom, industrial education and Indian industries. To mention a few among the papers,—you will find in this volume a most valuable one on the cotton industry by the Hon. Mr. Vithaldas Thackersey of Bombay, who so worthily fills the chair to-day; and you will find another on cotton cultivation by Raja Pyari Mohan Mukerjee of Bengal. You will find interesting papers on Co-operative Credit by Mr. Hope Simpson and Sir Frederick Lely, and papers on minerals by Mr. Holland and Rao Bahadur Joshi. The late Dewan of Travancore ably explains the necessity of a College of Technology in India; Mr. N. G. Mukerjee writes on sericulture; and Mr. Havell and Mr. Chatterton, who have done so much for promoting our Indian industries, write on hand-loom, on chrome leather, on aluminium, and on other industries. To these, and to all other gentlemen who contributed papers to the First Industrial Conference, I take this opportunity of conveying, once more,

the cordial thanks of the Conference; and I believe their collective work will be a most useful guide to us in our labours for many years to come.

Our second object was to make arrangements for carrying on our work all through the year, instead of being satisfied with one day's deliberation. For this purpose we established a Central Office, and we were fortunate in getting so energetic, so zealous, so able a worker as Rao Bahadur Mudholkar to be our Honorary Secretary. He has devoted himself to this great task, and the success which he has achieved within the period of a twelve month in carrying out our aims and objects is recorded in this volume. Mr. Mudholkar has been ably assisted by his Under Secretary. Mr. Chintamani, an untiring and zealous worker, who has within this year, visited the different Provinces of India, helped the Provincial Committees, compiled information, and has done much to promote our objects. He is peculiarly fitted for this work; and I believe it is in contemplation to allow him an assistant in the coming year, so that he may have more time to help in the work which devolves on the different Provincial Committees. I am glad to be able to add that the subscriptions we were able to raise have covered all our expenditure; and I may remark that three public-spirited men of Baroda State came to our rescue, and subscribed Rs. 500 each, when we were threatened with a deficit.

Our third and last object was to organise Provincial Committees in all the large Provinces of India, and you will be glad to learn that this important work has been done. The Bengal Committee is fortunate in getting Mr. S. R. Das to act as Honorary Secretary, and the Bombay Committee is equally fortunate in getting Mr. Lalubhai Samaldas to act in the same capacity. An Industrial Association, which had been founded in Madras, consented to work as the Committee of that Province; Dewar Bahadur Krishnaswami Rao, of Travancore fame, is its President; and Mr. Subramania Iyer and Mr. Hanumant Rao are its Secretaries. I have only to



add that the United Provinces Committee has appointed Mr. Bhargava as Secretary and the Punjab Committee has elected Mr. Mulkraj in the same capacity. The Provincial Committees have thus been organised, and a beginning has been made for continued and well-concerted work, all through India. It is hoped that, with a greater degree of co-operation between the Central Office and the Provincial Committees, our organisation will be able to show a good outturn of work in the future from year to year.

So far, gentlemen, I have dwelt on the organisation and work of the Industrial Conference of the last year. But I would like to add a few words on the industrial activity which the whole country has manifested during the year now closing. And, first of all, we must all gratefully acknowledge the grant of Rs. 5 lakhs, which the Government of India has allotted in the current year's budget for this purpose, one half of which, approximately, is for technical education. It is a small grant, considering the requirements of this vast country, but we acknowledge it with gratitude,—as gratitude has been described as a lively sense of greater favours to come.

Our countrymen have also shown a laudable activity. In Bengal a Technical Institute has been founded, mainly through the liberality of my friend, the talented and patriotic Mr. Palit, whose ill-health we all deplore to-day. The Association for Scientific Education, founded mainly through the exertions of my friend, Mr. Jogendra Chandra Ghose, sent 17 students abroad in 1905, and no less than 44 students this year, for technical education. If the same number of students be sent up year after year to the different countries of Europe and also to Japan and America, I believe our country will greatly benefit, and feel grateful to the organisers of that benevolent scheme.

Two or three mills have also been started in Bengal, and the number of hand-looms has more than doubled within the year, bringing relief to the great weaving population of the Province, and, at the same time, meeting the demand of

home-made cloths which is increasing all over the Province. I am glad to add that the Indian Stores Limited, for which the country is indebted to the Hon'ble Mr. J. Chaudhuri, is now on a sound commercial basis, and similar Stores are multiplying all over the country.

Among the great captains of industry and enterprise in the Bombay Presidency, the name of the late lamented Mr. Tata stands foremost in the hearts of his countrymen; and the Iron and Steel Company, which he tried to organise, is engaging the attention of his worthy sons. Two Indian Banks have recently been started in Bombay,—one of them mainly through the exertion of our worthy President, the Hon'ble Vithaldas Thackersey:—and an Insurance Company has been floated under the auspices of our veteran leader and patriot, Sir Pherozshah Mehta. New mills have been started in Bombay, Ahmedabad, and other industrial towns in the West of India, and Indian Stores are also multiplying,—one of the best of them having been lately opened by our Grand Old man, Mr. Dadabhai Naoroji.

Madras has been busy during the year with her Industrial Exhibitions, and has started dye-works, weaving factories, and candle and soap factories. And we are all interested in the future success of the Swadeshi Steam Navigation Company, which we trust will yet triumph over all its initial difficulties, and prove a commercial success.

In Benares, which had the honour of being the scene of the First Industrial Conference, the silk weavers have started a Co-operative Association: and several sugar factories have been started at Cawnpore, Shahjahanpore and other places in the United Provinces. We all hope that the endeavours of the brother of the Prime Minister of Nepal, to establish a glass factory near Dehra Dun, will be crowned with success.

The success which has been already achieved in the Punjab in turning out glass-ware of a superior kind will be attested to by all who were at the Industrial Exhibition at

Benares last year, or who have been at the splendid Calcutta Exhibition of the present year. Recently, a Spinning and Weaving Mill has been started at Lahore, a Handloom Weaving Company at Jullundar, and a Woollen Manufacturing Company at Amritsar. Indian Stores have been opened all over the province.

Lastly, the Central Provinces and Berar have been busy with their exhibitions, and a Spinning and Weaving Mill and other industrial enterprises have been started at Akola.

These, Gentlemen, are a few of the indications of a healthy industrial activity which is visible to-day, all over India. The Industrial Conference claims no credit for this activity, for the conference itself is one of the results of the spirit of the age. There is a movement which is growing and spreading, day by day, over the whole continent of India, which the nation has begun earnestly, and which the nation will not let die. The Swadeshi movement is an Industrial Revolution, more far-reaching in its effects than many political revolutions; and history will record in future ages how the people of India in the commencement of the twentieth century effected their own industrial salvation. Without any control over our own tariff or financial arrangements, without any effective voice over our own legislation or our administration,—such as every other civilized nation on earth possesses to-day, and such as we are bound to obtain in the near future,—without any of these privileges which are the birth-right of nations, we have determined, simply by giving preference to our home manufactures, to revive the industrial activity of this vast country, and to improve the condition of our industrial population. The call has gone forth from Province to Province, and from village to village; and unnumbered millions are responding to the call with almost religious fervour. The womanhood of India has nobly joined in this patriotic work and co-operating with us, in fact leading us and we are following in their footsteps. There is nothing new in this, gentlemen, because,

the history of India in the past is luminous with women's work and women's patriotism; and when the history of the present times comes to be written, the work which they are doing at the present day will not compare unfavourably with the work they have done in the past. In this connection I may say with the permission of His Highness that there is no more patriotic lady in India than Her Highness the Maharani of Baroda (cheers), who after a long sojourn in Europe and America, before she came to this country organised a meeting in this Town while she was still in England inviting ladies of rank and respectability from all parts of India; and this morning she was unable to attend our meeting in time because she was herself presiding at the Lady's Conference with the self same object. And every true Indian, Hindu or Mussalman, Parsee, Jain or Christian, co-operates in this "Swadeshi" movement and exerts himself for the industrial progress of his father land. We are yet far, very far from success; but in our heart of hearts we have taken a solemn vow, to work together towards this great object. And when we have passed away, our sons and grand-sons will take up this holy work, and will accomplish what we have begun to-day, giving our country her rightful, her ancient place among the industrial nations of the earth.

I have great pleasure, ladies and Gentlemen, in presenting this volume (copy of the annual report as well as the report of the last year's conference) to His Highness The Gaekwar.

*Adoption of the Report.*

The President :—Before I proceed to express the views I hold with regard to the Industrial regeneration of India, I would ask you, Gentlemen, first to signify your approval to the adoption of the report that has been placed before by you Mr. R. C. Dutt by holding up your hands.

The motion for the adoption of the report was carried unanimously.

## THE PRESIDENTIAL ADDRESS.

The President who in rising was received with loud cheers, then delivered the following address :—

Gentlemen, I thank you heartily, especially the Maharaja of Mourbhunj, for the very kind words in which he has proposed my election to the Presidentship of this Conference.

GENTLEMEN,—It was with much diffidence that I accepted the invitation of the Executive Committee to preside over the deliberations of this, the second Session of our Industrial Conference. While I considered it a very great honour which the Committee wished to confer on me, I yet felt that it was one to which I could not hope to do as much justice as, for instance, His Highness the Maharaja Gaekwar who has just addressed to you words of ripe wisdom from his experience of many lands and his study of many systems, or the 1st President, Mr. Romesh Chander Dutt, whose large administrative experience, wide reading, and sound knowledge of economic and industrial history, pre-eminently qualified him to guide this Conference in the great work that it has undertaken. I allowed myself, however, to be persuaded into accepting the important part that it was proposed to assign to me in connection with this year's meeting, by the consideration that the Conference, being devoted to the advancement of industries and commerce, may be pleased to give indulgent hearing to one who is engaged in these activities, and who may, therefore, be expected to know the more practical aspects of some of the many problems which this Conference may help to solve. I shall not detain you further with personal observations, and for the few that I have already made I offer you my apologies.

Gentlemen,—Whatever doubts might have been felt last year as to the utility of holding an Industrial Conference, I am sure they have been dispelled by the experience that we have already gained. The meeting of the Conference and the circular letters of the General Secretary, the tours made by the

Assistant Secretary in Madras and Northern India, of which a very interesting account has been supplied to us, the admirable report of the Proceedings of the last Conference, and Mr. Mudholker's excellent summary of industrial activities in the country during the year, are all proofs of the success that has attended the efforts of the promoters of the Conference to create public interest in industrial questions. At no period in our history have the thoughts of the people been concentrated so much on the development of Indian indigenous industries. The objects of the Conference have evoked the warm sympathies of Government and of the official and non-official European community, which I consider to be a happy augury of the success of our industrial movement. Differences may arise, they must arise now and then, between the Indian and non-official Anglo-Indian communities, as regards political and administrative questions with which, however, we have nothing to do on this platform. But on industrial and economic questions there is a very extensive field for co-operation and fellow-feeling between them. The Englishman who invests capital and spends his energies in Indian industries suffers equally with the Indian producer from ignorant interference from England, the thrusting of inequitable financial burdens on the rate-payer in India, and the adoption of measures which lead to discontent and unsettlement of the minds of the people. I rejoice to see that this is coming to be recognised in an increasing degree and I may mention as an illustration the strong and unanimous opposition which Anglo-Indian opinion offered, in support of Indian interests, to proposals of one or other of these kinds made in recent years. I am firmly convinced that the promoters of this Conference have displayed true statesmanship and deep insight into the realities of the situation in extending their appeal for sympathy and support to Government and the nonofficial European community; and the response from these quarters which has been received and which is set forth fully in the

excellent Report of the last Conference is, I think, one of the brightest and most hopeful features of public life at the present time. I earnestly pray that the feeling of harmony thus begun will grow in strength and power as the years pass, and that Englishmen and Indians will appreciate to a larger extent the value of mutual co-operation for the material advancement of the country and in the amelioration of the unspeakably wretched condition which is the lot of millions of the Indian people. While on this subject I should not omit to say a word of acknowledgment of the able and extremely sympathetic manner in which the new Commercial and Industrial Department of the Government of India has been administered by the retiring Member, the Hon'ble Mr. Hewett and Mr. W. L. Harvey, the capable Secretary in charge of the Department, and to express the hope that under the new Member who is well-known and justly esteemed in this country, the Department will gain further the confidence and good-will of the industrial and commercial public. The appointment of the Stores Committee and the resolution announcing its appointment, afforded conclusive proof of the great sympathy felt by the present Government of India for the cause of our industrial advancement, and the whole country look to His Excellency the Viceroy, of whose strength of principle and devotion to duty it has had ample proof, not to allow interested intervention to frustrate the just and righteous object with which the Committee was appointed. The Committee has made its Report, and I would humbly suggest the Report should be published at once to enable the public to express its opinion on the recommendations contained in it. The value of such enquiries extends beyond their immediate results. I respectfully submit that we are entitled to have an opportunity of expressing our opinion on the recommendations, before the Government in England or India pronounces its final decision. This is a matter where Indian and Anglo-Indian interests are identical and

this Conference will have the whole country at its back if it elect to approach Government with a prayer for the immediate publication of the Report of the Indian Stores Committee.

*Foreign Capital.*

I have referred to Englishmen who have invested Capital in Indian Industries, and I may not inappropriately make some observations here on the much debated question of Indian Capital *versus* Foreign Capital. The great mistake to be guarded against is that, because certain capital used in India is foreign, it therefore must do harm to the country. It has, of course, to be considered that we ought not to pay too high a price for it. Let us take the instance of Japan, an Asiatic people who have risen to greatness on account of their practical genius, whose industrial conditions are similar in many respects to our own, and whom we are all naturally anxious now-a-days to emulate. All the great statesmen and patriots of Japan are eager to attract foreign capital to their country for purpose of industrial development. It is because they feel that, notwithstanding their skill, enterprise and ability, they are greatly handicapped owing to want of capital. At the same time, when they speak of attracting foreign capital, they do not mean to allow all the profits of the industry to go out of the country. They will not pay more than a reasonable price for it. Their position as an independent State, of course, enables them to regulate the conditions under which foreign capital will be free to engage in the development of the country. But in our country, where the open door policy prevails to the fullest extent, and where already there is a very large amount of foreign capital invested, and, I admit, there is a very large field for it, it is necessary for us to form a general conception of the limits within which its application is beneficial. Let us take our Railways. The capital outlay from the commencement on open lines, lines partly open and on lines



wholly under construction, amounted at the close of the calendar year 1905, to over Rupees 370 Crores." Without maintaining that the Railway Policy of the Government of India has always been dictated solely by the productive needs of the country, I may say that we cannot be enjoying all the advantages of these Railways, the ability to cope with famine, the easy transportation from one part of the country to another, and not least of all our assembling here to-day for the purpose of advancing the interests of the country in various directions, but for the fact that we were able to get this large capital at a comparatively cheap rate of interest from England. Indeed, it is easy to see that the spirit of nationalism that is inspiring our movements to-day would have been impossible but for the network of railways which, annihilating distance, brings the Punjab and Madras, Assam and Baluchistan near to each other and binds the whole country by the common bond of economic and national interests. Apart from strategic Railways, everybody is agreed as to the immense benefits which have been conferred on the country. Even now there are several new lines which may be laid down with the greatest benefit, and which will tap new country and which may give scope for Indian capital, if we can be satisfied with a return of 4 per cent. on the outlay. If we cannot afford to invest money at that rate, is it not desirable that those who are able to do so should lend us the money? Though in the beginning Railways may not earn much, experience shows that their earning power steadily increases with the progress of the country. If Government had allowed foreign investors to construct Railways unconditionally, the high profits and the unearned increments thereof would have gone out of the country for ever, to enrich the original investors after the manner of the American magnates who have the good fortune to be the sole owners of Railways uncontrolled by Government. We owe, therefore, a deep debt of gratitude to those who, with clear

foresight, kept in view while arranging terms with the guaranteed railway Companies the ultimate object of nationalizing them after allowing the investors to take the full benefit of the Railway for a limited period, generally of twenty-five years. It is thus that most of the main lines have already become State lines, and that the few remaining ones will become so in course of time. The system of the repayment of the value of Railways by annuities, obviates the difficulty and inconvenience incident to the raising of heavy loans. How profitable this policy of nationalizing the railways has turned out to be may be gauged by the case of the East Indian Railway purchased by the State in 1880. In 1905, the net earnings on this line amounted to Rs. 482 lakhs. Out of this amount 87 lakhs were paid as interest charges on borrowed capital and Rs. 216 lakhs as annuity to the original shareholders on the basis of repaying the whole purchase amount before 1953. There still remains Rs. 160 lakhs as net yearly gain to the State, while after 1953, the yearly gain will be trebled, taking the present revenue as it is. Here, then, is an instance of the right use of foreign capital. But when we turn to the petroleum industry in Burma, the gold mines of Mysore, the coal mines of Bengal, the tea and jute industries, the carrying trade by sea and the financing of our vast foreign trade by foreign Banks, we come upon another and a less favourable aspect of the question of the investment of foreign capital. It is impossible to estimate accurately the amount of wealth that goes out of the country in this manner, though an approximate idea can be had of it from the excess of our exports over our imports, after omitting Government transactions. It must be remembered that so much of this amount as represents merely the interest on borrowed capital, should not be regarded in the light of a drain from the country. It is in such investments as these that we find cause for complaint. In such cases I cannot but think that it would be to the permanent good of the country to allow petroleum to remain under ground and the gold to rest in the bowels of

the earth, until the gradual regeneration of the country, which must come about under British rule, enables her own industrialists to raise them and get the profits of the industries. A country which maintains a population of thirty crores is not likely to let about one lakh persons starve, and this is the number of wage-earners benefited by these industries. The price paid is much too great for the advantages accruing from them to the country. That much is the view of all impartial people who are sincerely interested in the material advancement of the country, is proved by the following passage which I quote from the excellent paper which Mr. Holland, the Director-General of the Geological Survey, read before this Conference - last year. Speaking of the successful exploitation of the petroleum fields of Burma, he observed: "The one regrettable feature is the fact that the capital required to drill the deep well has been raised in Europe, and the profits consequently have left the country. In the petroleum industry, as in so many other enterprises of the kind, India will continue to pay such an unnecessary and undesirable tax as long as those in the country who possess money will not risk their reserve fund in industrial purposes."

#### *Indian Banks.*

I think, however, that indigenous capital will not be quite enough for financing the enormous and ever-expanding trade of the country and for accelerating the progress of our material and industrial regeneration. For these purposes, we require as much capital as we can, and if we can get it cheaper in England than in India, I for one do not see why we should not avail ourselves of it. No country in the world can make much progress in industrial directions without plenty of capital. The problem of India may be briefly stated as follows:—

Our immense trade, our comparatively small capital, the fixed open door policy of our Government, and the absence

of power to control our financial policy—these are the main factors of the situation, and the question is how best we can under these conditions develop our industries. We cannot do without foreign capital; it will be extremely short-sighted to reject it on sentimental grounds. We must avail ourselves of it, but we ought to take care that we do not pay more for it than other nations. We have to consider what is the best way of bringing foreign capital to India. It is necessary for this purpose to offer foreign capitalists absolute security for their money, in order to get it as cheaply as possible. Government is in a position to do this and hence Government is able to borrow from them as much as it likes on easy terms. There are few private individuals in India who can offer security necessary for this purpose. Smaller capitalists there are in plenty, but each of these by himself can be of no use in this matter. But what individuals cannot do singly, they can do by combination. Joint-Stock Banks being the results of such combination offer the only means of bringing foreign capital into the country at easy interest. Till recently, there have been no such Indian Banks among us, with large enough capital for the purpose. It is, however, a matter for satisfaction that two such Banks have been started in Bombay within the last few months. These Banks at present intend to finance the internal trade of the country for which there is a wide scope; but we hope that after some time they may feel their way to extend their operations to foreign exchanges, and thus take advantage of foreign capital as the other Exchange Banks are at present doing. We want more of such Banks in order that the present situation may be ameliorated. The Presidency Banks are allowed to borrow from foreign countries. The Exchange Banks do trade with foreign capital, but as their Shareholders and Directors are outside of India, the immense profits of the trade go to them and not to the people of India who get only the bare interest on their Deposits running to over sixteen crores in these Banks. Indian Banks with large capital have, therefore, an important function to perform in

this, and in other ways, and I hope and trust that the movement begun in Bombay will expand and flourish. There is one other suggestion which I should like to make before leaving this part of the subject. It may happen in many cases that although we may not be able to provide all the capital required for a new industry, we may yet be able to supply a portion of it, and so save some portion of the profits of the industry from leaving the country. But few foreign Companies ever give a chance to Indian capital. They like to do all the financing themselves and do not even place their shares in the Indian market. This is unfair, and I would suggest that the legislature should make it obligatory on every industrial concern floated by foreign Companies that the same opportunities should be given to Indian capitalists, that the prospectus should be published simultaneously in both countries, that the time for applications for shares should be the same, and that allotment must be made at the same rates, and on the same principles. This is the least that our Government should do under the present circumstances.

#### *Swadeshi Movement.*

Gentlemen, you will, perhaps, expect me to refer here to the Swadeshi movement, and I hasten to satisfy that expectation. Whatever Bengal might have done or failed to do during the last twelve months, she has undoubtedly given an impetus to the Swadeshi idea. All over the country to-day among young and old, rich and poor; men and women, high caste and low caste, the word "Swadeshi" has become a household word, and the spirit of it too, we may hope, is well understood. Gentlemen of Bengal, on behalf of the whole country I tender you our hearty thanks for this valuable result which is wholly due to your enthusiasm in the cause of the motherland. I am not one of those, Gentlemen, who sneer at enthusiasm. Enthusiasm is divine, and without it even in regard to the industrial regeneration of the country we can

achieve but little. You have applied the life-giving spark to the slumbering spirit of Swadeshism in this land, and yours is the honour of concentrating the national mind on the work of industrial development. It is inevitable that in a time of excitement and distress words might be spoken and things done which in calmer moments might not commend themselves to our sober judgment. I am referring solely to the effect of your enthusiasm and self-sacrifice on the whole of India, even among those who did not and could not see eye to eye with the Bengalis on the question of partition, and the subsidiary questions connected with it.

#### *Agricultural Industry.*

Gentlemen, we have got the Swadeshi idea firmly implanted in the national mind. We have now to consider what our programme should be for the near future. We cannot do everything at once. Industries are not created in a day. We should profit by the experience of other countries which have grown industrially great, and, in the pursuit of the Swadeshi ideal, we should follow the methods which have proved successful in those countries. I admit that in one important respect the conditions with which we are beset are somewhat different from those prevailing in countries which have come to the front as centres of the world's great industries. We cannot look to Government to give us any direct help in the shape of protective import duties or bounties such as have been given in other countries. But short of that, Government can do much, and I am satisfied that they are not likely to revert to the old *laissez-faire* policy in respect of our industrial advancement. Although, as I have said, we cannot do everything at once, our plan of action should be drawn up with a view to future development in all directions. When you view the industrial situation Gentlemen, the first thing that forces itself on your attention is the primitive condition of the premier industry of the country, I mean the Agri-

cultural Industry, the industry which supports more than 65 per cent. and, according to Lord Curzon, 80 per cent. of our population, and on which we must depend for our subsistence as well as for the raw material of our chief manufacturing industries. So long as agriculture is carried on in the present primitive fashion, no great industrial improvement need be expected in India. Even Protectionist Economists admit that until the agricultural industry has reached a high state of development, manufacturing industries cannot be largely brought into existence even with the support of the State. In England itself the era of manufactures was immediately preceded by a period of extraordinary agricultural development, due mainly to the enterprise of the great landlords. I rejoice to see that the greatest landlord of all in India, namely Government, are recognising their duty and have taken and are taking measures to spread a scientific knowledge of agriculture, by means of colleges, experimental farms and such other measures, to free cultivation from insect pests and to introduce new and valuable forms of the agricultural industry. The work done in connection with rubber cultivation, if it lead to the tree becoming naturalised in India, would add materially to the national income, as the demand for rubber all over the world is immense. While Government are waking up to their duty, it behoves private landlords like the Zeminders of Bengal, who correspond to the landed aristocracy of England, to devote their time and resources towards developing their industry. Gentlemen, if the Swadeshi spirit inspires these great landed magnates to introduce science and system into agriculture so as to make it yield the highest profit of which it is capable, then believe me, you will be in sight of large manufactures financed, controlled and worked by our own countrymen. It is a common fallacy to suppose that the arena of great achievements lies far afield of our everyday lives. It is never so. Few people talk of the Swadeshi movement in connection with agriculture. But really that is the industry which most

requires the application of the true Swadeshi spirit, for on it are based all our possibilities of manufacturing industries. If the mill industry flourishes in Western India, it is because the Guzerathi is acknowledged on all hands to be the most efficient cultivator of cotton in India.

### *Mineral Industry.*

From agriculture, let us turn to mineral industries, in which considerable interest is being evinced at the present time. I do not think that there is any one in India who can speak with greater authority or give more valuable information on this subject than Mr. Holland, the Director of the Geological Survey of India, and I would remind you of his admirable paper read before the Conference last year as well as to his official reports. He is a gentleman with the true Swadeshi instinct in him and I believe that to his writings and his influence is due to a very large extent the active interest shown everywhere in mining enterprise. Possessed of the knack of clothing technical matter in popular style his reports are easily intelligible to the general reader and have been read everywhere with enthusiasm. There was a very marked development of interest in mineral industries last year resulting in an increase of 50 per cent. in the prospecting licenses and mining leases taken up. The explorations of geologists confirm the verdict of ancient history that our country is rich in minerals of every kind, and that there is hardly anything which we cannot produce if only capital, enterprise, and the requisite technical knowledge were forthcoming. The total value of the mineral productions of India, omitting minor industries for which no returns are available, was over 8½ crores of rupees in 1905. Gold and Coal contributed two thirds of this value, and in both of these mineral industries I need hardly tell you that Indians have very little share. The same is the case with the petroleum industry which comes third in the list of values. These three together



account for three-fourths of the total value of mineral production in India. What are the causes of this apathy on the part of the Indian people? Want of capital is one cause. But want of technical and scientific knowledge is probably a more important one. One of the first needs of the country, therefore, is to educate a large number of young men and to train them up in mineral industries. So long as there is the present dearth of skilled experts, and one has to pay a high price for the preliminary work of exploration, we can never expect mining industries to progress rapidly. One does not grudge to pay a high fee to an expert who has to be consulted at the final stages or from time to time during the progress of the work of exploration. But for preliminary work, we want a large number of trained men with a thorough practical knowledge of the different kinds of mineral industries. Government have already done something in this direction. In Bengal a scheme for giving mining instruction has been sanctioned by the Imperial Government, and a Mining Professor and Mining Inspector have been engaged. The experience of these officers has dispelled the fear expressed in some quarters, that there was no real demand for mining instruction in India. Professor Robertson has received applications which show that India-trained mining students will be able to readily obtain employment when become qualified. Four young Indians are studying mining in the University of Birmingham, receiving Government scholarships of £150 per annum. These are happy signs, but we cannot help thinking that instead of sending Indian students to learn mining in England, the conditions here are such that Government by establishing an up-to-date Mining College in India can make this country a great centre of mining instruction, training our own students to take charge of the higher posts in the Geological Department. If it be deemed necessary to give Indian students the expanded knowledge that comes of visiting the centres of mining in Europe and America it can be so arranged that after completing their course of studies in the Indian College,

they may spend a short time in those centres. It is a matter for thankfulness that Government rules in relation to mining enterprise are liberal and, speaking from my own personal experience, I can say that the Geological Department is always anxious to give the fullest information and assistance to any enquiry. In connection with the mineral industries, it has been pointed out that without a cycle of chemical industries, it is almost impossible to make several of them paying. Several instances of this kind are mentioned in Mr. Holland's quinquennial review published last year. In his paper read before this Conference last year, Mr. Holland referred to the manufacture of ammonium sulphate as a very promising industry. It is gratifying that the East Indian Railway Company has now nearly completed the erection of a plant on the Giridih Coalfield for this purpose. I have no doubt that other colliery owners will follow suit when they find that this experiment proves successful. I also understand that a small plant for the manufacture of ammonium sulphate from gas-liquor has been set up by the Calcutta Gas Co., using sulphuric acid. There is a vast field for this as well as for similar industries which make use of the bye-products of mineral industries, but a large number of chemical experts are required to utilise them in full measure.

#### *Cotton Industry.*

I will now refer to manufacturing industries, of which Cotton is by far the most important, both in bulk and value. Next to food comes clothing among the necessaries of life. I will not detain you with the statistics of the industry. These have been ably enlarged upon in some of the papers read before the Conference at Benares. Nor shall I take up your time with my opinion on the handloom industry and its prospects. A separate resolution is to be submitted to you on the subject, and the speakers to that resolution will

not thank me for anticipating their remark in my address. The importance of the handloom industry is widely recognised, and the only question is how the ordinary handloom can be improved so as to meet the competition of its rivals. The conditions of the new handloom are that it should be cheap, simple in construction, and capable of being easily repaired by the village carpenter, while at the same time the output should be larger than that of the existing ones. There are several inventions in the field, and only experience can show which of them come up most to these requirements.

Turning to the power-loom industry, of which I can speak from personal knowledge, most of you are aware that Indian Mills produce cloth generally of the coarser kinds, largely manufactured up to 21s warp and 30s weft; and only a small proportion of finer kinds of cloth. The reason why they have to restrict themselves to the production of the coarser sorts, is the quality of cotton grown in the country at present. So long as cotton of superior staple is not produced here, it is hopeless to expect the manufacturer to improve the quality of his cloth. That he is doing his best is clear from the fact that the official returns show that every year finer qualities of cloth are manufactured to an increasing extent. At the present moment cloth of the quality which Indian Mills largely produce is hardly imported into India. If the country gives the Indian manufacturer a superior staple cotton, there can hardly be a doubt that he will be able to supply the needs of the people from his looms. What a large field there is yet to be exploited by the Indian power-loom weaver, is shown by the fact that the quantity of cloth imported from Great Britain last year amounted to over 290 crores of yards. Besides we imported  $3\frac{1}{2}$  crores lbs. of yarn. If the Indian mill-owner is able to produce the superior kinds of cloth and yarn, he can safely increase the number of mills to ten times what they are. I am glad to say that the prospects of our being able to weave finer cloth are fairly promising. The gratitude of the country is due to the Government

of Bombay for its action in regard to the experiments for the cultivation of high-class cotton in Sind from Egyptian seed, which have been attended with splendid success. The area sown this year was 7,000 acres; from the point of view of the agriculturist also, the introduction of the superior cotton has been a great boon. The yield per acre was greater and the price considerably higher than that obtained for ordinary Sind cotton. The gain to the cultivator is so great from the introduction of Egyptian cotton, that it is not extravagant to hope that all the arable land suitable for this quality of cotton on the banks of the great perennial irrigation canals, which is estimated to be at least 100,000 acres and probably more, will be brought under it at no distant date. The only retarding feature is that this year the plants were attacked by Boll-worm and sustained damage to the extent of 50 per cent. But the Government Entomologist, Mr. Lefroy, has suggested to cultivators a certain method of prevention which we may hope they will follow. When this comes to pass, the conditions of the Indian Cotton Industry will be revolutionised, and India will be able to supply a very large portion of her demand for superior kinds of cloth. Then will be the time for the realisation of Swadeshi ideal in respect of our clothing. Until then for superior varieties of cloth we must depend on the foreign producer.

May I venture to make an observation here in regard to the complaint lodged against Indian manufacturers by our Bengali friends to the effect that they (the manufacturers) did not sufficiently support them in their patriotic and unselfish Swadeshi propogandism? Those who brought forward the charge did not realise that prices are regulated by the unalterable laws of supply and demand, and that howsoever laudable the object may be, it is impossible to control prices by artificial means even if the manufacturers desired to do so. The manufacturer is only one stage in the process whereby the cloth that he produces reaches the person who uses it. Between him and the consumer there is a hierarchy of inter-

mediaries, all of whom, depending as they do on the profits of trade for their maintenance, are not likely at any time to forego the opportunity of higher profits. Even if the manufacturer reduced prices to a slight degree below the market level, it would not at all follow that the consumer would get the advantage. The dealers would get it.

The mechanism of trade is a highly complex one and a single bale of cloth has to pass through three or four hands before it reaches the consumer. It is too much to expect each of these persons to be so philanthropic as to lose his legitimate opportunity. The complaint is founded on a misconception as to the nature of trade which follows high prices as water flows from a higher to a lower level.

The one unfortunate element of the Indian Cotton Mill Industry, is that it has always been looked upon by Lancashire manufacturers with unfriendly eyes. From time to time, the self-interest of these manufacturers has laid a heavy hand on our long struggling industry under one pretext or another. Now, it is the sacred principle of free trade; at another time it is humanity and philanthropy and all the virtues of mankind rolled into one. I do not refer to the abolition of the import duties on cotton goods twenty-five years ago. But the imposition of the excise duty on mill-made cotton cloth in compensation for a revenue duty on imported cotton goods was a flagrant departure from the practice of Great Britain itself. But this has not been enough. The cry is now for restricting the hours of labour of adult male labourers in our mills. The reason assigned for the interference is, of course, humanity, but sometimes the cloak is thrown aside and the naked truth comes into view. Thus, during the discussion of the Indian Budget in the House of Commons, Mr. Keir Hardie complained that the manufacturer in India had the advantage over the manufacturer in Great Britain of lower wages. It was wrong, he said, that he should also have the advantage of long hours. Well, if we consider what immense advantages England has over India in regard to manufacturing in-

dustries, on the principle of Mr. Keir Hardie's complaint, we should be justified in asking for a curtailment of many of them. But who would listen to us? If the possession of cheap labour is an undue advantage, why not the possession of cheap capital? The fact, however, is Lancashire does not care to argue with us. It is the old story of the wolf and the lamb. Lancashire would be glad to kill the Indian industry, and one reason is as good as another for that purpose. It is due, however, to the Government of India to acknowledge that they have always tried to withstand the pressure of Lancashire, though, unfortunately for us, often without success. Now Mr. Morley has been induced to send out a special Inspector to enquire into the conditions of labour in Indian Factories. The factory owners in India will do their best to facilitate his work, for they have nothing to conceal. But we have our fears that Lancashire will be satisfied with nothing less than putting a limit on the hours of adult male labour. Such a thing would be unprecedented, and we may hope that the Government of India will energetically protect the interests of our industries. We may appeal to Mr. Morley himself who is fully cognisant of the evils of such restriction to resist the attempts of Lancashire to cripple the Indian industry. The Bengal Chamber of Commerce has strongly protested against interference with the hours of labour in jute mills, and on behalf of the cotton mill industry, I humbly add my protest in the same sense to that of the Chamber.

#### *Sugar Industry.*

I have dwelt at length on the two most important industries of India. There are numerous other industries for which there is a vast field in this country and which if taken up by our capitalists would be productive of great benefit to themselves as well as to the labouring population. After cotton piece-goods, sugar is the most important article imported into India in point of value, and it is well

known that the sugar industry has been declining in this country of late years as the result of foreign competition. The history of the establishment of the beet sugar industry in Europe and its development to its present proportions, is one of the most fascinating chapters of industrial history, and for a succinct account of it I would refer you to the excellent series of articles which have appeared in the pages of the *Indian Trade Journal*, which my friend, Mr. Noel Paton, edits with quite as much zeal as ability. *The Indian Trade Journal* has enhanced the practical value of the series of articles on sugar by publishing statistics relating to the production of sugar-cane and the demand for sugar in each of the provinces of India. India is the home of the sugar-cane, and is it not strange that we should be ousted from the manufacture of sugar by foreign competition? There is an immense market for sugar in this country. What is needed here is, first, the improvement of the quality of the sugar-cane grown and the introduction of modern machinery. Investigation has shown that beet-root can not be grown in India on a profitable scale. But it has been found possible to increase the percentage of sugar in the cane by the use of suitable manure. Thus the problem is an agricultural one first. The United Provinces of Agra and Oudh have the largest area of land under sugar-cane, and we may hope that our friends in those provinces will take early steps to organise the sugar industry on modern lines.

#### *Other Industries.*

There are similarly the jute industry which our Bengali friends ought to develop; Silk, which may be introduced in several parts of the country, and paper in Burma, as shown by an instructive monograph just issued by the Government paper expert, Mr. Sindall. Leather is another industry for which there is a large field in India. It does not require large fixed capital, and, in spite of the prejudice against

working in hides, there is a large amount of cheap labour available. The enormous number of hides and skins exported from the country every year shows that there is no lack of the raw material for the industry. We are thankful to the Government of Madras for all that it has done and is doing to establish the Chromo Leather Industry in that province. I would observe in passing that it is not necessary nor is it advantageous that the same industries should be established in all parts of the country. This may not be possible in the first place. Even where it may be possible it may be found, perhaps, that the production of wealth will be better assisted by leaving provinces to promote the industry for which they have special facilities.

#### *Industrial Survey.*

I venture to suggest that the Commercial Department should have its counterpart in each province, the duty of the provincial department being to devote its attention to the industrial and commercial possibilities of the province and keep in touch with its economic problems. Of course this is being done to some extent under the present system, but the work deserves to be attended to more systematically and thoroughly. I read with pleasure the other day in the papers that the Madras Government has appointed Mr. Alfred Chatterton, Director of Industrial and Technical Inquiries in that Presidency for five years. Mr. Chatterton's work for the industrial development of the Southern Presidency is well known, and there is every reason to expect that in the next five years he will be able to do important service in exploring the industrial capacities of the province. We want similar measures adopted in every province in the country. Provincial agencies will be better able to conduct the much-needed survey of indigenous industries recommended by the Committee on Industrial Education appointed by Lord Curzon, and also suggested by the Hon'ble Mr. Hewett in his last



budget speech. He urged the Provincial Governments "to make a survey of the state of indigenous industries within the area of their jurisdiction with a view to ascertaining the exact state of the various industries and handicrafts, the amount of the earnings and the present condition of the artisans respectively employed in them, the precise manner in which the different industries have been affected by competition with imported articles, the practicability of creating new markets or of developing markets which already exist, and the possibility of giving a new lease of life to these industries, either by means of special instruction or by the improvement of the appliances in use."

*Labour Question.*

Gentlemen, I have spoken of the organization of capital, and the development of industries. I should not omit to make a few observations on the all-important question of the supply of labour. True, we have a large population, but owing to illiteracy and the prejudices concomitant to it, every industry in the land feels the difficulty arising from not having an adequate supply of labour. In order to convert our vast population into an effective labour-force, we have first of all to instil into them the rudiments of knowledge, which will widen their mental outlook, fill them with new aspirations, and enable them to know what opportunities await them in the industrial world, and to take advantage of them for their own and their country's benefit. Plague has in many parts of the country played sad havoc with the labour supply and, speaking from the purely industrial and commercial point of view, I beg to express the earnest hope that Government may be pleased to create more centres of investigation, so that the discovery of a remedy may be accelerated.

Except by the Committee working at the Parel Laboratory, which is doing excellent work, there is no effort made at present to elucidate the etiology of the disease, and what can

one Committee sitting in a single centre of plague do to trace the causes of a calamity so wide-spread and elusive?

*Education.*

Gentlemen, you all know that the Government of India have addressed Local Governments on the subject of the abolition of fees in primary schools throughout the country. From the strong views expressed by the Supreme Government in their Circular letter, we are led to hope that the proposal will be carried through at no distant date. This will be the first step towards introducing a system of universal national education, and its effects are bound to be most beneficial to the people. Gentlemen, I hope that Government will be equally liberal towards technical education, for which the grant now made is insignificant, considering the vast extent of the country and our large population. What I have said above as to the necessity of a large number of experts for the development of mining industries, applies with equal force to all industries, and hence technical education on a large scale is one of our primary needs. I may also mention here the importance of a wider spread of Commercial education, which at present is practically neglected by the State. I ought to make an exception in the case of Bengal where Commercial education is imparted in the Presidency College at Calcutta, and Madras, where a rather feeble attempt has been made to encourage it. Those who do not understand what Commercial education is and mistake it to be mere book-keeping, sneer at it, but Commercial education is much more than that, and if there were more of Commercially educated men among us, we would be able to retain in the country a very large proportion of the profits which now go to foreign firms which do importing and exporting business only.

Coming to the highest departments of industrial education, the department of scientific research, it is gratifying to note that after a long period of suspended animation, the Indian

Institute of Science, which owes its origin to the far-seeing patriotism and princely munificence of the late Mr. Jamsetji N. Tata is likely to shortly become an accomplished fact, as evidenced by the appointment of Dr. Travers, an eminent scientist, to the Directorship of the Institution. All these are hopeful signs of the times, and I am sure you will agree that they all point to a bright industrial future for our country.

*Concluding Remarks.*

Gentlemen, I have endeavoured in the remarks that I have made to-day to set before you in as few words as possible the main features of the industrial situation as it appears to me:—the importance of utilizing foreign capital in the development of the country instead of being utilized by it for its own gain, the principal directions in which industrial progress may be made, the lines on which we should proceed, and the requirements of the country in the matter of technical and scientific education. No doubt, there have been omissions, but these, I am sure, will be supplied by the gentlemen who will speak on the several resolutions to be placed before you. The word Swadeshi, Gentlemen, signifies the love of motherland. It does not signify hatred of any other land. This love of motherland, if it really becomes a part of our nature, will manifest itself not in one direction only but in all; not in one department of life only but in all departments of it. Industrially you all know that Swadeshism is enforced in many civilized countries by means of prohibitive tariffs, and bounties to home producers. This may or may not be a wise policy, but there is at any rate nothing immoral or unrighteous. We are only following the example of these nations, and following it at a very great distance, by making voluntary efforts to encourage indigenous industries. There is nothing wrong in this. On the contrary, it is all the more creditable to us that what in other countries requires to be enforced by the State, is undertaken here by the spontaneous action of the

people. May the spirit of Swadeshism grow among us, and may the development of industries, which is sure to follow it lead to the permanent prosperity of this, our motherland.

### SUBJECTS COMMITTEE.

Mr. R. N. Mudholkar:—Before we separate there is a small matter which has to be done. The subjects in regard to which resolutions have to be placed before you have been placed before the country during the last month and a half. We had a small committee meeting representative of the different Provinces of India at Bombay recently; and then we went into the matter and settled what subjects should be taken up. In regard to the Provincial Committees we had a meeting in Calcutta on the 25th instant and that Committee has revised the list. It is possible that other gentlemen may have subjects to suggest and it is therefore better that we should have a small subjects Committee consisting of the President, Mr. R. C. Dutt, Mr. P. N. Bose, Mr. D. E. Wacha, Mr. J. B. Joshi and myself. This Committee will meet tomorrow at the Industrial Conference Office. If any gentlemen have any subjects to suggest other than those already announced we shall be glad to receive and consider their proposals. Gentlemen, the Conference will now be adjourned and will meet on the 31st instant at 11 A. M.

Papers laid before the Second Indian Industrial  
Conference.

## Agriculture & Industrial Progress of India.

BY K. FERRAJU, ESQ., *First Grade Pleader, Cocanada.*

THE problem which is now forcing itself upon the attention of all intelligent and patriotic Indians, is how to ensure the economic and industrial progress of India. The problem is by no means parallel to any of those that confronted our forefathers during the pre-British rule. The 18th Century was the century of great political revolution, while the 19th Century witnessed stupendous industrial revolutions. All over the civilised world there had been remarkable and considerable displacements of population. The dumb forces of nature handled and set in operation by the western races during the last century to an extent unknown to the previous period have revolutionized the old order of things, and the ceaseless stress and competition of the present day have been causing us no little uneasiness as to the future of the Indian people, with whom solid movements or new adjustments of thought and life are by no means rapid, and whose work has been mainly, if not solely, custom-work.

Under a settled and peaceful Government population will increase and there is no use of merely complaining of its multiplication beyond the limits of subsistence. There is yet ample room in India for expansion of population before the limits of food supply will be reached even under the present cultivated area, but for the enormous quantity of produce which the state draws for its revenue and the want of suitable education of the people.

It is well said that 'watch ye' is good counsel for the patriot, and eternal vigilance is the price of liberty and it is equally the price of every element of social welfare. There is no vigilance on the part of the state such as would ensure the economic stability of the people. The labor of the Indian people creates the enormous raw produce which is annually exported to England and foreign countries, out of the manufactures of which those countries are able to secure such prodigious store of wealth that it helped those nations to considerably increase their standard of comfort and happiness. The vast masses of the Indian population are allowed to drift as isolated toilers living a low standard of life, if not a life of absolute penury. Neither have they been helped to develop the genius of co-operation in the production or manufacture of the simplest articles of use.

From the earliest times India and China had been the largest agricultural countries of the world, and their populations consisted of agricultural communities to a considerable extent. Agriculture is still the greatest industry in the world. Without counting India and China it occupies more than 80 million peasants, and the annual product is something like four thousand million pounds sterling. Since so recently as 1840, the capital employed and the value of the agricultural products of the civilized nations have been doubled. The number of hands engaged in it have not increased like this proportion and the increase of the value of the product is due to improvements in the methods of agriculture and to the progress of the agricultural service. Whilst the agricultural capital of Europe is doubled since 1840, that of the United States increased sixfold. According to the ablest statisticians 9 million hands employed in agriculture in the United States raised as much produce as 66 millions did in Europe. Mr. Malhall has shown that want of proper implements in Europe resulted in waste of labor equal to 48 millions of peasants. One farm laborer in the United States was worth

more than three in Europe. The same statistician show that one farm laborer in the United States raised as much as

3 in Germany

5 in Austria or

7 in Russia.

At the close of the last century in Europe the number of farmers was just nine times that of the United States, and yet the produce raised was only double that of the United States, so that it takes four Europeans and a boy to raise as much food as one American. Owing to improved methods, Americans have been increasing their produce at a much faster rate than any other country and there seems to be no end to the increase of their produce.

Indian methods of agriculture are still the same, and how many Indians will it take to produce as much weight of food as one American does?

According to Mr. Gibbins formerly an Oxford University prizeman, the productive area in India is too small for the actual population—the agricultural area being only one acre to each inhabitant. The farm products come to a small percentage and it is estimated to be 10 for each adult male peasant. Out of this he has to pay the heavy revenue, money borrowed for cultivation expenses, and maintain his family. While the production per acre has greatly increased in European countries, it is still almost the same in vast tracts of India. How long can the Indian peasantry with no state aid of any kind nor capital for improvements or machinery, nor knowledge of scientific agriculture, continue to produce any respectable quantity of produce against the vast stores of America in the world markets and compete with others more favorably situated, notwithstanding that their country is no less vast or fertile than most other countries.

While improved implements and machinery contributed

to the enormous progress of agriculture elsewhere, in India the increase that is, is due to large numbers of population being forced to fall on land owing to the extinction of the indigenous industries.

The prices of grain have gone down in the western countries but wages have increased. India presents the unparalleled spectacle of the rise of prices without the proportionate increase in wages. Need there be wonder that the descendants of the Indian peasantry are swelling the ranks of coolies with the off-chance of getting any work for their daily food, scanty and ill-nourishing as it is. India is perhaps the only country where manual labor has become so cheap that machine labor will not pay. If things are allowed to continue as they are, India will soon lose her place among the exporting nations of the world.

In the present state of the country voluntary associations cannot be trusted to co-operate with each other, and find means for the production of good results. Substantial state-aid and initiative are absolutely necessary. Out of the Imperial funds, the state should maintain agricultural schools, experimental farms, and demonstration and example plots in all the districts. Then the field of action may be sufficiently extensive for travelling professors and instructors to be supplied by the Department of Agriculture for the diffusion of agricultural knowledge to the peasantry of the various part of the country.

• The Department of Agriculture should include bureaux of—

1. Agricultural education
2. Veterinary education and Veterinary services and police, including all measures for the prevention of cattle disease.
3. Encouragements to agriculture, cattle breeding, agricultural associations and shows.
4. Agricultural statistics as in England.



We find that for a single year credit was given to the Department of Agriculture by the Government of France to the extent of—

£1,703,720, and the Department spent so much as

£182,300 on Agricultural Education

£327,240 on Bounties and other encouragement to agriculture,

£75,400 on Subvention to agricultural societies and shows.

During all these years our Government which has been drawing more than 19 million pounds Sterling as Land Revenue has virtually spent nothing when compared to other countries. There is no tinkering with the problem.

Pious wishes nor empty handed sympathy will do. Unless the State comes forward with substantial contribution, the progress and prosperity of the Indian agriculture can not be ensured. The small kingdom of Belgium finds it advantageous to devote £112,900 a year in state aids to agriculture. If so, the Government of India with its 260 Districts, consisting of an area exceeding one million square miles and a rural population of 210 millions, ought to set aside at least 2 millions sterling for a similar purpose. In India Agriculture and Industry are interdependent and the prosperity of the one helps the prosperity of the other. In the present state of industrial chaos it is perhaps difficult where and how to begin. Here, too, the example of other countries may profitably be followed. Sometime ago Dr. James of Chicago said :—

“No matter whether our education in the past is good or bad, we are determined to have all grades as perfect as they can be made. We work for this and not only because a great nation should have great schools, but from the conviction that great schools will make a great nation.”

The state must be determined to make all grades of education in India, pre-eminently agricultural and industrial, as

perfect as they can be made. It is only great schools in India that can make the Indian nation great. If the State does not feel it to be its duty, the people must themselves undertake the task, for otherwise there will be no foundation for a great self-reliant nation. Our captains of industry have yet to come.

In the olden days the specialization of industries went to the extreme limits in so much that the followers of divers handicrafts became in course of time so many distinctive sects and the belief in hereditary instincts and capacities was so strong that they ceased to have intermarriage with other sects. All the work shops of the country were so many industrial schools where the practical side was soon learnt and mastered by the numerous grades of apprentices who were freely admitted into them on terms of mutual advantage. Greater regard was paid to the practice than to the theory, of which only the most intellectually gifted could be cognizant. With the disappearance or extinction of the indigenous arts, to dwell on the causes of which will now be profitless task, there was a total breakdown of the apprentice system. The masses lost the art and the skill and had no resource to fall back upon but the land. General impoverishment was the consequence. But no serious attempt was made to avert the national disaster.

We are grateful to Government for its educational system, but it is mainly confined to the teaching of 'heads'. It is more 'literary' than 'practical.' The teaching of 'hands' is most essential in a country like India.

In the western countries we find numerous important technical schools of the college and university rank, offering to their people unique advantages, but none of the kind exist here. In many high schools, the high school course is specialized in a technical direction. Numerous manual training high schools give free instruction in America and in many large villages and counties free secondary instruction is provided from public taxation.

What is wanted here is a sufficiently large number of schools that turn out technically trained men year after year, and the tuition ought to be the least costly if not quite free. Here is a question of state aid to industries.

The small kingdom of Holland imparts technical instruction in 160 schools, other than agricultural schools, maintained at an annual cost of £450,000, of which the Treasury pays four-fifths. Besides the middle schools of technical instruction, there are schools for mechanical engineers, and voluntary institutions or artisan schools receiving municipal support. The Polytechnic School at Delft was given laboratories that cost £50,000. On technical education alone Holland spends annually £500,000, towards which the Government Treasury supplies £400,000.

Belgium which is smaller than Holland has 220 technical schools attended by 50,000 to 55,000 young people. There are besides artisan schools, one or more for every large town, with the aggregate number of about 25,000 pupils. The annual cost is close upon £100,000. The state bears  $\frac{2}{3}$  and the municipalities  $\frac{1}{3}$  of this cost. No fees are charged to the pupils of the artisan schools. Their object has thus been defined—"To give the workman a scientific instruction that he cannot obtain in the workshop, to lead him away from the tyranny of the routine, to increase the economic value of his labours, and thus to add to his own benefit and the wealth of the nation."

The united population of Belgium and Holland is about 11 millions. The population of the Punjab exceeds 20 millions, that of Madras 38 millions and Bengal 74 millions. If the Governments of Holland and Belgium pay such attention to agricultural and industrial interests, how much more should be done for the provinces of India under the British rule teeming with helpless unskilled labourers.

The evening school instruction given in England has contributed to much industrial progress. It is now found that it is inadequate to meet the modern needs of a first class industrial nation.

To begin with, even if such a system be introduced here in the interests of the working classes, it will, to some extent, ensure the foundation for the industrial progress of India.

## The Effect of Import Duties on Industrial Development.

BY SIR GUILFORD MOLESWORTH, K. C. I. E

In a paper read before the Benares Industrial Conference on the "Industrial Development of India" in 1905, I drew attention to the manner in which the industrial interests of India had been sacrificed to the English fiscal policy, and I advocated the adoption of a policy of moderate and carefully considered import duties to relieve the dead weight of taxation from the land, and to prevent the crushing of India's industries, by unfair and unrestricted foreign competition.

I regret that more attention was not devoted to this subject by members of the Conference, because I am convinced that unless some such policy be adopted it will be impossible to develop the vast industrial resources of India. It is difficult to exaggerate the importance of the question. I was glad to see that Mr. Dutt in his Presidential address said :—

*"We will not see our country made a land of raw produce or a dumping ground for the manufactures of all nations."*

The Swadeshi movement is a step in the right direction, but I fear it will prove a failure unless it is backed up by a policy of fiscal reform. It must necessarily be limited in action, confined as it will be to a comparatively small number of the educated and patriotic classes of India, but it cannot reach the masses and consequently can produce no practical results, unless combined with the policy of import duties.

In my previous paper I have already alluded to the causes which have given an undue prestige to the fiscal policy prevailing in Great Britain for which the term "Free Trade" is a

misnomer. I have also briefly alluded to the fact that British industrial supremacy was established under a policy of strict protection. Under that policy she developed her manufactures and had a complete monopoly of them. She had control of all the markets of the world, and became the greatest capitalist nation. Alison in his "History of Europe" wrote:—

"There is perhaps no example in the annals of mankind of a nation having made such advances in industry, wealth and numbers, as Great Britain has made since the peace. In the 30 years that have elapsed since the Battle of Waterloo, during which it has enjoyed in Europe at least almost uninterrupted peace, its population has increased more than one-half, having advanced from 18,500,000 to 28,000,000. Its imports have doubled, having risen from £32,000,000 to £70,000,000; its exports have more than tripled, having swelled from £42,000,000 to £130,000,000, exclusive of Colonial produce; its shipping has doubled, having grown from 2,500,000 to 5,000,000 tons.....During the same period the agricultural industry of the country has been so far from falling short of this prodigious increase in its commercial transactions, that it has signally prospered. The dependence of the nation on foreign supplies has steadily diminished until the grain annually imported had come (on an average of 5 years ending with 1835) to be no more than a *twooth part in average years of the annual consumption*, and the prodigy was exhibited of a rural industry, in an old state, possessing a narrow and long cultivated territory, not only keeping pace with but outstripping an increase of numbers and augmentation of food required for the purpose of luxury unparalleled in any age." (Alison's "History of Europe," Chap. XCV., 66.)

It should be noted that during this period the British trade was of a far more healthy character than at present, for at the end of this period in 1846, we had a *favourable* balance of trade amounting to £66,000,000, whereas we have now an *adverse* balance of £180,000,000. It must also be remembered that during this period there were but few railways and scarcely any steam navigation. It was only at the end of this period that the great railway mania set in.

It was about 1835 that an extraordinary era of prosperity sprang up throughout the whole civilised world, tending to an enormous increase in the wealth of the world. This was due to numerous improvements in arts, sciences and inventions, as

well as to improved communications by railways, steam navigation and telegraphs, which made such rapid strides during the second quarter of the nineteenth century. England was the great pioneer in these improvements. Then came the great rush of gold from California and Australia, causing an expansion of the currency of the world, a condition which is always accompanied by increased activity of trade. Foreign nations share this prosperity as well as ourselves, but England was in a better position than any other nation to reap the advantages of this altered condition of affairs. As already stated she had the markets of the world in her hands, she had developed her coal, her iron and her textile industries under the policy of strict protection; and had complete monopoly of them. She not only supplied manufactures and machinery for the whole world, but as the great capitalist nation she furnished funds for every public work abroad with the understanding that plant of every description should be supplied from England. The value of her investments increased enormously with the rapid development of the countries in which they had been invested, and she has been enabled constantly to re-invest the produce of these investments, so that her wealth as a capitalist has become enormous and must now amount to many thousand millions sterling.

The English people, generally satisfied with this rush of prosperity and wealth, accepted without enquiry the persistent claims of the advocates of Free Trade for this result, and this idea has been so thoroughly ingrained into the English mind that those who venture to question it, have been thought to be men beyond the reach of argument, and the policy of Free Trade has become a sort of fetish or religion not to be questioned.

The year 1846, in which our present fiscal policy was adopted opened auspiciously. In January 1846 the Queen's speech assured Parliament of—

“The prosperous state of the realm, the increased demand for labour and the general improvement that had taken place in the internal condition of the country.”

Shortly afterwards, the leading bankers and merchants of the City of London thought it right to state —

“For the information of Parliament that commercial and manufacturing interests had been for some time in a state of great activity and prosperity.”

The month of May in the same year witnessed the passing of the Act which formed the first step in our Free Trade policy. In vain it was urged that it would throw land out of cultivation, that it would involve dangerous dependence on foreign supplies, and heavy taxation of England's industries, as well as ruinous competition. For many years England did not feel the blighting effects of Free Trade. She had a good start in the race and it would naturally take years for other nations to overtake her, but the capital which she recklessly expended in purchasing abroad commodities which might have been produced at home, gradually armed other nations with funds for successful competition with her. It was not until after 20 or 25 years that the effects of her policy began to be felt. The situation had to some extent been saved by the partial restriction of unlimited free imports in consequence of the Crimean and the American Civil War. Our agriculture being more heavily burdened than any other industry was the first to suffer, and has been practically ruined, millions of acres having gone out of cultivation and lapsed into weedy pasture, and a large number of our manufacturing industries have been crushed out by unlimited foreign competition.

Mr. Carnegie in a speech at St. Andrews has declared that the United States, under a policy of strict protection, has now taken the foremost place in wealth production, and exports. Germany under a similar policy is rapidly overtaking us, and Mr. Carnegie thought that before long Russia would press us hardly, and this probably would have been the case but for her war with Japan and her internal troubles.

But what is the cause of this loss of industrial and commercial supremacy? It is simply due to our own folly in failing to foster a reciprocal trade with India and our Colonies. The

British Empire has a large area of 12,000,000 sq. miles, comprising enormous, but undeveloped, wealth, whether mineral or agricultural. It has climates of every gradation from the cold to the tropical, capable of providing every variety of produce. It has a population of nearly 400,000,000 and labour of every description, in many parts absurdly cheap. If it had been properly fostered it ought to have furnished a magnificent market, which would have rendered us independent of foreign trade and enabled us to have surpassed the United States in a greater measure than that in which she is now surpassing us. The undeveloped state of our Empire is a disgrace to Great Britain. We have not merely failed to foster its resources, but on the contrary we have handicapped our subjects in every way and allowed the foreigner advantages which our own subjects do not possess. The foreigner who uses our own Colonies and Dependencies as freely as our own subjects, contributes nothing to the cost of our Home Government or the Army and Navy which protects his interests, if he has not a domicile in England; yet he reaps all the advantages of an English farm while he evades the heavy taxes and burdens which the British subjects have to pay. It is absurd to suppose that such an unequal competition can be maintained. After securing new markets at great cost in blood and treasure, we foolishly allow any foreigner to reap the benefit at our expense and to our detriment. We now expend more than £400,000,000 a year in purchasing from the foreigner much which under a wise policy might have been supplied within our own Empire and in doing so the money is not only lost to our own subjects but it is mischievously employed in furnishing the foreigner with capital for successful competition with us, and while we admit the manufactures and products of foreign nations free of import duty, they close their doors to us with heavy tariffs.

The time has now arrived when we must decide whether we shall maintain our vast Empire or allow its gradual disintegration. Our Colonies have expressed a desire to enter into reciprocal relations with us on a basis of preferential treatment,



which would be mutually advantageous, but up to the present time their advances have been treated with contempt. Shall we foster its industries and develop its enormous resources, or shall we allow the slow process of neglect to complete the work of commercial disintegration and ruin? Shall we again neglect the plain teaching of history and repeat that gigantic folly by which we lost our American Colonies; which with all their wealth ought to have been ours but for our short-sighted policy in the criminal neglect of their interest and our own?

The incidence of taxation is one of the most difficult problems in political economy. It has been assumed by many of the followers of Cobden that a tariff must necessarily raise the prices of the articles taxed. To shallow thinkers the paradox of prices falling after the imposition of the import duty is incomprehensible, but to those who have carefully studied the matter, it is evident that there are other factors in the problem which may act *indirectly* in counteracting the *direct* tendency of the tax. No doubt in some cases the imposition of a tariff does increase the price, but experience proves, as will be shewn hereafter, that in the majority of cases it does not have that effect. Some times it raises the price temporarily with the result that it falls again, sometimes it has immediate effect in lowering prices by destroying a foreign monopoly or stimulating the development of a home industry, sometimes it happens that the anticipation of a tariff causes a fall of price, because the foreign producer, knowing that the tax will come from his own profits pushes through his surplus stock at a sacrifice so as to save the tax before the tariff law can come into operation. This was especially the case before the McKinley Act came into effect.

It may perhaps be laid down as a general axiom, subject of course to modifying influences, that when an article is or can be produced at home a tariff, if it be not prohibitive, stimulates production, and does not raise the price, the tax being paid by the foreign producer, but when an article is not of home production, such as tea, coffee, cocoa, tobacco, wines, etc.,

the tariff increases the price and the tax falls on the consumer. The practical effect of English fiscal policy is that we admit free of duty those articles which compete with our own industries and tax those articles which do not. We remit the tax which should be paid by the foreign producer, whilst we exact that which falls upon our own subjects.

In the year 1896 Mr. A. Williamson, being convinced that the duty on any article which had to encounter competition of a home product fell upon the foreign producer and not upon the consumer, challenged the Cobden Club, in order to test this question, to issue a short circular to the chief exporters of Great Britain asking their experience. As the challenge was declined, Mr. Williamson sent a circular to a large number of representative exporters of our chief manufacturing centres, embracing cotton, woollen, carpet, iron and steel, brass, gold, silver, electro-plate, hardware, guns, cycles, engineering, glass, India rubber and other industries. Out of 331 replies 330 admitted that the *incidence of taxation fell upon them and not upon the consumer*. The only dissenting reply was from an American cycle exporter, who had recently opened business in Coventry.

(A few examples, proving that the imposition of tariff does not necessarily raise prices are given in Appendix I.)

In no case is the proverb "Fallacies die hard" more strongly exemplified than in the case of that mischievous and dishonest appeal to the ignorance of the masses, the electioneering cry of "Taxing the poor man's bread". In many letters discussing Mr. Chamberlain's proposals regarding the trade of the Empire, it is too often assumed that a tax on wheat must necessarily increase the cost of bread. Now this is absolutely contrary to facts and past experience.

The price of wheat is generally regulated by that which may be termed the "World's level of prices"—a level which is due to the general conditions of exchange, currency, transport and production. Tariffs in their *direct* action have but little influence on prices *unless they are almost prohibitory*. Under

a well regulated system of Import Duties, there is an action tending towards the equalisation of prices in different countries; and this is maintained by constant telegraphic communication of brokers with the principal markets of the world. A few examples will suffice. The Committee of the Belgian House of Representatives in their report of 1886 stated that on several occasions on which Import Duties were imposed upon wheat, the price thereafter fell, and when the duty was abolished it rose except in one instance. Again in a Consular report dated 14th of May 1883, Sir E. Malet wrote:—

“Eight years' experience has shewn that the higher duties introduced in 1879 have been attended with the most successful results fiscally... They failed to raise the price of wheat; prices had fallen instead of rising.”

Again Mr. Vansittart, Consul at Wurtemberg, reported in 1818:—

“Since the addition of the duties all kinds of grain were cheaper than ever.”

In 1888 the duty on wheat in Italy was raised from 1 franc per quintal to 4 francs, or about 7/6 per quarter. Practically it may be said that the price of bread remained almost unchanged, the tendency having been rather to a fall than a rise in price, although large imports of foreign wheat poured into Italy. Similar results ensued in Germany in 1892 when the duty was raised 400 per cent. and the price of wheat fell 9 per cent. Also in France in 1895 when the duty was raised, the price of bread fell 7 per cent. In all these cases it is evident the burden of taxation fell upon the foreign producer not on the consumer. In the Colony of Victoria in 1888, under an Import Duty of 9/6 per qr. on wheat, bread was cheaper than in New South Wales which admitted wheat duty free, the reason being that the Victorian farmer was protected from an undue influx of foreign surplus, and was consequently able, not only to grow wheat with confidence but owing to the reduction of other taxation, caused by the revenue derived from foreign imports, he was in a position to grow wheat at a cheaper rate. The internal competition was thereby stimu-

lated to an extent which tended to a fall rather than a rise in price.

Of course if a duty be prohibitive (as was the case in which France imposed a duty of more than 12/ a qr. on wheat when the outside world's price was as low as 27/.) the price must necessarily rise in times when the home crop happens to be scanty.

The development of the tin plate industry in the United States affords a valuable example of the manner in which an industry may be developed by the policy which I have advocated. Before 1891 there was an import duty of 1 cent per lb. on tin plates. This was found to be insufficient to develop the industry, as the British manufacturers dumped down, in the United States, their surplus plates, and ruined the struggling industry. It was therefore determined to increase the duty. President McKinley in reply to the Free Traders' argument said ;—

"They insist that we cannot make tin plates ; so they said about steel rails, so they said about plate glass and cutlery and pottery."

All these industries and many others had been developed by the means of import duties. The duty was therefore raised from 1 cent to 2·2 cents per lb. This according to a Free Trader's contention should have raised the price of tin plates in the United States from 3 to 4·2 cents, but on the contrary, as the industry developed the price fell from 3 to 2·2 cents in 1898, and the development of the tin plate industry has been a complete success. The production of tin plates in the United States has increased from 1,000 tons in 1891 (the year in which the McKinley Act took effect) to 412,000 tons in 1902. During this period the value of imported tin plates amounted to 1,492,000 dollars paying duty, but subject to a draw back of 99 per cent. if exported in a manufactured form.

The United States Census of 1900 shows that there has been an increase of 104 per cent. in the number of fruit and vegetable canning establishments since 1890, an increase of 73 per cent. in the amount of wages paid in the same industry,

101 per cent. increase in the cost of fruit and vegetables canned and 89 per cent. increase in the value of the completed produce. The average cost of tin plates for 11 years after the McKinley Tariff was imposed has been 2.65 as against 3 cents per lb. in the years 1890-91. When the tariff was first imposed the cost of tin plates, instead of rising, steadily fell, although there was a large import, the foreigner paying duty. The great development of the canning industry and the consequent demand for tin plates has tended to a temporary rise in the prices, and this was increased by the great coal strike, as well as by the strike of tin plate operatives who obtained a rise in their wages; but the average price of 1902 was not higher than in 1891.

Now to sum up the results :—

- (1) The industry of canning fruit and vegetables has largely increased.
- (2) The amount paid in wages has also increased.
- (3) The amount of fruit and vegetables used for canning has increased.
- (4) The tin plate industry has been successfully developed and the Welsh monopoly broken up.
- (5) Capital has been largely attracted to the United States.
- (6) There has been a large increase to the revenue from duty.
- (7) The cost of the tin plates has been reduced to the consumer.
- (8) The wages of the tin plate operatives have been raised.
- (9) The payment which formerly went abroad for tin plates, now circulates through the wage earners, amongst retail traders, and gives additional employment to the industries allied to the tin plate industry, such as the chemical, iron, mining and others.

Sir Lyon Playfair, the champion of the Cobden Club, was right when he said in condemnation of the McKinley Act :—

“If the Americans be right in principle and if they be successful in practice, the whole of the policy of the United Kingdom is founded on a gigantic error and must lead to our ruin as a commercial nation.”

The McKinley Act has proved to have been successful beyond all anticipation, even of its most sanguine supporters.

The following incident furnishes an example of the effects of dumping on a struggling industry. In 1846 when the United States were struggling to develop their iron industry, iron rails were sold in the United States for 50 dollars a ton under import duties, but as soon as the tariff was removed, the British manufactures dumped on the United States market rails at 40 dollars a ton and then, having ruined the struggling industry, raised the price to 70 dollars.

The history of the United States proves that there have been several periods during which, under the influence of economic charlatans, the Government has relaxed its policy of protection. Such periods have been marked by depression of trade and distress, whilst the periods of strict protection have been marked by activity of trade and general prosperity. For details of this see Appendix No. II.

None of the prophecies of the originators of the policy of Free Trade have been realised. In 1844 Cobden prophesied :—

“In ten years from the time when England inaugurates the glorious era of commercial freedom, every country will be Free Traders to the backbone.”

Again he prophesied in 1846 :—

“There will not be a tariff in Europe that will not be changed in less than 5 years to follow your example.”

More than half a century has elapsed and Free Trade is either an English or a savage custom. Not a single civilized country, except Denmark, has followed our example, but in most countries tariffs are increasing in intensity. Again in 1844 he prophesied that agriculture would flourish under

Free Trade, and no interest would receive so much benefit from the repeal of the Corn Laws as the farm tenant interest. But our agriculture has been ruined, millions of acres have gone out of cultivation, and both farm tenants and landholders have lost their capital. Property has been constantly changing hands, and freeholds are heavily mortgaged.

I have already pointed out that the British fiscal policy of unrestricted foreign imports, though claimed by free traders to be based on the political economy of Adam Smith, is absolutely opposed to it. Adam Smith, in his "Wealth of Nations," rightly directed much argument against "monopolies," "absolute prohibition," and "high duties" which amounted to a prohibition. He only advocated the free import of foreign corn on the assumption that it will be so small that it "could affect very little the interests" of the farmers of Great Britain. Of course he could not have foreseen that steam navigation and railways, which did not exist in his days, would entirely change the conditions of import, and would enable the actual import of foreign corn to be more than two thousand times as great as the quantity on which he based his assumption. He actually predicted the ruin, which has already befallen many of the British manufactures, in the following terms:—

"If the free importation of foreign manufactures were permitted several home manufactures would probably suffer, and some of them perhaps go to ruin altogether."

Both he and Mill advocated the imposition of countervailing duties on those foreign nations which restricted, by high duties or prohibition, the importation of produce into their countries. (See Appendix III.)

In conclusion, I would recommend to the Provincial Committees of the Industrial Conference a careful study of "Facts for Fiscal Reformers", which I compiled four years ago for the information of the Working Men's Tariff Reform League of Birmingham (see Appendix IV); and I would suggest that the

following Resolution be submitted for the consideration of the next Industrial Conference :—

*Resolution.*

Resolved.—That this Conference urges on the Government of India :—(1) To inaugurate a carefully considered policy of moderate import duties, which will not only yield a revenue that will relieve the land of the dead weight of taxation, but will also protect the industries of India from unfair and unrestricted foreign competition. (2) To foster International and Intor-Colonial trade by the exchange of mutual concessions and preferential treatment with the Colonies and Great Britain.



## APPENDIX I.

EXAMPLES PROVING THAT THE IMPOSITION OF A TARIFF  
DOES NOT NECESSARILY RAISE PRICES.

If America had pursued the policy of free imports she could never have developed her manufactures, but would have remained a huge agricultural country, exchanging her agricultural produce for British manufactures. Even as it is, she experienced the greatest difficulty in developing her resources. Whenever she attempted to start an industry the British manufacturers killed it, by dumping down upon her a quantity of materials at low prices, and again raising the price as soon as the struggling industry had been ruined. It was only by imposing tariffs that such industries could be developed. But such import duties did not necessarily raise prices. Germany experiences similar difficulties with her iron and steel industries, which were swamped by English produce and almost extinguished, until Bismark infused new life into these moribund industries, by the imposition of heavy import tariffs, which have enabled, Germany, not only to develop the industry, and compete successfully with us, but even to import into England large quantities of iron and steel, rough and manufactured.

The manufacture of steel rails commenced in 1867; at that date steel rails cost 150 dollars per ton; the duty was changed to 28 dollars per ton, and in 1872 the price had fallen to 112 dollars; in 1874 it fell to 49 dollars; in 1876 to 59 dollars; and in 1885 to 27 dollars.

Sir Lyon Playfair, the Apologist for Cobden Club, has endeavoured to account for this fall by improved process of manufacture, which of course has some slight share in it, but the only improvement that would very materially cheapen the cost of steel rails is the Bessemer process, which was invented as early as 1855 and was in full use long before the dates above mentioned. The reduction of price is fully accounted for by the fact that between 1868 and 1899 the output of steel rails in the United States increased from 8618 tons to 2,270,000 tons, whilst the output of the United Kingdom decreased from 1,019,000 tons in 1890 to 838,000 tons in 1899.

The Manager of the Barrow Steel Company stated in evidence before the Royal Commission on Trade depression that in one year, 1884, his Company had paid £160,000 duty to the United States.

Mons. Thiers in his speech of January 22nd 1870 stated that a tariff on linen and Cotton thread had reduced the price of a kilogram of linen

thread from 7 to 3½ francs, and that the price of Cotton thread had been reduced in similar proportion; the British monopoly having been killed by the tariff.

Under the high protective tariff in the United States, between 1860 and 1883, Cotton hosiery was reduced to nearly one-half the prices prevailing in 1860.

In 1867 a protection duty was imposed on wool. In 1872 there were in the United States 148 looms producing 1,500,600 yards of Brussels tapestry; in 1880 there were 1,070 looms producing 16,950,000 yards, and the price fell from 2.30 dollars in 1872 to 1.50 dollars in 1880, and to 93 cents in 1890.

Mr. Wycoff, United States Census Agent, stated that the average decline in the value of silk goods was not less than 23 per cent, probably as much as 50 per cent in 15 years.

Salt under a tariff fell in price from 1 dollar and 80 cent in 1866 to 74 cents in 1882.

Mr. T. Dudley, formerly United States Consul at Liverpool, gave the following rates of fall under the protective tariff between 1861 and 1883.

Cotton Goods	...	...	25 per cent.
Woollen Goods, Carpets, etc.	...	...	25 do.
Silk	...	...	35 per cent to 40 per cent.
Crockery	...	...	37 do.

In 1860, the duty on Crockery was 24 per cent. The tariff was increased to 40 per cent, which was afterwards raised to 55 per cent, *ad valorem*, and now many kinds of crockery are sold in the United States at lower rates than in England.

The "American Economist" of the 2nd, October 1891, gives the average retail prices of fifty-six articles in common use, at three periods. In the first column is shown prices in 1857, near the close of the last Free Trade of the United States; in the second column are the prices in 1889, a year before the McKinley Bill was passed; in the next, or third column, is given the prices of 1890, during the electoral campaign; whilst the last column gives the prices after the passing of the McKinley Act. About four weeks previously a letter was sent to 1400 official correspondents of the American Protective Tariff League, asking them to get these prices from the merchants of the vicinity. The returns have been most complete. In many instances the testimonies of three and four merchants are given. The correspondents did not ask a dealer's politics; they were simply instructed to get actual retail prices as they existed at the periods stated.

Articles	1857	Oct. 1889	Oct. 1890	Sept. 1891
	\$	\$	\$	\$
Axe ... ..	1.49	0.95	0.92	0.88
Binding Twine, lb. ... ..	—	0.14 $\frac{1}{2}$	0.14 $\frac{1}{2}$	0.11
Blankets, pair ... ..	6.83 $\frac{1}{2}$	4.23	4.09 $\frac{1}{2}$	3.70
Blue Shirting, yard ... ..	0.17 $\frac{1}{2}$	0.11 $\frac{1}{2}$	0.11	0.09 $\frac{1}{2}$
Boots ... ..	4.76	3.27	3.07	2.78 $\frac{1}{2}$
Calico, yard ... ..	0.14 $\frac{1}{2}$	0.07 $\frac{1}{2}$	0.06 $\frac{1}{2}$	0.06
Carpets, yard ... ..	1.30 $\frac{1}{2}$	0.77 $\frac{1}{2}$	0.72 $\frac{1}{2}$	0.66 $\frac{1}{2}$
Cotton Gloves ... ..	0.34 $\frac{1}{2}$	0.24 $\frac{1}{2}$	0.22 $\frac{1}{2}$	0.19 $\frac{1}{2}$
Cotton Hosiery ... ..	0.47	0.25 $\frac{1}{2}$	0.25 $\frac{1}{2}$	0.20 $\frac{1}{2}$
Cotton Knit Goods ... ..	0.98	0.52 $\frac{1}{2}$	0.46 $\frac{1}{2}$	0.41 $\frac{1}{2}$
Cotton Thread, spool ... ..	0.09 $\frac{1}{2}$	0.05	0.04 $\frac{1}{2}$	0.04 $\frac{1}{2}$
Crowbar, lb. ... ..	0.11 $\frac{1}{2}$	0.07 $\frac{1}{2}$	0.06 $\frac{1}{2}$	0.06 $\frac{1}{2}$
Drawing Chains, pair ... ..	1.28 $\frac{1}{2}$	0.71 $\frac{1}{2}$	0.65 $\frac{1}{2}$	0.58 $\frac{1}{2}$
File ... ..	0.42	0.27 $\frac{1}{2}$	0.24	0.20 $\frac{1}{2}$
Fork, 3-tined ... ..	0.99 $\frac{1}{2}$	0.56 $\frac{1}{2}$	0.52 $\frac{1}{2}$	0.46 $\frac{1}{2}$
Flannel, yard ... ..	0.70	0.39 $\frac{1}{2}$	0.37 $\frac{1}{2}$	0.34 $\frac{1}{2}$
Fruit Cans, per dozen ... ..	3.00	0.72	0.65	0.54 $\frac{1}{2}$
Gingham, yard ... ..	0.22 $\frac{1}{2}$	0.10 $\frac{1}{2}$	0.10 $\frac{1}{2}$	0.08 $\frac{1}{2}$
Hand Saw ... ..	2.43 $\frac{1}{2}$	1.62 $\frac{1}{2}$	0.53	1.39
Hoe ... ..	0.85	0.48 $\frac{1}{2}$	0.43	0.37 $\frac{1}{2}$
Hemp Rope, lb. ... ..	0.21	0.14	0.14 $\frac{1}{2}$	0.11 $\frac{1}{2}$
Linens, yard ... ..	0.83	0.48 $\frac{1}{2}$	0.47	0.42 $\frac{1}{2}$
Mowing Machine ... ..	121.15	56.98	52.60	47.10
Nails, Wire, lb. ... ..	—	0.05	0.04 $\frac{1}{2}$	0.03 $\frac{1}{2}$
Nails, Iron, lb. ... ..	0.08 $\frac{1}{2}$	0.03 $\frac{1}{2}$	0.03 $\frac{1}{2}$	0.03
Oilcloth, yard ... ..	0.84	0.38	0.35 $\frac{1}{2}$	0.31

Articles	1857	Oct. 1889	Oct. 1890	Sept. 1891
	\$	\$	\$	\$
Pearl Bottons, dozen ... ..	0.22½	0.11½	0.11½	0.13½
Pins, Paper ... ..	0.11½	0.06½	0.06½	0.05½
Plough ... ..	20.12½	14.37½	13.93½	12.90
Rake, Horse ... ..	41.25	22.56½	21.24½	19.40½
Reaper & Binder ... ..	247.85	142.36	129.85	115.95
Rubber Boots ... ..	4.83½	3.10½	3.00	2.73½
Salt, lb. ... ..	2.30	1.75	1.65	1.38
Shoes ... ..	5.84	3.45	3.15	3.06
Sheeting, yard ... ..	0.12½	0.08	0.07½	0.06½
Shovel ... ..	1.47	0.97½	0.93½	0.80½
Spade ... ..	1.44½	0.96½	0.95½	0.8
Starch, lb. ... ..	0.13½	0.09½	0.09½	0.09½
Straw Hat, good. ... ..	1.75	1.28	1.25	1.10
Straw Hat, common. ... ..	0.44	0.31	0.28	0.23½
Sugar, lb., granulated ... ..	0.19½	0.09½	0.09½	0.05½
Sugar, lb., brown. ... ..	0.16½	0.08½	0.08	0.04½
Sugar Bowel ... ..	0.61	0.38½	0.37½	0.32½
Scythe ... ..	1.22	0.85½	0.74½	0.68½
Tin Dipper ... ..	0.25	0.12½	0.11½	0.10½
Tin Milk Pail ... ..	0.75½	0.46½	0.43½	0.39½
Tin Milk Pain ... ..	0.37½	0.18½	0.17½	0.15½
Ticking, yard ... ..	0.35½	0.20	0.18½	0.17
Waggon ... ..	130.00	95.00	90.00	75.00
Washboard ... ..	0.41	0.24½	0.24	0.22½
Washtub ... ..	1.20	0.70½	0.65	0.65
Wheelbarrow ... ..	2.23	1.65	1.60	1.40
Wooden Pails ... ..	0.45	0.24½	0.22	0.20½
Woollen Clothing ... ..	24.00	16.75	14.50	14.50

## APPENDIX II.

PERIODS OF STRICT PROTECTION HAVE BEEN MARKED BY ACTIVITY OF TRADE AND GENERAL PROSPERITY, WHILST PERIODS OF RELAXATION OF THAT POLICY HAVE BEEN MARKED BY DEPRESSION IN TRADE AND DISTRESS.

In 1789 the policy of protective duties in the United States was affirmed, and between 1789 and 1822 additional Acts were passed, increasing the rates of duty. The country enjoyed remarkable prosperity during that period. Washington in his message of 1795 said:—

"Our agriculture, commerce and manufactures are prospering beyond former example with burdens so light as scarcely to be perceived."

In 1801 Jefferson congratulated the Congress on the revenue derived from tariff duties, and he suggested that they might safely dispense with all internal taxes; and in 1807 he was able to advise Congress of a heavy surplus of 14,000,000 dollars in the Revenue. In 1812 existing duties were doubled, and ten per cent was added to all imported articles. Under this policy the United States made wonderful progress in the development of their industries; and in spite of their three year's war with England, were richer at the close of the war than before. In 1816 a free trade policy prevailed, and Mr. Clay, Speaker of the House in 1823-24, said:—

"The general distress which pervades the whole country is forced upon us by numerous facts of the most incontestable character; it is most painful for me to dwell upon the gloom of this picture; but I have exaggerated nothing. Perfect fidelity to the original would have authorized me to throw on deeper and darker hues."

In 1824, protective duties were again imposed, and the prosperity that followed the imposition of these tariffs encouraged the legislature to increase them in 1828. Mr. Clay in a speech in the United States in 1832 said:—

"If I were to select any term here of 7 years, since the adoption of the present Constitution, which exhibited a scene of the most wide spread dismay and desolation, it will be exactly that term of 7 years which immediately preceded the establishment of the tariff in 1824. If the term of 7 years were to be selected of the greatest prosperity which the people have enjoyed since the establishment of their present Constitution, it will be exactly that period of 7 years which immediately followed the passage of the tariff of 1824."

In 1833 an Act reducing the duties was followed by a period of disaster, but under the Protective Tariff of 1842, the prosperity of the country revived, and was followed by an almost phenomenal increase in all industries of the country. In 1846 Party Politics again prevailed, and the Free Trade Tariff was enacted, but evil results were obscured for a time by the great progress in the railways, steam navigation and other conditions, which imparted to Free Trade in England a fictitious prestige for results unfairly claimed as its work.

In 1852, President Filmore in his message to Congress said: "Our manufactures are broken down, thousands of homes and industrious citizens are thrown out of employment, and the farmers deprived of a home market for their surplus products." In 1857, President Buchanan said:—"With unsurpassed plenty in all the elements of National wealth, our manufactures are suspended, our public works are retarded, and private enterprises of different kinds abandoned. Thousands of useful labourers are thrown out of employment and are reduced to want." In 1861 the "Morill" Protective Tariff was introduced, and in spite of the sudden outburst of the great Civil War, and all the evils that accompanied it, including the Industrial paralysis of the Eleven seceded States, the country was enabled to sustain itself, to revive, and to increase in an extraordinary degree its manufacturing industries. In 1891 the McKinley Tariff was enacted. It was simply a modification of the strict policy of protection which commencing with the "Morill" Tariff in 1861, had been pursued with eminent success. It was a very carefully considered Act, and embraced the more stringent policy of protection for those industries which required development. It met with great opposition and our English Statesmen in general prophesied utter ruin to the United States from its adoption. It has, however, been a complete success, but in 1892, under the Free Trade Administration of President Cleveland, the "Wilson Gorman Compromised Tariff" was passed, neutralising to some extent the McKinley Tariff. The activity of trade was somewhat checked by this change, but in 1896 Mr. McKinley was elected President, and in 1897 the "Dingley Protective Tariff" came into effect with unprecedented prosperity, and although it is the contention of Free Traders that Protection will kill an Export Trade, it is a fact that the export of manufactures from the United States has increased within the last eight years from £44,800,000 to £82,600,000 under its policy of protection.

### APPENDIX III.

#### THE BRITISH FISCAL POLICY OF "FREE TRADE" IS OPPOSED TO POLITICAL ECONOMY.

TO THE EDITOR OF THE DAILY NEWS.

#### SIR GUILFORD MOLESWORTH ON FREE TRADE.

Sir,—In your review of my unpretending booklet, "Our Empire under Protection and Free Trade," you say :

It is difficult to argue with a writer who clings in this way to doctrines which belong to the dark ages of economic science. We can only recommend the author to devote a little study to the 'Wealth of Nations' and to the writing of Frederick Bastiat.

I may state that I have not only studied those works, but have quoted freely from them in support of my arguments in the 'British Jugernath,' which I published 19 years ago. Referring to the second edition of that work, I find quotations from Adam Smith's 'Wealth of Nations' (at pages 9, 10, 11, 21, 24, 43, 46, 51, 52, 53, 54, 55 and 57), and from Bastiat (at pages 23, 58, 59, and 76), the quotation at 23 showing how Bastiat has misled his followers by false predictions.

Modern economists, and especially the later school of German economists look upon the Manchester School of economics as belonging to past ages, and scornfully repudiate it as "Manchesterthum" and "Smithianismus."

I fear that your reviewer has not studied the books he recommends to my notice ; otherwise he would never have ignored the following sentences, which occur in Adam Smith's 'Wealth of Nations,' and which to a great extent support the views I have advocated :

If the free importation of foreign manufactures were permitted, several of the home manufactures would probably suffer, and some of them perhaps go to ruin altogether.—Wealth of Nations, Book IV., Chap. 11.

It will generally be advantageous to lay some burden on the foreigner, for the encouragement of domestic industry, when some tax is imposed at home upon the produce of the latter.

In this case it seems reasonable that an equal tax should be imposed upon the like produce of the former. . . .

It may sometimes be a matter of deliberation how far it is proper to continue the free importation of foreign goods, when some foreign nation restricts by high duties or prohibitions, importation of some of our manufactures into their country.—Wealth of Nations, Book IV., Chap. 2.

I would recommend to your reviewer's notice the following quotations from Mill:

The only mode by which a country can save itself from being a loser by the revenue duties imposed by other countries on its commodities, is to impose corresponding duties on theirs.—Principles of Political Economy; by John Stuart Mill, Book IV.

Yours, &c.

GUILFORD L. MOLESWORTH.

The Manor House, Bexley :

July 2nd, 1902.

[Our reviewer, who has seen the above letter, says : " Free-traders are not concerned to deny that the sudden adoption of Free Trade by a country so given up to an artificial system, as Great Britain was in Adam Smith's time, would probably have entailed disagreeable consequences upon those who were then basking in the sunshine of a protective system at the expense of their fellow-countrymen. Neither do they deny that when a tax is imposed upon some home product, it is reasonable that an equal tax should be laid upon a like product imported from abroad, and *vice versa*. On the contrary, their chief objection to Sir Michael Hicks-Beach's corn tax is based upon this very doctrine. The passage which Sir Guilford Molesworth quotes from Mill's Principles of Political Economy, does not occur in ' Book IV..' as he says, but in Chapter IV. of Book V. (Section 6). If the reader will turn to it he will find that it is accompanied by limitations which render it practically valueless for the purposes of the advocates of Protection. It is well known that Mr. Mill has occasionally granted more to his opponent than his disciples approve : but to claim his authority on that ground on behalf of your correspondent's book, which is full of economic heresies, would be absurd." ]

*To the Editor of the Daily News.*

Sir,—With reference to the remarks of your reviewer on my letter which was published in your issue of yesterday, permit me to point out that the ruin of some of our manufactures, which Adam Smith predicted as the probable result of the free import of foreign manufactures, was by no means " sudden." It was very gradual, and was only complete after we had for years been " basking in the sunshine " (to use your reviewer's words) of Free Trade. The reason why that ruin was gradual has been fully explained in my booklet.

It is true that Adam Smith did not include our agricultural industry in the same category with our manufactures, but that was upon a false assumption ; for, as he has explained :—

Even the free import of foreign corn could very little affect the interest of the farmers of Great Britain . . . The average quantity imported



one year with another, amounts only . . . to 23,728 quarters of all sorts of grain. . . . So it is probable that one year with another, less would be imported than at present. (Book IV, C. 11.)

Now the actual import in the year 1900, in round numbers, amounted to 42,000,000 quarters. Can any unprejudiced man doubt that Adam Smith would have predicted the ruin which has unfortunately fallen upon our agriculture, if he could have had any conception that the actual import could be nearly 1800 times as much as that on which he based his conclusion, that the free import of so small a quantity would *very little affect the farming interest?*"

With regard to Adam Smith's opinion, that

"It will generally be advantageous to lay some burden on the foreigner for the encouragement of domestic industry, when some tax is imposed on the home produce, your reviewer infers that this is inapplicable to corn, because there is no direct tax upon it, but he forgets that the English grower is burdened with taxation of the most crushing character, which the foreign grower evades.

Your reviewer is mistaken in stating that Mill's advocacy of the imposition of revenue duties corresponding to those of other countries "is accompanied by limitations which render it practically valueless for the purposes of the advocates of Protection."

The only limitation is this:—Only it must take care that those duties be not so high as to exceed all that remains of the advantage of trade, and put an end to importation altogether.

Surely this limitation does not render it valueless to the advocate of Protection—it is exactly what he would desire. To advocate *protection* is not to advocate *prohibition*; and the object of Protection is not to prevent imports, but to place the industries of a country on a fair footing with those of other countries.

I fear that my booklet must plead guilty to the reviewer's charge of being full of "economic heresies," but my faith is not of the stalwart character of the Free Trader's—that faith which has been defined by a Sunday School girl as:—"Faith is believing that which we know to be untrue."

GUILFORD, L. MOLESWORTH.

THE MANOR HOUSE, BEXLEY, KENT:

July 8th, 1902

## APPENDIX IV,

### FACTS FOR FISCAL REFORMERS.

*Compiled for the Working Men of Birmingham in 1902.*

BY SIR GUILFORD MOLESWORTH, K. C. L. B.

1. Extremes are injurious.
2. Unlimited free import is one extreme, prohibitive tariffs the other, protective tariff is the practical mean.
3. It is a fallacy to suppose that a tariff must necessarily raise the price of the article taxed.
4. As a general rule, when an article is, or can be produced at home, a tariff, if it be not prohibitive, stimulates production, promotes internal competition, prevents a permanent increase of prices, and in many cases eventually decreases the cost to the consumers.
5. When, however, an article is not of home production such as tea, coffee, cocoa, tobacco, wines, etc, the tariff naturally increases the price.
6. A tariff on a competing import is frequently paid by the foreign producer, and does not fall on the consumer.
7. Experience has shown that the imposition of a tariff is frequently followed by a fall in the price of the article taxed.
8. It sometimes happens even that the anticipation of the tariff causes a fall in the price.
9. The imposition of a tariff frequently kills a foreign monopoly, or enables a new industry to arise.
10. Unrestricted foreign competition often prevents the establishment of a new home industry, or crushes out an existing one.
11. Even when a tariff raises prices, it adds to the revenue and saves other taxation.
12. Direct taxation of capital and profits is a burden on our industries and reacts on the working classes by reduction of wages and employment.
13. Industries burdened by direct taxation are at a disadvantage in competition with those foreign industries which do not share that burden.
14. Indirect taxation (derived from tariffs) is in many cases no burden.
15. The term "Free Trade" (Libre Echange), as explained by economists, means the free exchange of commodities between nations, which England has never had, and has no signs of ever having.
16. We have no free import for our productions to any country, not even to our self-governing colonies.

17. We have thrown away our bargaining power with foreign countries by abolishing our tariffs on competing products, and have handicapped our trading relations with our Colonies.

18. We admit, free of duty, those articles which compete with our industries, but tax those which do not compete.

19. We impose taxation in a form which must fall solely on our own people, but remit it when only any portion, if not the whole, is likely to fall on the foreigner using our markets.

20. The "big and little loaf" of Free Trade is only a delusive electioneering fiction, and the cry of seeking to "tax the poor man's loaf" an absurdity, since the loaf produced at home is already taxed to the hilt.

21. The influence of the price of wheat on the price of bread is generally exaggerated, no account being taken of the fact that the retail price of the loaf includes many more items than the wheat itself, namely, the labour employed in the milling, the baking and the distribution, besides the profits of the middlemen and employes at each stage, the rent of premises, and so forth, which do not vary with the price of wheat.

22. Our dependence on foreign nations for wheat supplies tends in war time to raise prices to famine rates. During the Crimean War the price of wheat was higher under free imports than it had been under the Corn Laws since 1818, the average price for the year 1855 being 74s. 8d. per quarter.

23. The price of wheat is less affected by tariffs than by the general level of the world's prices.

24. A tariff does not, as a rule, raise the price of wheat, provided that the duty be not so high as to be prohibitive or nearly so; but the present prohibitive duty 12s. 2d. per quarter in France, when the outside price is only 27s. or 28s., necessarily raises the price.

25. The price of wheat in Protectionist countries is not necessarily higher than in free-trade England; in some cases it is lower. Bodio's analysis of the price of wheat in the principal markets of Europe for the average of 16 years 1869-84, shews that the price in Brussels and Paris was 3 per cent. higher than in London, but in Amsterdam it was 1 per cent. lower; than in London; in Rome 3 per cent. lower; in Berlin 10 per cent. lower; in Budapesth 14 per cent. lower; and in Vienna 25 per cent. lower than in London.

26. The repeal of the Corn Laws in 1765 was followed by a rise in the price of wheat from 33s. 3d. (the average of ten years preceeding the Repeal) to 50s. 5d. for the average of the ten years succeeding their repeal.

27. During the French War (period 1809-13, prior to the enactment of the 1815 Corn Laws) the average price of wheat rose to 107s. under Free import.

28. After the enactment of the Corn Laws in 1815, the average price

fell gradually so that in the three years 1843-45 preceeding the Repeal of the Corn Laws, the average price was 50s. 9d. per quarter.

29. The average price of wheat for the three years preceeding the Repeal of the Corn Laws in 1846 was slightly lower than the average of thirty years succeeding their Repeal.

30. The present low price of wheat is mainly consequent upon the diminished cost of transport by steamers and railways and improved processes of agriculture, but should we be engaged in war with strong maritime powers, there would be the utmost risk of famine prices.

31. The distress in 1141-42 which gave rise to the Anti-Corn Law agitation, was not due to dear bread, but to a temporary monetary crisis caused by a sudden drain of gold to the United States.

32. The average price of wheat for the five years preceeding the Repeal in 1846, was almost lowest, that had been touched during the half century 1800-50.

33. The re-imposition of the registration Corn Tax in 1902 did not raise the price of wheat; but after the remission of the Tax in 1903, the price of wheat and flour rose.

34. We enjoyed extraordinary prosperity and acquired our commercial and industrial superiority, as well as our position as the Capitalist nation of the world, under a policy of strict Protection.

35. We are losing these advantages under the so-called policy of Free Trade.

36. In the United States the periods of protective tariffs have uniformly been marked with prosperity, and the periods following their several repeals have been marked by depression and distress.

37. The prosperity which we enjoyed in the "fifties," although unfairly claimed as the work of Free Trade, was due to other causes, namely, gold discoveries, inventions and science, steam navigation, railways, etc., which have been shared by foreign nations;

38. Having laid the foundations of our industrial prosperity under Protection, and having thereby secured the command of the world's markets, we were not merely the first, but the only country able to utilise these new forces that then came into play.

39. For more than twenty years fortuitous events, such as the Crimean War in the "fifties," Civil War in the United States, and Continental disturbances in Europe in the "sixties" and early "seventies," retarded the progress of foreign nations.

40. As soon as foreign Protectionist nations were able to avail themselves of the new industrial conditions, they successfully competed with us even in our own markets, and our country is flooded with the productions of the very nations which we formerly supplied.

41. Since that time most of our industries have either been ruined or have struggled hard for existence.
42. Our Colonies are also becoming more and more Protectionist, and are flourishing under that policy, and Canada and our South African possessions are able to give the Mother Country preferential treatment and to their honour do so as yet without reciprocity on our part.
43. Many of our best workmen have emigrated to the United States where they obtain higher remuneration for their labour.
44. The capital recklessly expended by us in purchasing abroad that which might have been produced at home has armed Protectionist nations with the sinews of war in competition with us.
45. Instead of fostering our own industries and providing employment for our working classes, we purchased from the foreigner in 1901 produce to the value of £416,000,000, much of which we could well have produced ourselves or in our Colonies. The value of exports to those nations in return was only £175,000,000.
46. Canada is being thrown into the arms of the United States by our policy and our refusal to respond to her advances for reciprocal trade.
47. We are constantly raising our direct taxes, while the United States lower theirs.
48. Since 1868 our direct Imperial taxation has increased from £19,000,000, to £59,000,000, and our direct local taxation by rates from £20,000,000 to £40,000,000.
49. The cost of food and the necessaries of life is not less in England than in Protectionist countries.
50. The wages in Protectionist America are, in the majority of cases, nearly double those prevailing in our "Free Trade" country.
51. The prophecies which induced our people to adopt Free Trade have proved to be false.
52. We stand alone, excepting Denmark, as "Free-Traders" amongst civilised nations; and Free Trade is now recognised as either British or a savage custom.
53. The predictions of ruin to those countries which have adopted Protection have altogether failed.
54. The volume of commerce is no criterion of the prosperity of our industries.
55. The excess of £241,500,000 per annum of our foreign imports over our foreign exports show that we are consuming more than we produce; we are living, to a great extent, on the interest of that capital which we have gained in former days of prosperity.
56. We have of late years been parting largely with our foreign securities in payment to Protectionist nations.

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57. Much of our import consists of food which is absolutely consumed. Much of our export consists of our national assets of coal and mineral wealth which cannot be replaced.

58. Since the passing of the McKinley Bill in 1891, which the Free Trade apologists prophesied would ruin the United States, the industries of that country have developed by leaps and bounds.

• 59. The special exports of the United States increased in 1898 by £76,000,000, when compared with 1890, while those of the United Kingdom decreased by £30,000,000. •

## Co-operative Credit Societies.

By K. C. De, Esq., M. A., I. C. S.

Registrar of Co-operative Credit Societies,  
Eastern Bengal and Assam.

FOR many years the chronic indebtedness of the agriculturists in India leading to their utter ruin in not a few cases, has been attracting the serious attention of the Government of India, and many enquiries were instituted with a view to devise means of alleviating their distress. Different experimental measures were adopted in some provinces, and after a great deal of deliberation, the Government adopted the institution of Co-operative Credit Societies as one of the remedies of this great evil. In 1904, an act was passed in the Supreme Council called the Co-operative Credit Societies Act (X of 1904). And although two years have passed, it is to be regretted that the provisions of this Act, and the various concessions and facilities granted to the Co-operative Credit Societies by Government are still unknown to the great mass of the people.

2. It is known to all conversant with the agricultural villages in the country, how the common cultivator lives in debt, year in and out, and is only too often ruined entirely by the *mahajan*. In many parts of the country, the actual cultivator of the soil has gradually lost all permanent interest in the land he cultivates and has become either a labourer working for wages only a *bargadae* or an *adhidar*, a yearly tenant who gets half the produce or less as wages. In a great many cases has the original cultivating lease been acquired by the middleman who does not till the soil himself but lives on the produce of the toil of the rack-rented sub-tenants or ill-paid labourers. In the districts of Eastern Bengal, the sub-infeudation of the tenures has become notoriously vast and complicated, and all over the province the

cultivator seldom gets the full benefit of his labour and the fertility of the soil. In most cases, the cultivator is deeply in debt to the *mahajan* and can hardly hope to ever get out of his clutches. At harvest, he is compelled in a great many cases to sell his produce to the *mahajan* at the *mahajan's* rate and is cheated only too often in the weighing as well as in the rate. The bulk of the money he earns goes to pay the rent and the too heavy interest on his former loans. Between harvests, the poor man has to borrow again for the necessities of life, and this hopeless cycle of heavy borrowings and meagre repayments plunge him deeper and deeper in debt.

3. Nor is the case of the poor artisan in the villages any better. The weaver, the boat-builder, the blacksmith are all in the same state of chronic indebtedness. For the purchase of raw materials the artisan has to borrow, and so pressing is the demand of the *mahajan*, that he is compelled to sell off his manufactured produce at once at what price he can get, too often to the *mahajan* himself. He has to borrow for his food and his clothing, for the payment of rent, for every necessity and luxury of life. Thus his ceaseless labour does not benefit him much and only serves to enrich his *mahajan*.

4. The fact is that for agriculture and petty industries, the cultivator or the labourer in the villages possesses no capital of his own. He has money to buy land, cattle, implements, or raw materials and he has no money to supply him with the necessities of life till he can sell his produce in the best market. He has to borrow his capital and he borrows it at an exorbitant rate, and too often he cannot get sufficient capital for his needs. Sir D. M. Hamilton, a former President of the Bengal Chamber of Commerce, expressed these circumstances very tersely. He said that one must buy one's finance cheap and sell one's produce dear to make one's industry profitable, but the Indian cultivator buys his finance dear and sells his produce cheap, and the consequence is that



he is imposed on at both ends and lives in poverty with scarcely any hope of bettering his position.

5. The reason for this deplorable state of affairs is to be found in the villager's want of thrift. He never knows how to save money, and as his income is chiefly derived from one or two harvests, he cannot make the money obtained by sale of the produce last the long intervals between them. Want of training how to save and put by, the hereditary instincts and customs of extravagance at weddings and other ceremonials, and above all, the want of a safe place where to keep the savings,—all these contribute to the absence of thrift among the poor in our country. When the man is able by hard work to save a few rupees, he knows not where to keep it safe. He generally buries it under the ground, where it lies unproductive for years—and he is too often robbed by the thieves, or dies without being able to tell any one where the hoard is concealed.

6. Again, the capital available for financing these people in the villages is not considerable. The *mahajans* very often are poor men themselves, dependant on the profits of their usury for their own maintenance. While a rich man can easily obtain loans of thousands of rupees in a city at 5 to 8 per cent., the poor man in the village cannot obtain accommodation of ten or twenty rupees at less than 37½ per cent., although the security he offers is no less sound than that of the rich man. The prevailing rate of interest at which a villager borrows money in this country is 37½ per annum, or two pice per rupee per month. In some parts of the country, the rate rises so high as 75 per cent., and not seldom have I come across rates of interest at 150 per cent. per annum.

7. Thus it will be seen that the problem before us is as vast and complicated as difficult of solution. No amount of state aid or philanthropic help can be of much effect, for obviously, it would be no use paying off the poor people's debt, unless they are taught not to fall into it again. Capital has to be provided in sufficient quantity to free the agriculturists

from the existing debts at usurious interest and then to supply funds for the purchase of implements, cattle, seed, labour and raw materials, and also for maintenance till the produce can be sold in the most advantageous market. This capital has then to be made available to the people for whom it is intended, with security to the capitalist and facility and safety to the borrower. The credit thus afforded should then be safeguarded from possible abuse and means must be devised to secure that no credit is given to undeserving persons or for undeserving purposes, and that the loans given to deserving persons are employed on useful and necessary purposes. The capital should not only be brought near the houses of the people but should be made available at a rate of interest which will leave a fair margin of profit to the individual who employs it. Lastly, the individual must be taught thrift, the habit of saving encouraged, and a safe place provided for the custody of the savings. The villagers have to be taught habits of business and reliance on their own selves, for any extraneous agency to work the capital must fail. One of the solutions that have been found by Government satisfying all these requirements, is the Co-operative Credit Society.

8. A Co-operative Credit Society is primarily a society composed of a number of persons who co-operate or combine their credit together, for the purpose of obtaining cheap and facile financial accommodation for themselves, or in other words, it is a joint-stock bank, the capital of which is subscribed by the members themselves, or is borrowed on their joint credit, and is employed only on loans to themselves. A single villager cannot get a loan except at a very high rate of interest, and he cannot successfully approach a wealthy capitalist or a joint-stock bank, who deals in hundreds of rupees and will not deal in small sums. But if a number of villagers of good and honest reputation form a credit society, and agree jointly and severally to stand security for all the debts of the society, then the society can approach the larger capitalist and obtain a lump sum as loan at a small rate of

interest. Even the smaller capitalists, the local money-lenders, will recognise the advantages of lending a large sum to one body, and will be satisfied with the smaller profit and reduce their rate of interest. From the lender's point of view, the co-operative credit societies will offer excellent investment. The security is good, as the joint and unlimited liability of a large number of people is pledged. One or two of the members may fail, but the others remain and the likelihood of the security proving useless is reduced to a minimum. Instead of a large number of petty accounts to keep, only one account need be kept for one village. Instead of having to collect little sums from a large number of poor people, regular instalments from a well ordered society will be collected with punctuality and ease. Instead of incurring large expenses and suffering great worry, trouble and much loss of time, in suing many petty debtors, only one suit, if ever necessary, will have to be instituted against one corporation and the security being so ample, the decree will be even more easily executed than against any individual debtor. It is certain that in most places, as soon as the people understand the principles, the capital for these societies will be forthcoming. For it must be remembered that though all men are not philanthropists, they are not all usurers. There are thousands of people whose money is locked up in Post Office Savings Banks or in Government Securities, bearing interest at 3 or 3½ per cent., who will be glad to invest at least part of their savings in the Co-operative Credit Societies at 5 or 6½ per cent, if their security and advantages are made known. The societies already established have got all that they require at present at 6 to 6½ per cent., and two societies have actually refused to accept offers of large loans at these rates, as the money was not needed by the members.

9. The societies will also be capital savings banks for the members. The societies will never refuse to accept deposits from members. Whatsoever money a member may save can be safely deposited with the society, and the society

will give him a very fair interest, say 6 or 6½ per cent., per annum. When a cultivator sells his jute or mustard seed or sugarcane, he pays his rent and then either squanders the remainder in purchasing unnecessary luxuries, or buries it under the ground. Sometimes, he starts money lending on his own account and often loses his money by injudicious loans. But if he deposits his money in the society, the society will pay him a fair interest regularly and will carefully invest the money for the benefit of his fellow-members. When the cultivator understands this, he will learn to save and deposit his money regularly. In some societies, there is a rule of compulsory saving, each member being required to deposit after each harvest a certain amount proportionate to his land or to the number of ploughs he keeps. The Government has offered, as an additional incentive to thrift, to lend to Co-operative Credit Societies a sum equal to what the members raise by their deposits, free from interest for three years and thereafter bearing interest at only 4 per cent. per annum.

10. With the capital obtained from deposits of members, loan from Government and borrowings from the large or small capitalists, the societies will have enough funds to work with. The capital, however, will be employed only for issue as loans to members and for no other purpose whatsoever. The loans shall be given to members only and to no others. Loans will be given out carefully, for the actual needs of the borrower and not for the purpose of squandering on unnecessary luxuries, or evil purposes or for re-lending to others. Neither the law nor the bye-laws will in any way limit the purposes for which the loans may be granted. But it is left to the good sense of the members themselves to grant or withhold any loan. Each member will remember that he is personally liable for the whole of the capital of the society, and thus every member will naturally strive to prevent the giving out of loans on insufficient security or for undeserving purposes. Loans will be granted for all productive purposes, for

maintenance, for payment of rent, for repayment of older debts, and for the absolutely necessary expenditure on marriages and other ceremonial occasions. No one except the members themselves know accurately whether a man really requires a loan or not, and how much he requires for his needs. A loan for a purpose approved of by the members is sure to be granted, and it is almost equally sure that it will be usefully employed. As the lenders are co-villagers, the borrower's own people, there would be great facility and expedition in obtaining the loans, and as in a village, it is scarcely possible for an individual to keep his affairs secret from the fellow-villagers, it will not be difficult to ensure that each loan is employed on the purpose for which it was intended. Again, the members will know the circumstances of each applicant exactly and will thus decide in a way satisfactory to the applicant as well as to the society, when and by what instalments the loan is to be repaid. If the borrower has got jute and mustard cultivation, the loan will be made repayable after the jute and the mustard harvests. If he has paddy and sugarcane, the loan will be repayable after the paddy and the sugarcane are sold. Loans thus carefully granted for actual needs and on suitable terms will be to the immense benefit of the borrower and safe investment to the society.

11. The law does not fix the rate of interest payable on loans. The authority is vested by the bye-laws in the members themselves. They are to fix the rates of interest payable to the society on loans issued as well as that payable by the society on deposits and borrowing for each year. The rates will depend on local circumstances. The rates will vary not only in different societies, but in the same society from year to year. If there is a heavy loss one year, the rate of interest payable to the society will be raised and that payable by it to the members on deposits lowered until the loss is recouped. If there is general distress in the village, the rate payable to the society will be lowered. The rate of interest payable by the society on outside capital will depend

entirely on the credit of the society and the capital available in the locality. But for the purpose of creating a reserve, the rate charged by the society must be slightly above the rate payable by it. If capital is obtainable at  $6\frac{1}{2}$  per cent., the rate on loans may be fixed at  $9\frac{3}{8}$  or  $12\frac{1}{2}$  per cent., the excess being kept for the purpose of creating a reserve. The members who deposit their savings get a fair interest on their money, and on the rest of the capital raised proper interest is paid, so all the profit the society makes by lending at a certain rate money obtained at a lower rate, will go to what is known as the Reserve Fund.

12. The purpose of the Reserve Fund is three-fold. If there is ever any loss or remission, the Reserve Fund will bear it. But if members are chosen with care, and fraudulent, dishonourable, bankrupt and spendthrift people are kept out of the society and if loans are granted with due caution, there is no likelihood of any loss ever accruing. Up to date, there has not been any loss in any society established in this province or in any other province in India. In Germany, where this system has been tried with immense success for over 50 years, "not a pfening has ever been lost either to creditor or to depositor." So in France, "not a sou has been lost" and in Italy "the losses have altogether been trifling; in time of economic crises less than those of other banks." The next purpose is for the creation of additional credit. If the society can show that it has so much money kept safe as a reserve, the capitalists will be much more willing to invest their money in the society than otherwise. A reserve of cash is so much more easy to realise than even the whole of the landed property of all the villagers. Lastly, as the Reserve increases, there will be less and less necessity for the society to make profit, and the rate of interest payable on loans issued by the society will be gradually reduced. When the Reserve reaches a certain amount, safe enough for the society, all profits since accruing will be used as capital, and less money will have to be borrowed and the rate of interest payable on borrowings

will be reduced to a minimum. Eventually, it is expected that the societies will work with the capital consisting of their own profits and the deposits of the members, and the members will be enabled to get loans at so low a rate of interest as 3 or 3½ per cent. The Reserve Fund will at all times be indivisible among the members. But if a society is ever closed or wound up, the balance remaining out of the funds after payment of all liabilities, will be employed on such useful public purpose as the members may decide. This provision is necessary to prevent the members being ever tempted to close the society for the purpose of dividing the accumulated profits among themselves.

13. The loans will be given to the members only, and as all the members and their circumstances, position and income are quite well known to all other members, the security required will not be prohibitive. In many cases, no security of any kind will be necessary. In many others, the personal security of a brother member will be sufficient. In some cases it may be found necessary to accept security of landed property. But these cases will be rare. In no case, however, moveable property should be taken as security, for the difficulties of testing and custody are in most rural places insuperable and the chances of the society being imposed on are very great.

14. If the members are chosen with care, and if they are honest even though they are very poor, there is no chance of any loan being lost. The other members, when they realise that they are each and every one responsible for the whole of the capital of the society, will see that the borrower pays up his dues in time. If owing to circumstances beyond his control, a borrower cannot pay up his dues in time, his brother members knowing the reason for default will give him time to pay up, and in extreme cases may even remit the debt. But the brother members are sure to know if the borrower defaults purposely when he is able to pay, when not only will they at once sue him for the debt and pursue that suit to the bitter

end, but levy a penal interest and remove the fraudulent borrower from the benefits of the society. No special summary procedure has been prescribed for recovering loans from members, as such concession is liable to abuse and is likely to scare the less intelligent cultivators. But it is extremely unlikely that if the members do their duty, a suit will ever be necessary. In no case has a suit ever been brought by any society in this province or in any other. As a matter of fact, members must be chosen with such care that no loan may be lost, and the loans should be given with such circumspection and the conditions of repayment made in such a way that no default will be probable.

15. To encourage the formation of these societies and help them to get on, as well as to simplify their proceedings, the Government of India has granted several concessions. I have mentioned before the generous terms on which advances will be granted by Government to the societies. Besides this, all deeds executed by or in favour of the society are exempted from the payment of stamp duty. When documents by or in favour of the society are registered, the registration fees are remitted. The income-tax on all profits by the society or by its members in dealing with the society is remitted. There is no fee charged by Government for the registration or incorporation of the society, and the stamp duty on the Articles of Association is remitted. The accounts of the societies are audited by the Registrar once every year free of charge, and his advice is always at the service of the society. The Post Office Savings Bank which is not open to any other companies has been opened to these societies for the safe custody of their money and the conditions of such custody are more convenient than those for private persons. Besides the absolute safety, there is another advantage in such custody, namely, that all the surplus funds of the society earn interest at 3 per cent. per annum so long as they remain in the Post Office Savings Bank. According to the Rules made by our Government, any entry in the books of account of any society can be proved in any court



of law by the production of a copy of the entry certified to be true by the Chairman. No officer of Government except the Registrar and the Collector or any person specially authorised by the Registrar or the Collector, is empowered to inspect the societies, so that there is no fear of undue interference of the petty officials of Government. The restrictions and obligations imposed on the joint-stock companies by the Indian Companies Act are not applicable to these societies. Extreme latitude is given to them in the making of their own bye-laws, including rules of procedure in fixing the rates of interest to be levied and paid and in all matters of internal administration. The money due to a member is paid after his death to any person whom he nominates in accordance with the rules, so that the heirs of members are spared the cost, delay and trouble of obtaining a Succession Certificate.

16. The Act also provides for the formation of Co-operative Credit Societies for the assistance of the needy people, who are not agriculturists or who are not residents of villages. These societies are called urban societies, while those described in the preceding paragraphs are called rural societies. In a rural society at least four-fifths of the members must be agriculturists and in the urban societies at least four-fifths of the members must be non-agriculturists. There is another important difference between these societies. Whereas the liability of the members of rural societies should almost always be unlimited, in urban societies it may be limited or unlimited. Usually we find that the residents of the towns have not all their property situate within the town, nor are their circumstances and dealings known to each other so well as in the villages. Hence in many cases, it is difficult to find men in towns who would be willing to co-operate their credit on the basis of unlimited liability, or in other words, take on themselves the responsibilities of the debts of others. The liability of the members of the society can however be limited to the amount of the share held by each. The capital of a society of limited liability is derived chiefly from the

value of the shares subscribed by the members. The shares are usually of small instalments at sufficiently long intervals. Every member must own at least one share and no member can hold more than one-fifth of the total number of shares, nor shares representing a nominal value of over one thousand rupees. The shares are not heritable, but the value of the share is paid to the nominee of the member after his death, like all other dues. When any person ceases to be a member of the society, the value of the share is refunded to him. The shares are not transferable except with the permission of the society and even then only to another member of the society. One-fourth of the profits of an urban society goes into the Reserve Fund, and the balance is paid to the members as dividend on the shares. In all other respects urban societies are similar to rural societies. These societies will much benefit the petty artisans, such as weavers, the petty tradesmen, the lowly paid clerks and the smaller professional men who work in towns. In many cases it is likely that these societies will, after supplying the needs of their members, have some surplus money in hand. The law provides for the employment of such sums in financing the rural societies in the neighbourhood.

17. I have dwelt on the economic advantages of the system of co-operation in these credit societies. But this is not all the good that comes from them. Wherever these societies have worked with success, "a new world has been called into existence to redress the balance of the old." I look forward with hope to the time when these societies will work wonders in elevating the social and the moral tone of the village communities in this province besides providing and organising the village finance. The time will come when the people of a village, who in the former times used to take scarcely any interest in anything outside their own threshold, who used to spend their scanty savings in extravagance, litigation or purchase of unnecessary articles of luxury, or to hoard them profitlessly, will learn how save and employ the

surplus funds for their own profit and for the benefit of their fellow-villagers. It will create "a new world—a world of brotherly love and mutual help where every one is the protector and assistor of his neighbour." The principles underlying credit and trust will infuse a new spirit in the careless and thriftless villager and kindle in him the desire for standing well in the eyes of his neighbours. One may hope, that, as in other countries, under the influence of these societies, the idle man will become industrious, the spendthrift thrifty, the drunkard will reform his ways and become sober, and the illiterate well learn to read and write."

18. It will no doubt take a good long time before we can attain the stage of such perfection. The movement is still in experimental stage in our country and has scarcely taken a firm root. We require the active co-operation of the intelligent and educated community, to make Cooperative Credit Societies a common national institution in every village, a luxurious growth spreading into the remotest corners of the empire. I cannot over-estimate the immense educative results of these noble organisations, which the Government has given the first impetus to, and which I sincerely hope will throw open the door of renewed national prosperity. I appeal to every one of my countrymen to assist and encourage this cause with his co-operation in work and in means within his own sphere of influence.

## **A Central Bank to Finance Co-operative Credit Societies.**

BY K. C. DE. Esq., I. C. S.

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In another paper which I had the privilege of reading before this Conference, I have described what Co-operative Credit Societies are, what they purport to do, and the methods of their working. Co-operative Credit Societies are institutions

for the purpose of conserving the wealth of the country and employing that wealth to the greatest advantage to the people of the country. The movement to introduce these institutions in our country ought therefore to receive the earnest sympathy and assistance of all people who have the good of their country at heart.

2. These institutions are primarily the Associations of the men of limited means, who cannot under the existing circumstances, command sufficient capital for their needs, or obtain it with sufficient facility or at sufficiently moderate rates. They are meant to finance the cultivators and weavers and other artisans in the villages, and the small tradesmen, petty dealers and other people of limited means in the cities. The primary idea is that when these people band themselves together in a Co-operative Association with unlimited liability,—that is, pledge all that they own—and jointly and severally undertake the responsibility of the whole of the liability of the Association, they create for themselves a collective credit far in excess of the sum of the individual credits of the members. Theoretically such Associations ought to be able to command in this way capital sufficient for the actual needs of all the members at a sufficiently moderate rate of interest, and in the ideal stage, they are expected to fulfil their highest ambition “every man his own banker.”

3. The difficulty in this country in the popularising of such institutions consists firstly in making the people of small credit who are proposed to be benefited, understand the enormous advantages of Co-operation and agree to join the Association with unlimited liability. But this difficulty is not insuperable, and wherever an attempt has been made in any rural area, and the entire internal administration of the affairs of the Society is vested in the people themselves, the fears of unlimited liability have vanished and people have come forward to form Societies. For in these rural areas, the people know each other and the material circumstances of each other very well and if the right of selection of the

members and the right of deciding the terms and conditions of the loans issued, are left entirely in their own hands, there is never any fear of any loss; the conditions of unlimited liability present no terrors and the responsibility of the whole liability makes them only more careful in their transactions. This has been the experience not only in the Province of Eastern Bengal and Assam, but all over India, and the very rapid increase in the number and the membership of these Societies all over the country, proves that where properly taught, the Indian agriculturists are not backward in appreciating and taking advantage of the principles of co-operation as applied to credit.

4. The second difficulty in the formation of a large number of these Societies lies in the financing. The members of these Societies are men of limited means and they join the Society primarily for the purpose of borrowing. It is seldom that they have money to deposit, sufficient to meet the needs of all the members. Such of the richer villagers as do join the Society not for the purpose of immediately taking loans but for the purpose of doing so, if circumstances ever require, can not or will not deposit all their savings in the Society. For, although, having the right of selection of members and control over loans in their own hands, they do not hesitate to undertake the unlimited liability, yet they are habitually conservative in thought and action, and are reluctant to put all their savings in an institution, which though entirely managed by them, is quite new and beyond the sphere of their knowledge and experience. It has been found in the actual working of these Societies that the deposit of the members amounts to very little in the beginning, but it steadily increases as the Society grows older, and the deposits are invariably put back into the Society when the period of the first instalment expires. The confidence of the members increases as they see the Society working wisely and with profit to itself and benefit to the members themselves. But in the very beginning it is hard to raise sufficient capital from the village itself. There is no

Society in the Province of Eastern Bengal and Assam which has begun solely with its own capital. All the Societies have taken loans from Government, but as these loans cannot exceed the amount which the members deposit themselves, they have not very materially helped in increasing the funds. In almost every case, the Societies have had recourse to outside help in the shape of loans from or deposits by non-members, such as educated philanthropic neighbours or Zamindars.

5. In order to facilitate the formation of new societies and finance those already established, one of the remedies that have been attempted in some provinces, is the formation of Joint Stock Banks to lend money solely to Co-operative Credit Societies. The capital of the Banks is raised in the very beginning by shares taken by its constituents, and then, as occasion requires, by the issue of debentures on the security of the unpaid share capital and the Reserve Fund. The Banks are Joint Stock Companies with limited liability, but they are registered under section 6 of the Co-operative Credit Societies Act ( X of 1904 ), and thus obtain all the privileges and concessions granted to Co-operative Credit Societies. These Banks like other Joint Stock Banks, are managed by Directors elected by the shareholders. The funds of the Bank are employed in giving loans to the existing or newly formed small Co-operative Credit Societies in the interior. The risk of loss in these Societies is minimised by wise provisions which are fully described in my paper on Co-operative Credit Societies. The risk of loss to the Central Bank is thus also reduced considerably. Instead of individuals lending money to individual Societies, they take shares in or buy debentures from the Joint Stock Central Banks, which deal with the individual Societies. The risk of loss to the investor will thus be as little as possible.

6. There are many such District and Central Banks in the United Provinces of Agra and Oudh, some of them with capital exceeding a lakh of rupees, which are financing hundreds of smaller Banks. In the Cities of Bombay and

Madras, such Banks have been recently established and promise to work very successfully. In the Province of Eastern Bengal and Assam, there is already one such Bank which besides accommodating its members, is financing the rural Co-operative Credit Societies established in the District and another such Bank, on a slightly larger scale, has been recently established. But the Banks in this Province are of extremely limited resources and they have not much scope for extensive work, and a large Provincial Bank on the model of other provinces will be of much assistance.

7. I do not intend to take up the time of the Conference with a detailed description of the methods on which the existing Central and District Banks are working or the way in which these Banks may work, but I only wish here to submit this scheme in the briefest possible terms. If the idea takes root in the minds of the thinking public, I shall be ready to place before them all the information I can furnish and my services will be at their disposal in any way in which I can further the working out of this idea.

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## **Dharmagolas, (Co-operative Grain Banks).**

BY RAI PARVATISANKARA CHAUDHURI.

*Of, Shaitgarh, Teota, Dacca ; Honorary Secretary.*

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The scheme was inaugurated in April 1892, and the first experiment was made at Jayganj in the district of Dinajpur, Bengal. The villagers have been much benefited and convinced of its utility. Both the Indian and Anglo-Indian press have noticed it favourably,\* and the Government of Bengal has also partly incorporated it in their Co-operative Credit System.

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\* "As a matter of fact, the plan that he has adopted to insure the success of these paddy *golahs* or Cooperative Corn Banks is not only

Emboldened by these encouragements and as the prosperity of the masses is expected to help the development of Indian Industries, I have ventured, though with much diffidence, to place the scheme before this Conference for its consideration, with a hope that steps may be taken by this Conference to establish *Dharmagolas* throughout the country.

Before entering into the details of the scheme, gentlemen, a brief survey of the condition of the agricultural classes, for whose benefit it is mainly intended, is, I think, necessary.

Gentlemen, the agricultural condition of India at the present moment can be more easily imagined than described. By the extinction of various industries and the moribund condition of others, the great majority of the people,—over 80 per cent. of the entire population,—have taken to agriculture as their means of living, which even through want and ignorance they carry on, in the most primitive fashion.

The fertility of the soil is being gradually exhausted for want of manures to replenish it. Rains through deforestation of the land and other causes, are unfortunately for us not evenly distributed and retained in the soil, so that there are either great droughts or sudden inundations. The result is, that, in most years, the crops fail in one part of the coun-

simple and practical but congenial to the genius of the people"—*Amritabazar Patrika*, 29th Nov. 1901.

"Its simplicity is its greatest attraction"—*Bengalee*, 14th Feb. 1902.

"This institution of *Dharmagolas* appears to us to be highly original, practical and useful. It has already passed the experimental stage and may be safely started in other parts of the country with advantage to the people."—*Indian Mirror*, 6th April, 1905.

"There can be no doubt that, if no difficulties exist, and the Zamindar, in a pamphlet he has published on the subject is inclined to believe that they do not exist, in the way of the extension of the system to other parts of India, the corn-bank might do much towards solving the problem of famine in this country."—*Englishman*, 17th January, 1902.

"*Dharmagolas* or Co-operative Corn Banks may now claim to have passed the experimental stage"—*Hindoo Patriot*, 26th July.



try or the other; agricultural distress follows, and the peasantry are hard pinched for food. Privation and want have thus become the order of the day with a vast majority of the teeming millions of India. Meanwhile, under the conditions of free-trade, wealth and grains continue to flow freely out of the country, and the people can hardly lay by enough in money or grains to sustain them through hard times. Although famines in India are seldom caused by a general scarcity all round and although while one part of the country is affected by famine, there may be good crops in some other parts, and with the extension of Railways and other easy means of communication, parts affected may be supplied with food-grains without much difficulty, yet the poverty of the masses does not allow them to buy food, even when it is near at hand. Gentlemen, it is for this reason that we hear of recurring famines with heavy mortality, on almost all the slightest occasions of drought. "Even the *Times* is constrained to observe that it may well be doubted whether a day is not coming when not all the resources of the British Empire will suffice to cope with a succession of bad seasons and a final failure of the rains over an extended area" (Extract from the Speech of Mr. E. D. Wacha, President of the 17th National Congress; reported in the *Bengalee* Saturday, the 28th December, 1901.)

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"The grain banks by supplying an ever ready store of corn on the spot will, therefore, be of immense value."—Hyderabad Journal, Sindh, 7th June, 1903.

"Really we are in love with this project by virtue of its simplicity and practicability. Such corn banks can be founded in every village, if necessary, by every Zemindar in the land"—Power and Guardian, February, 1902.

"Money banks and grain banks can be established, it can be proved up to hilt, and no one has yet lost a pice in endeavouring to start them; they are without exception attendant of good results. There is no possible excuse why they should not be started in every village beyond that of not being our brother's keeper..... The people do not ask your money, they ask for no charity, all they plead is that they shall get the superior intellect of those above them in the scale to pull them out of the mad, to start them on fresh lines"—Pioneer, 27th July, 1905.

I have been intimately connected in various ways with the work of affording relief to tenants in our zemindary during several periods of scarcity. From what experience I have thus gained, I have come to the conclusion that relief, in order to be efficacious, must always be near at hand and should also preferably consist of grants of grain, as the purchasing value of money becomes very much depreciated at the time. It is thus necessary that somewhere close at hand to the distressed village, there should be available in times of famine, a store of grains which all persons in distress may fall back upon. But the average income of an individual there is so low that it is not possible for him, even in the most prosperous years to lay by, individually, enough to sustain him and his family throughout a bad season. But what can not be achieved by the individual can more easily be done by collective efforts; and I have found that by inducing the village communities to keep a common stock of grain in a good year and by profitably investing the same in comparatively bad years, a reserve might be built up in each village, which would sustain the villagers during a period of scarcity and avert any calamity that might befall through a sudden failure of crops.

It is also on this principle of co-operation that the Government has subsequently based its system of Co-operative Credit Societies. That system aims at improving the condition of the agriculturist by opening for him easy means of obtaining loans to improve his farm, and maintain his family and children during a season of distress, by arranging for loans on the co-operative credit of several agriculturists.

The scheme, gentlemen, which I am now going to place before you, has the same principle of co-operation as its underlying basis, but its field lies elsewhere. According to this scheme, the inhabitants of one or more villages assembled at a meeting may, if desirable, decide to establish a *Dharmagola* or grain bank. They shall then elect five honorary *panchayets* to manage the affairs of the *gola* with one *goladar* among them, who may be entrusted with the duty of keeping the

accounts and may receive some remuneration. The *panchayat* shall prepare a list of subscriptions, and after having it sanctioned by the villagers, begin to collect paddy from them and thus form the stock of the *gola* from which loans will be granted to both contributors and non-contributors, though at somewhat varying rates of interest, which must not exceed the rates prevalent in the locality. As the stocks of the *gola* go on thus increasing, a reserve stock will be formed out of it to serve the villagers in times of distress. These *Dharmagolas*, it is hoped, will not only help the villagers when famine is actually in their midst, but will serve as a permanent grain-store, from which, at any time during the year, any poor villager can have his immediate want supplied without much difficulty and without resorting to the *mahajan*.

A *gola* thus once formed is the property of the village. The people of the village or villages who contribute to its fund, will have no right to appropriate the stock of the *gola*, or to sell it and divide the proceeds amongst themselves, unless it be to establish several *Dharmagolas* out of it in different places.

My first experiment was made in the year 1892 at Jayganj in the district of Dinajpur. The scheme was explained to the principal men of the village assembled at a meeting, and the majority of them decided to establish a *Dharmagola* on the lines suggested. It should, however, be mentioned that there were some dissentients among them, who doubted the ultimate success of the experiment. The *Dharmagola* thus established started with a stock of 80 maunds of paddy, and loans began to be asked for and were given by the *goladar panchayat*. The stock increased from year to year, and in 14 years, it amounted to nearly 2,500 maunds. The institution also gradually advanced in public estimation as persons in increased number began to be benefited each year. After another 8 years, it may be possible to form a permanent reserve stock of 1,500 maunds of paddy to meet any serious non-realisation of loans, in case of failure of crops in the

village. That quantity, I reckon, would keep 900 persons of the village fairly provided with food for three months and a half in a bad season. In fact, the inhabitants of Jayganj during the scarcity of food grains in Bengal [in September, October and November] last, did not feel any difficulty. Those who were in want of food grains took loans from the *Dharmagola* and had not to purchase grains at a very high price. Mr. J. Vas. I. C. S., Officiating Magistrate of Dinajpur, who visited the Jayganj *Dharmagola* on the 4th of November last, remarks that "the benefit of the bank has been keenly appreciated during the present year of scarcity. It is a pity that those concerned are unwilling to come under the Act..... Nevertheless the bank is doing immense good. The capital has increased in value from Rs 105/- to Rs. 4000. The *gola* house is being enlarged within healthy site. I wish the *gola* every success."

Besides the *Dharmagola* at Jayganj, I established three *golas* in the district of Dacca; the starting stocks in two cases of which were 50 and 60 maunds and they have in six years increased to 182 and 186 maunds respectively. I am glad to say that enquiries about the scheme have been made by Sir Suba's office, Baroda State, the Dewan's office of Bhoj, the Assistant Commissioner, Chitaldrug in Mysore State, the Dewan's office of Travancore, and a few other Indian States, and by several public associations and private gentlemen all over India.

But I am not aware, as yet, whether any *Dharmagolas* have been established by them. Several *Dharmagolas* have recently been established in the Mymensingh district and I hear that they are doing well.

For fuller reports kindly refer to my pamphlet entitled 'Dharmagola—Co-operative Corn Bank for prevention of famine.

Notwithstanding the difficulties of introducing a new scheme among the illiterate and conservative peasantry, specially as they are most unfortunately out of touch with the more enlightened literate classes, this system recommends itself more than any other cognate ones on the following grounds;—

1. A *Dharmagola* can be established in each villages from its own resources, whereas in the Co-operative Credit Society system; the question of capital appears as a stumbling block at the very outset, specially when there is not much superfluity of wealth in the country. Of course, the Government can raise loans in foreign countries or invite foreign syndicates to issue loans broadcast to our countrymen, but these loan operations though used for a productive purpose, will, no doubt, deprive the cultivators of some of their profits, which will be left entirely to them in the other system. Moreover, it will meet with no little opposition from the money-lending class, who, though much maligned, form an important and a numerous section of our society, as it will vitally affect their interest. As regards the want of capital, this is what Mr. K. C. De, I. C. S., Registrar of Co-operative Credit Societies, Eastern Bengal, says,—  
“The greatest difficulty I encountered in the organisation of new societies in this province, was in finding adequate capital. The price of food grains was very high in the year under report, and much of the hoarded money of the peasants was spent in maintenance. In most of the places the members pleaded absolute want and could not make any deposits. The richer people are almost all moneylenders and kept aloof from the Societies when they did not actually oppose. A few Zemindars in Bengal helped, but most Zemindars are absentees and take but little interest in the welfare of their tenants. Many of the petty landlords are themselves usurers and opposed to this movement. To give the societies a chance to prove their usefulness, more aid from the Government seems to me to be necessary. We cannot afford to wait for the members to come forward and deposit their savings, for they will not do so until the Society is a success and the Society can not work without capital.”

— (Vide, Report No. 139, dated Shilong, the 14th June, 1906).

2. It may be said that resting as it does on the free gifts of grain on the part of the villagers, the system rests on an uncertain basis, but practically this is not so. It is only when

there is a fairly good harvest that the agriculturist is in a position to spare something, and having to pay in kind rather than in money, which becomes dear on account of the fall of the price of food grains, he does not grudge to lay aside a small portion of the produce once for all as a contribution to the stock of the *gola*, specially as he knows that by so doing, he will get the benefit of the institution whenever he is in actual want. Taking the average annual yield of paddy per acre (nearly three standard bighas) to be 18 maunds, a contribution of 15 or 20 seers is not at all a hardship for the cultivator; and in fact, no difficulty has been experienced to create a starting fund in the instances mentioned.

3. The cost of its upkeep will not be heavy, as the posts of the *Panchayet* other than the *Goldar* will be honorary. Agriculturists having already been accustomed to grain loans, fit men for the management of the banks will be always available in the village, as is testified to by Mr. W. Gourlay, I. C. S., the late Registrar of Co-operative Credit Societies of Bèngal in his remark ;—

“The people grasp the principle at once and the institution is indigenous. They manage it themselves without any assistance beyond the good will of the Zemindar.” (*Vide* his remarks on the Rahatpur *Dharmagola* dated 7th March 1905.)

4. There will be no scope for excessive borrowing from corn banks, as there may be in money banks, for it is well known that an agriculturist is generally a spendthrift when he has got some cash in his hands.

5. On the accumulation of a stock of paddy in the *Gola* old paddy can easily be exchanged for new with profit, to preserve the stock and also to prevent diseases due to the consumption of new rice\*.

6. “The loan operations of the banks in ordinary seasons

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\* In recent years, Diarrhoea and Cholera in winter has perceptibly decreased at Jayagunj.

would tend, materially to diminish the dependence of the tenantry on the money lenders, and thus indirectly be the means of enabling them to appropriate a larger share of the value of their crops" (*Vide* remarks of *Statesman*, August 15, 1902), for "as the agriculture of the country is at present financed, the cultivator is practically forced to sell his produce as soon as it is harvested, and the result of the entire crop being thrown in a lump on the market (or into the hands of the money lender) is, that the cultivator gets only bottom prices for his produce (*Vide* Sir D. M. Hamilton's leaflet on Agricultural finance.)

7. The *Dharmagola* being public property of the village and no one having a right to sell its stock, "the effect of the scheme would be the perennial retention of a large stock of grain in the country without in any way interfering with its export trade" (*Vide* remarks of *Bengalee*, August 19, 1902.) Moreover the institution being of a public nature, all persons in need will be equally entitled to get relief from it, and no one will be able to take advantage of the hard times to put forth exacting terms for his individual aggrandisement.

8. Another special feature of the scheme is its elasticity and simplicity. A set of rules has been framed as model to the villagers to chose from, as contrasted with the hard and fast rules of Co-operative Credit Societies. I may be permitted to quote the following sentences from the *Bengalee* February 14, 1902. "We have read with great interest his brochure on the *Dharmagolas* or Co-operative corn bank. While famine looms so largely on the view and all sorts of remedies are suggested in the shape of agricultural banks and other schemes of a more or less expensive and complicated character, Rai Parvatisankar comes forward with a suggestion of his own, and what is still more important, has himself reduced his theory into practice, and invites us to examine it and judge about its merits. Its simplicity is its great attraction; and it does not need any extensive organisation. It proceeds

upon the line of least resistance. It starts with the village as a unit, and it needs no more than the co-operation of the village elders or of the village Panchayet, and perhaps, the sympathetic help of the local Zeminder."

The scheme is in the nature of a mutual assurance, the people will be in a position to resort to these banks more readily for timely relief than to any institution which can be provided for them by the Government or by the Mahajans working for their private gain, for they realise that the profit is their own as it all goes into the *gola* before their eyes and remains there under their own control. This is amply illustrated by the remarks of Mr. W. Gourlay, I. C. S., March 7, 1905 :—"The people have come to appreciate the benefits so much that through their advice two other *golas* have been started in other villages near at hand."

10. During scarcities and famine, a formidable difficulty presents itself in the transport of grain, to villages which are without railway or steamer communication, and the advantages of having a source of relief near at hand in both central and out of the way places are enormous and public opinion, as reported in the Famine Commission Report, is almost unanimous about it. The commissioners in their report of the year 1901, page 22 state :—"We would however lay great stress on the fact that there is a large and influential body of opinion in favour of village works as being—

- (a) more economical
- (b) more useful
- (c) less exposed to outbreaks of cholera and epidemic diseases
- (d) more easy to control
- (e) less open to the objections of :—
  - (i) interference with the labour market
  - (ii) neglect of agricultural dwellings and stock
  - (iii) hindrance to the early resumption of agricultural activity.
  - (iv) less likely to loosen domestic and moral ties.



○ We invite special attention to the last two considerations, which have not, we think, been sufficiently appreciated hitherto. The establishment of *Dharmagolas* will solve the difficulty.

○ The Mahomedans permit no usury and it may throw a great obstacle in the way of Co-operative Credit Societies in their loan operations, profits of which ultimately vest in the members thereof. But in the case of *Dharmagols* such objections will perhaps not be raised as the profits of the *gola* cannot be appropriated by anybody and remains vested in the public or their benefit.

○ Hitherto the scheme has only been successfully carried out experimentally in several cases in Bengal.

○ It now remains to be seen whether the institution can be introduced with equal success in other parts of India where rice does not form the staple food of the people. For this purpose it would be necessary to institute enquiries into the nature of the grains which form the staple food in different localities, and for how many years each of those grains retains its quality as food without deterioration, and whether it improves or deteriorates in its quality as food-stuff in the 2nd, 3rd and 4th years. So far as I have been able to gather information during my travels, I have found that in the Madras and Bombay Presidencies, in Central India and some parts of the North West Provinces, *bajra* forms the staple food crop of the peasantry in several large areas, and *bajra* like paddy remains in good condition for at least five years. In these localities *Dharmagolas* can be very successfully established with *bajra* as capital. In some parts of the Madras Presidency, in Orissa and Bengal and Assam, rice being the staple food, no difficulty can arise in establishing *Dharmagolas* with paddy. If any means can be discovered by which wheat can be preserved in wholesome condition for three or four years, there is not the least doubt that, the whole of India can have the benefit of the scheme. There would thus, after a reasonable time, ac-

cumulate a stock of grain in every village of India, and when there is scarcity of food or famine, relief will be ready, cheap, efficient, and handy, without the expenditure of a pice from the public exchequer, or any appreciable trouble or cost to the villagers; and a poor father or mother shall have no occasion to shed tears at the sight of his or her hungry children crying for food. The terrible loss of life during famines will be thus prevented, and the Government will, at least, in a great measure, be relieved of the gigantic task of feeding the people at an enormous cost. The institution, in addition to these advantages, will serve as a beneficial lesson to the villagers in teaching them co-operation, self-help and thrift, of which they stand in so much need.

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RULES FOR THE ESTABLISHMENT AND  
MAINTENANCE OF THE DHARMA  
GOLAS.

1. A Dharma Gola may be established for one village or group of contiguous villages.

2. At the initiative of a Zemindar, or a leading man of the village, or a Government Officer, a general meeting of the people of the village or group of contiguous villages, may be convened in which the object and the utility of the Dharma Gola will be read.

3. If the majority of the persons present at the meeting decide to establish a Dharma Gola for the village or group of contiguous villages, they shall elect five Panchayets from amongst themselves, and one *Goladhyaksha* or *Goladar* (Keeper of the Gola) from among the five Panchayest. The *Goladar* will be entrusted with the duty of keeping the accounts of the Dharma Gola. The posts of the Panchayets other than that of the *Goladar* will be honorary.

4. Persons who are opposed to the establishment of the Dharma Gola, and who are not likely to contribute paddy to the Dharma Gola, drunkards, persons with physical infirmities,

and persons convicted of theft, &c., shall not be eligible as Panchayets. But those who are reputed to be honest and godfearing, and those who are generally respected in the village, and have business capacities, are to be elected Panchayets.

5. The Panchayets on being thus elected shall prepare a list of the householders in the village or villages, and the quantity of culturable land which each of them possesses.

6. After the list is prepared, the Panchayets shall call another meeting of the villagers, and shall read before them the list, and if any valid objection is raised about the entries in the list, these shall be corrected, and the list finally passed. The villagers shall then discuss and fix the rate per bigha at which each householder is to contribute paddy to the Dharma Gola. If any one is unable to contribute to the full quantity according to the rate, a compromise shall be made and a quantity fixed. The rate at which each individual shall contribute, must not exceed ten seers per bigha. If it is not possible to make a list of culturable land which each villager holds or if such a procedure is not liked by the villager, then the Panchayets shall make a list of contribution according to the circumstances of each villager. After the final list of contribution is settled, the villagers shall decide the rates of interest to be charged per maund of paddy, given on loan to a contributor and to a non-contributor, till the next crop.

The rates must not exceed the rates prevalent in the locality and must not exceed fifteen seers per maund for a contributor and 20 seers for a non-contributor. The place where the Dharma Gola is to be located will also be decided in this meeting. Particular care shall be taken in selecting the site so as to avoid, as far as possible, all risks of fire and robbery.

The rates of interest fixed at the meeting shall remain in force for three years, after which period the rates may be changed according to the circumstances and needs of the

villagers, by the decision of the majority of the villagers assembled in a meeting held for the purpose.

8. Within seven days from the date of the meeting provided for in rule 6, the Panchayets shall report to the Zemindar, or to the local Kutchary, resolution of the villagers to establish a Dharma Gola, and as soon as practicable, the place where it will be established, the name of the Panchayets, the list of contributors, and the quantity of paddy each will contribute.

9. The Panchayets having reported the matter as provided for in rule 8, shall proceed to erect the Dharma Gola, the cost of which as a rule will be contributed by the Zemindar. If the Zemindar refuses to contribute such cost, the villagers shall raise a subscription in money for the purpose, and begin the collection of paddy. If the Gola is not ready, they may store the paddy in the house of one of the Panchayets or of a substantial man of the village.

10. Each Gola shall be locked with two substantial locks. The key of one of these locks shall remain in charge of the *Goladar*, and the key of the other lock shall remain in charge of one of the other four Panchayets. The *Goladar* shall be responsible for the safe custody of the stock, but the other Panchayets shall be responsible to the villagers for the safety of the Golas.

11. In the Golas, a compartment shall be provided for keeping apart fresh grain for the purpose of supplying loans for seed.

12. The Panchayets shall collect the quantity of paddy apportioned to each householder without any *zulum*, and in special cases may collect it in two or three instalments. Those who are not willing to pay in kind, may pay to the Panchayets the market-value of his contribution. The Panchayets shall purchase the paddy immediately, to avoid loss in consequence of fluctuations in the market.

13. If the quantity of paddy collected for the Dharma Gola in the first year is found to be insignificant, the Pan-

chayets shall call a meeting of the villagers immediately before the next harvest, and induce them to subscribe a further quantity of paddy. The case of the defaulters shall also be brought forward in this meeting with a view to realise the arrears.

14. The *Goladar* shall enter in the *Amdani khata*, the name, the father's name, and the place of residence of each contributor, and the quantity of paddy contributed by each individual.

15. When *Dharma Gola* has been established for a certain village or villages, all persons in the village or villages shall have a right to be present in all the meetings held in connection with it, but when it will be necessary to decide a question by majority of votes, those villagers only who are contributors, or are heirs to, or executors of contributors shall have the right to vote. The rest shall have no power to vote.

16. The following *khata*s (Books and Ledgers) are to be kept in connection with the *Dharma Golās* :—

1. The *Itihas khata*. (The proceeding book.)
2. The *Niamabali khata*. (The rules and regulations).
3. The *Amdani khata*. (The stock book.)
4. The *Jamakarach khata*. (The daily account book.)
5. The *Hatchita khata*, or the cheque *Bahi*.
6. The *Khatiani khata*. (The Ledger.)
7. The *Nikashi khata*. (The yearly account book.)
8. The *Tee Mantabya khata*. (The remark book.) &

(1) *Itihas khata*:—In this book the name of the person who proposed the *Dharma Gola*, the names of the villages for which it was established, and the proceedings of the meetings of the villagers shall be recorded. The Panchayets shall also record in this book any other matter which they may think fit in connection with the history of the *Dharma Gola*.

(2) *Niyamabali khata*:—In this book the rules and regulations in connection with *Dharma Gola* shall be recorded;

and if any rule is changed, added or expunged, the alteration shall be properly recorded.

(3) *The Amdani khata*.—In this book the quantity of paddy contributed as stock by each villager shall be entered against his name. The total quantity of paddy realised as increase or interest at the end of the year, the quantity of paddy given in charity, or expended as collection charges, or as the remuneration of the *Goladhyaksha*, or as charges for guarding, or for the maintenance or repair of the Dharma Gola, or for any incidental expenses, shall be entered in this book. At the end of each year, the Panchayets shall write in words the total of debits and credits, and sign their names. The total shall be carried forward to the next year's account.

(4) *Jamakharach khata*.—All entries about the loan of paddy given to different individuals, and the realisation of loans and interests, shall be recorded in this book. Every entry on the debit side shall be written both in figures and words, and, if practicable, shall be initialled by one of the Panchayets besides the *Goladar*.

(5) *The Hatchita khata*.—In this book under the heading of each debtor's name, the particulars of his transaction with the Dharma Gola shall be entered by the debtor, in his own handwriting, and if he is illiterate by the hand of a friend or neighbour or by one of the Panchayets, but the debtor shall put the mark of his finger under the entry in all cases if he is unable to write. The name of the debtor shall be signed by himself or by his agent on the right side on the top of the page, as is usual in *Hatchitas*.

(6) *The Khatian khata*.—In this book the name of each debtor shall be written at the top of the pages, and their transactions, credit and debit, with the Dharma Gola on different dates shall be taken from the *Jamakharach*, and entered chronologically, and totalled to show the loans granted and realised. If in the opinion of the Panchayets, the *Hatchita khata* is considered sufficient to answer the purposes of the *Khatian*, they may dispense with this *khata*.

If necessary, some pages in this *khata* may be set apart for the *Khatiani* of the *Amdani khata*.

(7) *The Nikashi khata*.—At the end of each year, the yearly account of the Dharma Gola shall be prepared by the Panchayets and audited, and the abstracts of the accounts shall be recorded in this *khata*, together with any remarks they or the villagers, assembled in meeting, like to make regarding the yearly account. It will not be necessary to change this *khata* year after year: several year's accounts may be continued in one *khata*.

(8) *The Mantabya khata*.—If the Zemindar or his agent or any officer of Government, or any other person interested in the Dharma Gola, visits or inspects the Dharma Gola, and wishes to write any remarks or suggestions, such remarks or suggestions may be written in this book.

17. Before any entries are made in any of the *khatas* in connection with the Dharma Gola, all the pages in the *khata* shall be numbered in ink.

18. When a person in the village is in actual want, he may forthwith apply to any of the Panchayets for a loan of paddy.

19. The Pauchayets or any two of them shall then enquire into the extent of the applicant's wants, and his capacity to pay off the loan, and, if necessary, they may call upon him to produce one of his friends as a surety for the loan, before they sanction the loan of paddy from the Gola.

20. No person shall be allowed loan of paddy in excess of his real want, or in such a quantity as may prevent other villagers from getting loans when they want in it.

21. The *Goladar* shall always consult at least one among the other Panchayets before granting loan to any body.

22. If any of the Panchayets or the *Goladar* transgress Rule Nos. 20 and 21, any of the villagers may call a meeting of the villagers, who shall deal with each individual case according to its merits, and may dismiss the Panchayet, if necessary.

23. The *Goladar* shall enter the name, father's name, the quantity of paddy in the *Jamakharach khata*, the entries regarding quantity being totalled in figures by the *Goladar*.

24. The quantity of paddy given to a person on loan shall be realised with interest after the next harvest by the Panchayets. As a rule, every debtor shall have to bring paddy to the Dharma Gola in payment of the loan.

25. The date of payment, the quantity realised, the debtor's name &c., shall be immediately entered on the credit side of the *Jamakharach*, and the same shall forthwith be entered in the *Hatchita khata*, to which the signature of the debtor shall be affixed.

26. If any debtor desire to pay only the interest and not the principal, the same shall be accepted by the Panchayets, if there be no special grounds for refusal. The unpaid principal or the interest shall be considered as a fresh loan for the next year. No person living outside the limits of the village or villages for which the Dharma Gola was established shall be entitled to any loan in the manner prescribed.

27. Contributors to the Dharma Gola and their descendants shall have priority of claim in respect of loans from the Gola.

28. In case the debtor fails to pay off the principal and interest during the next harvest, he shall have to pay off his loan next year with compound interest.

29. The Panchayets shall take particular care to see that 90 per cent. of paddy due on account of principal and interest at the end of the year be realised. They shall be held responsible if the arrears exceed ten per cent.

30. No debtor shall be allowed to withhold payment of his loan for more than two years, except on the ground of total failure of his crops for two succeeding years.

31. The Panchayets may stop giving loans to any person who has not behaved well in his transactions with the Dharma Gola, for period which may extend to three years.

32. When the stock of paddy will increase to one thousand



maunds, the Panchayets shall not lend more than 750 maunds in the year following, and shall keep 250 maunds in the Dharma Gola as reserve stock, and they shall add 250 maunds next year to the reserve stock and shall continue to do so, if not prevented by any unforeseen exigencies, until the quantity of paddy in the reserve stock will attain to (2,000) two thousand maunds, or a quantity which in the opinion of the villagers is sufficient to feed them for six months or more, during a year of total failure of crops.

33. The Panchayets shall exchange old paddy for new paddy, whenever they think it necessary to do so, to prevent deterioration of the stock.

34. Any one living in the village, whether he is a contributor to the Dharma Gola or not, shall have the right to exchange new paddy in the Dharma Gola up to a limited quantity to be determined by the Panchayets, but he shall have to pay an additional quantity of two seers per maund of paddy so exchanged.

35. No one will get a loan from the Dharma Gola for the purpose of opening shops to sell paddy, &c., or for any other purposes besides one's own real want of food or of seed grain or for any other purpose fixed by the villagers. If any one is found to do so, the villagers on proof of such conduct shall, as a punishment, stop lending him paddy for a period of three years from the Dharma Gola, or he may be visited with social punishment.

36. Towards the end of each calendar year, the Panchayets shall weigh the stock of paddy in the Dharma Gola in the presence of three of the principal men of the village, who will certify the quantity of paddy found in it.

37. They shall then prepare a complete account of the year's transaction, and a clear statement showing the stock of paddy at the commencement of the year, the quantity given in loan, the quantity realised, the quantity realised as interest, the quantity of principal and interest, the arrears, the quantity of bad debts, and the quantity of decrease in

stock on account of wastage, loss in weight, and other causes.

38. As soon as the accounts and the statement are ready, the Panchayets shall convene a meeting of the villagers, and the accounts, and statement shall be laid before them and explained.

39. The villagers shall carefully examine the accounts, and may sanction the striking off of all the bad debts; and the total amount shall be immediately debited in the *Amdani khata* in the presence of the villagers. The total quantity of wastage should be carefully considered, and if its percentage is unusually high, the Panchayets shall be required to explain the cause of such wastage to the satisfaction of the villagers. If the explanation is not satisfactory, the Panchayets shall be made liable for the loss, and the loss shall be realised from them in any manner that may be settled at the meeting of the villagers.

40. If the villagers assembled at the meeting find that any defalcation has been committed by a Panchayet, they shall dismiss him and appoint a new Panchayet in his place, and take proper steps to realise the amount defalcated with interest. The Panchayet may also be visited with some social punishment suited to the nature of the case.

41. The villagers assembled in the meeting will also sanction the quantity of paddy which is to be paid to the *Goladar* as reward or remuneration, and they will then finally sanction the accounts and statements, and at least ten of the villagers shall affix their signatures to the annual account, and they may record any remarks that they may think necessary and proper.

42. If any Panchayet dies or resigns his appointment during the course of the year, his place shall be filled up by the villagers without any loss of time.

43. At the end of each calendar year, it will be optional with the villagers to elect new Panchayets or retain the old Panchayets.

44. Whenever there is a change of the *Goladar*, the keys of the Dharma Gola will be handed over to the new *Goladar* in the presence of at least three of the principal villagers.

45. The villagers assembled at the annual meeting may, if they think necessary, alter or add or expunge any of the existing rules, or may add new rules, and may change the rates of interest on loans by a majority of votes of the contributors, subject to the provisions of Rule 6 and 7.

46. It will be the duty of the Zemindar of the village, or his authorised agent, to inspect the accounts and the stock of the Dharma Gola once in every year, and to record any remarks or suggestions for the welfare of the Dharma Gola in the *Mantabya khata*.

47. The Panchayets shall be bound to show the books to the Zemindar, or his recognised agent, when they come to inspect them. If any Government officer likes to inspect the books, and to inquire into the management of the Dharma Gola, the Panchayets shall be bound to offer every facility to them, and shall request them to record in the *Mantabya khata* any remarks that they wish to make in connection with the Dharma Gola.

48. If any one makes any donation in cash to the funds of the Dharma Gola, the Panchayets shall be bound to receive such amounts, and shall apply the money for expenses for repair, &c. of the Dharma Gola and shall keep an account of the same.

49. As a rule all payments for the erection of the Golas, railings and incidental expenses shall be paid in paddy from the Dharma Golas, but in cases where cash payments are absolutely necessary, the Panchayets may sell some paddy and convert it into cash for the purpose.

50. The villagers should make voluntary donations in cash or kind to the Dharma Gola on all joyful occasions, such as marriage, the birth of a child, &c.

51. The people passing by the Dharma Gola must bow or *salam* or take off their hats according to the customary forms of showing respect.

52. No one should indulge in intoxicating drinks, or do anything against public decency or morals within the enclosure of the Dharma Gola. Any one found doing so shall be expelled; and punished.

53. The social punishments suggested in some of the above rules must not be too severe, such as the denial of the villagers to assist in cremating or burying any dead member in the family of the delinquent, or stoppage of marriages, &c., but the ostracism of the offender for a week or month from social gatherings or caste-feast, &c., should be resorted to.

54. The Dharma Gola shall be the joint property of all persons of the village or villages for which it has been established. The rights and privileges, which each villager shall have in the Dharma Gola, shall be as laid down in the rules. The people of the village or villages shall have no right to appropriate the stock of the Dharma Gola to themselves, or to sell the stock and divide the proceeds among themselves. But if the village or villages be washed away by river, or the inhabitants of the village in a body are obliged to leave the village permanently, owing to the spread of malaria, or pestilence, or to some other cause, it will be the duty of the villagers to decide as to the best way of removing the Dharma Gola to some other place, or to divide the stock in the Gola in such a proportion, as to enable them to establish two or more Dharma Golas in different localities where the people of the village may remove. In case of the failure of the villagers to do so, the stock in the Dharma Gola shall be transferred by the Zamindar, or by some authority which may have jurisdiction in the matter, to other Dharma Golas in the vicinity, or to any other institution of public utility.

## The Paddies of Bengal.

Being lessons drawn from the Agricultural Exhibition of 1906-07.

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FOR the purpose of the present Exhibition most of the Districts of Bengal were ransacked for finding out the most valuable products of the Province. In each place a meeting of actual cultivators was called, and they were catechised in accordance with a printed list that I had drawn up for the purpose. In some cases, as in Murshidabad, Burdwan and Bankura, experienced *Kabirajes* were consulted. Important information was thus elicited, and the collection which you see in the Agricultural Department shed of this Province is the result of the enquiry. Important Economic products, some of which are not even mentioned in Dr. Prain's 'Bengal Plants,' have been found out, in the Departments of, fodder grasses and other food plants, of drugs, of sugarcanes, of grains, of oils and oil seeds. You have, for instance an up-land rank-growing fodder-grass here (we may call it the *Coix lactinies*), *Johi*, *majir* which may make our attempt at the introduction of the *Reana* grass superfluous. Of course, the aquatic and shorter *Job's tear* is well-known as a fodder plant, but it will not grow in high land, but this one will. Here is a pot-herb (as well as fodder) locally known in sea-side places of *Khulna* as *Gere-ghas* (probably the same as Dr. Prain's *Suzda maritima*), the leaves of which taste so saline that it is cooked without the addition of salt. It would be an excellent fodder to grow on sea-side places where few things will grow. Here is a vine called near *Calcutta* *Tit-koka*, the flowers of which are called *Futi phul* (and the flowers are eaten cooked), the fibre of which seems to be stronger than any other fibre, and in some villages it is used for tying fishing hooks to lines. You may have seen sugarcanes 25ft long, and striped sugarcanes

called *Haragomi*, which seems to be the origin of the striped Mauritius which is the fattest cane in the Exhibition. You will find two canes grown from seedlings and several which grow in water. Here is a grass (*Ruisa* grass) the fragrance of which would delight the heart of a Raja. The seed of this grass (which is the Motia variety of *Ruisa* grass) I obtained in the jungles of Baroda and on sowing it in Calcutta, I have got one plant which has now seeded and the fragrance is just as good as the fragrance of the original grass. It shows that with patience this can be propagated in Bengal. Here is *Dhunnantari* grass, the botanical name of which is the same as that of the Motia grass, viz, *Andropogon schoenanthus*, with which you are quite familiar as the *Agya ghas* or *lemon grass*, which has been declared to be a most efficacious remedy for snake bite. The roots of this are pounded up with round pepper and given to the patient. But the most remarkable drug is the *Harjora pata* which is said to reunite fractured bones. The "yarn" was confirmed by so many cultivators of Bankura that I am rather inclined to believe in it.

But the object of this paper is to give you some idea of the paddies collected for this Exhibition. They are nearly all paddies of special value, and the ordinary paddies grown in the country are scarcely represented. Of course, from some districts large collections (which I never wanted) have come, and these contain probably all paddies, common and uncommon. But most of them you will see are classified under certain definite groups. These are—

- (1) The drought resisting paddies,
- (2) The flood resisting varieties, which class is divided into two groups,—those which increase in height with the increase of flood, and those which can remain sunk in water in a live state for a week or more. These two classes suit two different conditions of flooding *i. e.* flooding as in Eastern Bengal where the flood remains for sometime, and flooding as in the undulating districts where the flood subsides in a few days.

(3) Paddies which can be grown on hill-sides without terracing.

(4) Autumn paddies which contain white, fine and fragrant rice.

(5) Prolific paddies which are also fine and fragrant.

(6) Paddies with special nourishing value,

(7) Paddies reputed to have medicinal properties.

(8) Paddies suitable for making *muri*, *khôl* (pop-corn) and *Cheera*.

(9) Absorbent paddies, i. e. paddies suitable for making *polab*.

(10) Autumn paddies that grow in water.

(11) Winter paddies that can be grown on sea-side places, unprotected by embankment, i. e. in highly saline land.

(12) Paddies containing two grains of rice in each, paddies with four to six grains in each spike-let instead of one or two, paddy of which the whole plant is fragrant, black paddy the leaves of which also are black, and paddies containing rice which does not require boiling.

(13) Wild paddies.

(14) The best paddies of Bengal.

### (1) THE DROUGHT RESISTING PADDIES,

In considering these we should take into account different levels of land in the same local area, and the districts which are most subject to drought. A paddy that is habitually grown in lowlying lands where in ordinary years water always accumulates, may be a drought-resisting paddy for this class of land and come out scatheless in a year of excessive drought, when even the lowlying valleys dry up, but such a paddy would perhaps have no chance in such a year if it were grown on a higher level. Again, a paddy that is considered drought-resisting in a moist district like Khulna, would have no chance in a dry year in districts like Sambalpur, Santhal Parganas or Saran. Again, it should be noted

that it is well-known among cultivators that the autumn paddies, specially those that are known as *Shathi* or *Sathia* (i. e. sixty-day-paddy) are recognised by cultivators as drought-resisting. But these are not much grown because as a rule, the yield of autumn paddies is less than that of winter paddies and the grain is red, coarse and indigestible. We must therefore take special notice of paddies that have been recognised to be drought-resisting in dry districts, in high soils, and paddies which are prolific in yield, and which produce white, fine and fragrant rice:—*Karibank*, one of the best paddies (i. e. fine and fragrant) of the Patna Division is a drought resisting winter paddy. The *khara* paddy of Darbhanga and Saran, which though a coarse winter paddy, produces white rice, is also drought-resisting. Of early or autumn paddies may be mentioned *Silangti* and *Kartika*.

In the Orissa Division the *Gopalbhog* paddy of Cuttack and Puri, which is a fine, white, and scented winter paddy, stands drought fairly well. But the *Sahara* paddy also of Cuttack, though a coarse winter paddy should be brought prominently into notice. It will live for about a month after other paddy crops have died of drought. The leaves of the *Sahara* paddy wither and die first and then the ears. In the shrivelled up condition, the grains of *Sahara* taste bitterish, but these are quite useful for seed, retaining even in the shrivelled up condition their germinating power.

Of autumn paddies, the *Hala Satia* of Balasore is the most drought-resisting of all the varieties of *Biali* or autumn paddy.

In the district of Sambalpur, for the *at* or highest lands, *Katia* and *Saria* which are both coarse autumn paddies, are considered the most drought resisting. For the next highest lands which are known as *mal*, *kalahansu*, *karunga*, *karni*, and *bakhu* are recognised as the most drought resisting and they are all *baghu* paddies, i. e. early winter. With the exception of the last mentioned paddy, all the others are black coloured. For the next highest lands, called *berua*



lands, *Phular*, *Kakrimari* and *Kankria* paddies are the most drought-resisting. These are all *aman* or *laghu* paddies i. e. winter or early winter paddies. The lowest class of soil in Sambalpur is called the *bahal*. For these, *kiaketai*, *thakur bhog*, *hanslo*, and *sal-jhanti* are the most drought resisting. Of all these varieties of paddy, the *saljhanti* is the finest and best.

In the Burdwan Division, the *Manik-kalma*, *Harkal* and *Kaya*, which are coarse winter paddies, and *Aus-Ramsal* which is a fine autumn paddy, are the most drought resisting. They are all Bankura paddies, i. e. paddies which are naturally subject to drought. In Midnapore, the *kayadhān*, a coarse up-land winter paddy is the most drought resisting. We may dismiss from consideration the paddies of Howrah, Murshidabad, Khulna and other low-lying districts, where the paddy crop is never subject to such conditions of drought, as it is in the districts mentioned. In any part of India where the crop is subject to excessive drought, seed of the one or the other variety of paddies mentioned may be tried experimentally.

Before leaving this subject, I must mention a very successful experiment which I initiated at Sibpur in 1891. I brought a handful of a fine *aus* paddy from Bilaspur that year and sowed it at Sibpur and I got very good result from it. The theory, with which I started was a paddy (which was also a fine and white paddy), which was naturally subjected to severe conditions of drought in a district where the rain fall was very much lower than in any part of Bengal, was likely to do better in the climate of Bengal where such severe conditions seldom prevailed. Then I found that this paddy after harvest, sent forth new leaves and a few ear-heads. Though as a crop this after-growth was not worth gathering, I protected and gathered the few grains for seed to be used next year. The seed produced a more luxuriant and a more drought-resisting crop, and the crop took a month more in ripening than the original crop. The result has been confirmed year after year at the Sibpur farm, and the distribution of the 2nd cutting seed

among cultivators of such widely divergent districts as Malda, Chittagong, Hazaribagh and Cuttack, has given remarkably good results. You will find this paddy described as "Mukerji's paddy" in the Sonthal Parganas collection. A nomenclature is a good plan of distinguishing a paddy. Even in some of our Experimental farms they cannot say whether the C. P. fine *aus* they are growing, is originally from the first or second cutting seed. Both varieties are called "C. P. fine *aus*", though the one differs from the other so much in essential qualities. The C. P. fine *aus* originating from the second cutting seed, is a deeper rooted, later, more-drought-resisting and more luxuriant variety of paddy, and it should have a distinct name to avoid confusion.

Then I would like to tell you of another experiment of mine on similar lines, which has resulted in the introduction into Bengal of a long, sweet scented and absorbent paddy from the frontier districts of India. This is the *Swati* paddy which is now grown not only at the Sibpur Farm, but in Cuttack, Hazaribagh, and in other districts differing from each other in climate, as you can infer from the collection of this paddy in the Exhibition. I do not pretend to say that the *Swati* paddy will make more fragrant and better *polao* than the *Kabuli* paddy which has been kindly sent to the Exhibition by H. H. the Maharaja of Gidhour. But the prolificness of the *Swati* originally obtained from the "second cutting seed", cannot be beaten by any Peshwari paddy from the first cutting seed. *Swati* from the 2nd cutting seed, indeed produces as large a crop as the 2nd cutting C. P. fine *aus*, and almost as much as the coarse varieties of winter paddy. This is due to the crop from the 2nd cutting, seeding in September instead of in August. The fertilization of these paddies which have very open branches, is prevented by the heavy rains of August, and though the plant from the large seed is always vigorous, the ears when ripe contain a very large proportion of empty grains. This is prevented by obtaining a crop which takes a month longer in coming to

ear. While a Peshwari paddy from the "first cutting seed" whether *Kabuli*, *Swati*, *Bara* or *Madhurmate*, yields only 7 to 10 mds, the yield from the *Swati* originating in the "second cutting seed" has been 18 to 21 maunds per acre. The large seeded vigorous growing and drought resisting *Peshwari* paddy is thus worth while for even the cultivator to grow and to use.

Both the *C. P. aus* and the *Swati* are drought-resisting paddies and, particularly suited to the dry regions of India. For detailed report of these experiments you are referred to the Reports of the Sibpur Experimental farm since 1900.

## (2) FLOOD-RESISTING PADDIES.

While seeking for the drought-resisting paddies in regions of the country which are naturally subject to drought, we should seek for flood-resisting ones in localities naturally subject to accumulation of water. There are two ways in which water accumulates. In undulating tracts, floods come and after remaining for a few hours or a few days they subside, while in flat countries like the districts of Eastern Bengal, the flood comes in more slowly and remains longer. For the former tracts, we must seek for paddies that can stand submerged under water for some days, say up to a fortnight or twenty days, and for the latter we require long-stemmed paddies. These two classes of paddies are arranged separately in the Exhibition.

### 1. Paddies that stand submergence under water.

*Dahar Nagra* of Nadia and Burdwan and *Majhi* of Nadia and the 24-Parganas, are coarse winter paddies which are recognised to be flood-resisting paddy-plants of Lower Bengal. But in Cuttack there is a drought-resisting, sweet-scented, fine and white winter paddy, which can also stand submergence under water up to 15 days, except at the *thhor-mukh* stage *i. e.* when the plant is coming into ear, when it cannot stand submergence for more than 4 or 5 days. This is a variety of

paddy eminently suited for introduction in those undulating tracts where loss from floods takes place occasionally. At Puri there is a coarse *Laghu i. e.* early winter paddy, called *Pati dhan*, which can stand submergence under water for 15 to 30 days. In Sambalpur, where the land is as undulating as in the Chota-Nagpur division, there are two distinct classes of flood resisting paddies for the the two classes of winter paddy land:—for *Berna* lands which are not so low as *Bahal* lands, *Kankria* and *Kharikuiti* varieties of early winter paddy stand flooding best, and for *Bahal* lands which are better suited for long-stemmed paddies *Jolghanta* paddy will stand submergence for a week. In Bhagalpur and Monghyr long-stemmed paddies are more suited for hill-lands, but there is a variety of winter-paddy called *Jaria* which would live submerged under water up to 15 days.

## II. Long-stemmed Paddies:—

Where the rise of water is gradual and where the water stays for months, the long-stemmed paddies and some *Boro-paddies* are recognised as the best. The most important variety of long-stemmed paddy is the *kershai*, which is grown in the districts of Nadia, Jessore, Khulna and 24 Parganas. *Bankui* grown in Midnapur and Jessore is another of these long-stemmed paddies, and *Rabana* grown in Puri and Balasore is also a well-recognised variety. Other long-stemmed paddies are *Kocho* of Howrah, *Muktahar Lalkanai*, *Neto*, and *Phul-amlā* of Nadia, *Dalkacher*, *Kola-boyra*, add *Rajomandal* of Jessore; *Kainata* and *Usna champa* of Puri; *Sankara* of Balasore; *Rajganji* and *Pushangla* of Sambalpur; *Panidubki* of Singhbhum; *Jessariadhan* of Hutwa, Saran; *Panjhali* of Bhagalpur and *Sathi Boro* of Monghyr. There are two long-stemmed winter paddies which are fairly fine, viz *Hardiphul* of Dumraon, Arrah, which is also a highly prolific variety of paddy, and *aman* paddy of Puri. It should be noted that there is a coarse and a fine variety of *Hardiphul* in Dumraon, both long-stemmed and prolific.

(3.) *Paddies that can be grown on hill-sides without terracing.*

The value of this class of paddy was first brought to my notice by Mr. Maude, Commissioner of the Chittagong Division. In that Division of Eastern Bengal, the rain-fall is very heavy, but the hill-sides are not much cultivated. I found there was a local variety of very superior and fine autumn paddy, called *Chandramuni* that is grown in certain localities on hill-sides without terracing. The C. P. fine *aus* our Department had introduced into Chittagong, was also found to do well on hill sides. Since then, I have noticed the following varieties of paddy belonging to our own Province suited for this purpose—

(1) *Anandi*, a *Champaran* paddy which is chiefly used for making *muri*.

(2) The *Satika dhan* of Puri and other neighbouring districts.

(4) *Goradhan* of Manbhum and Hazaribagh.

(4) *Chaidhan* of Bankura.

(5) *Kanaia-gora* of Singhbhum,

(6) *Harilimbo* and *Minvo* paddies of Rauchi.

It should be noted that the two last mentioned varieties are very fine and *Harilimbo* is fragrant besides.

(4.) *Fine, white and fragrant autumn paddies.*

The ordinary autumn paddies of Bengal are coarse, red and indigestible paddies, which are in disfavour with all. They are grown like millets on high lands, because they are drought-resisting, and because they take only about three months in maturing. The varieties known as *Shati* or *Shatika* (*lit.* 60 day paddy) take still shorter time to mature. The autumn paddy is, however, a most valuable staple, as after harvesting this crop the land can be prepared for a second crop. The autumn paddy does fairly well in a year of short-rainfall, and although it is, as a rule, not so prolific as the winter paddy, it does not run such risk of utter destruction from drought. One of the principal experiments of our Depart-

ment has been in connection with the introduction of the C. P. fine *aus* already referred to. But there are better staples still in Bengal as you can see from an observation of the specimens in the Exhibition. There is the *Harilimbo* already mentioned as a hill-side paddy of the Ranchi District. There are the *Rajbhog*, *Modo* and *Surjomani* paddies of Nadia, *Modo* and *Rajbhog* being as prolific as a winter paddy. I may also mention the *Benaphul* of Jessore, the *Aus-nona* of Murshidabad, the *Kartika Gayabali* of Midnapur, the *Aus-Ramsal* of Bankura; the *Durgabhog-gora* and *Ramsal-gora* of Singbhum and Manbhum; the *Muturia*, the *Rartika* and *Saj Behanwa* of Dumraon, Arrah, as other high-class autumn paddies of Bengal, which should be introduced as drought resisting staples in all precarious tracts.

(5.) *Prolific winter paddies which are also fine and fragrant.*

To this class of paddy, my attention was first directed by the large yield I got at the Sibpur farm from the *Badsabhog* variety of paddy. This paddy has been since tried in Hazaribagh and other districts with similar results, and its introduction can generally be recommended both in damp and in dry regions, in lands which are considered specially suited for winter paddies.

Other prolific fine, and fragrant winter-paddies are *Gondoh* and *Chattaphirla* of Patna; *Benibhog* of Cuttack *Khasagundi* of Puri, *Dudshar* of Balasore; *Rudru* of Ranchi *Kalajora* of Singbhum and *Bansmati* of Burdwan. In this connection, I may mention a very hardy Sambalpur paddy, *Kiaketki*, which is not only fine and prolific, but which is both flood-resisting and drought resisting.

(6.) *Paddies with special nourishing value.*

I had hoped to have got the paddies of Bengal which have been collected under this head, chemically analysed, so as to ascertain whether the paddies reputed to be specially

nourishing and strengthening actually contain a higher proportion of proteids and fats. But time has been too limited for such a purpose. I hope however the analysis of these paddies will be taken up, and it may be judged how these paddies compare with wheat, oats, barley and other strengthening food-grains. The ordinary rices eaten by the upper classes are considered weakening by cultivators, but there are only a few paddies that have the reputation of being particularly strengthening. These are: (1) *Jaunga* of Hazaribagh and Bhagalpur which is a black and awned paddy, which is not very coarse and is very sweet in taste; (2) the *Sathi Boro* paddy of Monghyr is also strengthening; (3) the *Nagradhan* of Ranchi; (4) the *Kaya*; (5) *Meghi*, and (6) the *Rashu* of Manbhum; (7) the *kalai-chusi*, and (8) the *Maunga-Kaima* of Bankura; (9) *Khukni* and (10) the *Lakshim-kajol* of Jessore; (11) the *Jabra-dhan* of Khulna; and (12) the *Boyarbant*, (13) the *Dholabokra* and the *Boahbini* of the 24-Parganas.

(7.) *Paddies reputed to have medicinal properties.*

I have consulted both *Kabirajes* and cultivators in making this collection. Several districts have each one or two paddies which have wide repute for some medical property. Of these *Paramaushal* or *Patamannashal* enjoys an inter-district reputation as being a very valuable paddy to use for long-standing dyspepsia. *Kabsar* paddy of Dumraon and *Thina* paddy of Hutwa yield rices that are eaten when a patient is recovering from diarrhoea; and *Gumrhi* rice of Darbhanga is eaten by patients actually suffering from diarrhoea. *Madhukar* rice of Behlia (Hutwa), is said to be efficacious for nervous diseases. *Rangdumala* and *Nandi-maccha-kata* are two Cuttack paddies which produce *Khai*, which is eaten by people suffering from eczema (*Khujli*.) The cake made out of *Karni* rice-meal is used by patients suffering from dropsy in Sambalpur. It is also given in cases of diarrhoea in domestic animals; and the cake is also used with medicine

when children suffer from asthma or general debility. *Teni* or *jhara dhan* which is rice from a wild paddy is also used for dropsy, *Karpursal* for convalescents and for nervous exhaustion, and *Karhani* rice for gonorrhœa. The ashes of this last mentioned rice are also used for bad eye-sight in Ranchi and Hazaribagh. In Manbhum, gruel of old *Paramaynschal* rice is given to cholera patients. In Bhagalpur, *Raksadhan* is used by patients suffering from gonorrhœa, and *Horadhan* by convalescents after severe illness. In Monghyr, *Sylheti* rice is used by convalescents. In Burdwan, *Pakshiraj* paddy is regarded as a medicine for apoplexy, and *Ramsala* for fever and diarrhœa. *Satidhan* rice is also used in Burdwan for curing nervous debility and in Bankura by convalescents. In Midnapur, *Kalindidhan* and *Anandsal khoi* (pop-corn) is used by patients suffering from diarrhœa, and *Parbati kaya dhan* is pounded and applied as poultice over the chest for pains. In Murshidabad, *Shanidhan* rice is eaten by women suffering from female disorders. In Khulna the gruel of *Uri* (wild) rice is eaten by convalescents, and in the Satkhira Sub-division of Khulna *Kaleparangi* rice is fried and powdered, mixed with *kala-jira*, and applied as a blister for pains and swellings.

(8.) *Paddies suitable for making khoi, muri and chura.*

There is a large collection of these paddies, every district having 3 or 4 paddies specially set apart for these purposes, *Kanakchur* is the most noted paddy for *khoi*. It grows best in soils where water can be kept continually, and so it does not grow in every district. For *khoi* and *muri* the test is the number of times the grain swells up from the original measure, the ideal being ten measures in the case of *khoi*. For *chura* the finest paddies are chosen by the rich and the largest by the poor. There are also certain special paddies that make the largest and softest *muri*. The best *muri*, *chura* and *khoi* are made in the districts round about Calcutta and the enumeration of the paddies grown for



these objects in the Burdwan and Presidency Division will be enough for our purpose. These are for the Burdwan Division.

- |      |  |                                |
|------|--|--------------------------------|
| (1)  | <i>Kanakchur</i> , which is good both for <i>muri</i> and <i>khoi</i>  | } Burdwan and other districts. |
| (2)  | <i>Ramsal dhan</i> for <i>muri</i> .   |                                |
| (3)  | <i>Dud-kalma</i> , a prolific variety of winter paddy, which is largely used in the Howrah district for making coarse <i>chura</i> . |                                |
| (4)  | <i>Jhingasal</i> for <i>muri</i>   | } Bankura                      |
| (5)  | <i>Jhagru</i> " "  |                                |
| (6)  | <i>Daijira</i> " "   |                                |
| (7)  | <i>Chhanchimoni</i> " <i>khoi</i>  |                                |
| (8)  | <i>Kalamkati</i> " <i>chura</i>  |                                |
| (9)  | <i>Kaminidhan</i> " "  |                                |
| (10) | <i>Danargunri</i> " "  | } Midnapur                     |
| (11) | <i>Jamai laru</i> " <i>khoi</i>  |                                |
| (12) | <i>Bhunri-panloy</i> " <i>muri</i>   |                                |
| (13) | <i>Panloy</i> " <i>chura</i>   |                                |
| (14) | <i>Badsabhog</i> " high class <i>chura</i>   | } Murshidabad                  |
| (15) | <i>Kalma</i> " <i>muri</i>   |                                |
| (16) | <i>Iatai-chawl</i> " "   |                                |
| (17) | <i>Nona paddy</i> " <i>chura</i>   |                                |
| (18) | <i>Dud-kalma</i> " <i>muri</i>   | } Nadia                        |
| (19) | <i>Mot</i> " "   |                                |
| (20) | <i>Nona</i> " "  |                                |
| (21) | <i>Kele</i> " <i>khoi</i>  |                                |
| (22) | <i>Bankchur</i> " <i>chura</i>   | } Jessore                      |
| (23) | <i>Korimsal</i> " <i>chura</i>   |                                |
| (24) | <i>Sundarsal</i> is excellent for <i>khoi</i>  |                                |
| (25) | <i>Malbhog</i> for <i>khoi</i> , <i>chura</i> & <i>muri</i>  |                                |
| (26) | <i>Machranga</i> " " "   |                                |
| (27) | <i>Kathmal</i> " " "   |                                |
| (28) | <i>Biringi</i> " " "   |                                |
| (29) | <i>Bhatial megli</i> " " "   |                                |
| (30) | <i>Derekhacchi</i> for <i>muri</i> in Khulna.  |                                |

- (31) *Marichshal* for *khoi*.  
 (32) *Lakshikayal* " "  
 (33) *Hamai* for *muri*  
 (34) *Bangeshwar* " "  
 (35) *Dholabakra* " "

It is not meant that in the other Divisions, there are not as good paddies for *khoi*, *muri* or *chura*. Indeed, there is hardly one of those mentioned equal to *kankjir* of Dumraon for *khoi* or to *karibank* for *muri* and to *karpuisal* for *chura*. These two are both Patna varieties of paddy. The *malajira* of Cuttack is as good as any for *chura*.

(9) *Absorbent paddies suitable for making pillao.*

Of these the *Kabuli* paddy of Gidhour should perhaps be given the first place. But the *Swati* variety introduced by the Agricultural Department is also highly appreciated for its delicate flavour and its high yield. There are however some indigenous paddies which are spongy and able to absorb a large proportion of *ghi* and which enjoy local reputation for making *pillao*. These are *Makar kalam* of Ranchi, *Satil chini* of Hazaribagh, *Sorshe phul* and *Badasa bhog* of Manbhum, *Kakri dhan* of Singhbhum, *Badsa pasand* and *Sitasal* of Bhaupalpur, *Bansmati* of Monghyr, and *Gayabali* of Midnapur.

(10) *Autumn paddies that grow in water.*

I have been able to collect two of these paddies that are particularly suited for places where there are practically no high and dry lands. These are *Dalkachu* of Jessore and *Nantali* of the Satkhira Sub-Division of Khulna. The latter can grow in water 3 to 5 feet deep. Paddies that grow in water and in lowest classes of land, are usually the latest to ripen. It is important therefore to have in view for particular localities these two paddies which take only three months ripening.

(11) *Winter paddies that can be grown on highly saline lands, i.e., in sea side lands, unprotected by dykes or embankment.*

Four of these paddies have been collected from the Satkhira sub-division of Khulna, viz., (1) *Derekhacchi*, (2) *Dhalshar* (3) *Hamai* (4) *Hanumanjata*. The importance of this variety of paddy for the sunderbans and for similarly situated tracts, is self evident.

(12) *Curiosities.*

There are a few paddies which contain in some two grains of rice in each shell. The two grains are so intimately joined together that they look like one grain of rice at first sight. But in rubbing between the palm and the thumb, the two grains separate out, as they do in the process of husking. The *Naria cha-ungra* paddy of Cuttack the *Ekte-dhane dutichal* of Bankura are the two rices that have been gathered possessing this quality which however is of no practical value. *Bhajurthupi* of Bankura and *Khajurechhari* of Burdwan, the 24-Parganas and other districts, are paddies with a peculiar inflorescence, there being 5 or 6 grains in a panicle instead of one or two. Paddies with such inflorescence are more prolific and this character has therefore some importance. In Bankura, there is a paddy called *Nuchi* which is sometimes grown twice during the same year. When flooding spoils this paddy, it is afterwards grown as a *boro* paddy, being sown in December or January and harvested in March or April. The *Dainunipur* of Sambalpur is entirely fragrant, not the grains only, but the whole 'plant'. The *Payra-pankhi* or *Pakshiraj* has peculiar wing-like processes on the two sides of each grain. The *Dedhia* rice of Ranchi, like the *Boka-chal* of Assam, does not require boiling but only steeping in hot water, to be edible. *Katang ghali* and other awned paddies are useful in that they are not subject to attack of birds and wild boars. Of all curious paddies perhaps the *Quilli-rai* of Sambalpur is the most important. This paddy has not only

its grains, but leaves also black, and it can therefore be distinguished readily from other paddies at all stages of growth. As the plants of wild paddy cannot be distinguished from other green-leaved paddies until they flower, where lands get overrun with wild paddies, weeding is facilitated if *Quilli-rai* is sown. *Qualli-rai* is a fine variety of winter paddy, this is a great advantage.

(13) *The wild paddies.*

From the exhibition collection, it will be noticed that wild paddy grows in almost every district of Bengal. As the grains shed very readily, wild paddies are regarded as a weed and at best as a fodder crop. But in some districts, they are carefully gathered and used for medicinal purposes or making puddings (*payash*). The fine varieties of wild paddy are very good eating. There are fine and coarse, white, red and black, and early and late varieties of wild paddy. They are known variously as *Uri*, *Jhara*, *Hora*, *Jhagri*, *Pasan*, *Balemga*, *Jhararga*, and *Teni*. In Balasore, the *Balemga* rice cake is largely used and it swells better than cake from other cereals.

(14) *The best paddies of Bengal.*

This is an extremely difficult question if out of hundreds of fine and fragrant rices any one has to be declared as the best of all. After all, it is not the albuminoid ratio, or the yield that will determine the value of a rice, but its fineness, whiteness, look, fragrance, and tooth someness. There are hundreds of paddies sent in, which rival each other in these respects, though I had tried to restrict the zeal of collectors in this respect, by asking them to send only the very best. There is difference of opinion in every district as to which the best paddy is, and as a rule several have been sent as the best. The following I believe to be the best. *Bahsmati* and *Lejuk bahan* from Cuttack, *Prosad bhog* from Hazaribag and Ranchi, *Danagure* from Manbhum, *Mal bhog*, *Jogan-*

*nath bhog, Titasol, Badsa bhog, Badsa pasand, Samudra bali* and *Karibank* of the Bhagalpur Division, *Khas khani, Bansmati, Bhashamanik, Gopal bhog, Tulsi mukul* and *Kalasira*, of the Burdwan Division; *Khirkon* of Khulna, *Golap saru, Halud guri, Labanga lata, Lilabati, Baus-Kanta, Dudhsar, Madhu malati Manlata, Chamarmuni* and *Chandrakona* of the Presidency Division. If one winter paddy has to be named alone as the best in Bengal, best for yield, for hardiness, for fineness and for fragrance, we will have to mention at least two paddies *Badsa bhog* and *Bansmati* and if one *aus* paday has to be named which for hardiness, yield, firmness, and fragrance that excel every other; perhaps the *Raj bhog* of Nadia, must be given the preference.

#### Conclusion.

You will find two bottles of paddy from Sambalpur, illustrating the effect of selection which is systematically practised by the best cultivators of that district. The earliest ripening and the largest heads of paddy are first picked from a field and they are separately reserved for seed. What large heads are obtained by cultivators in whose families this custom is followed can be seen from those two bottles. I could also draw your attention to two bunches of paddy plants sent in by Babu Troilokya Nath Chatterji, Khulna, (from whom we have got some of the most remarkable exhibits including the 25 ft. long sugarcane). The larger bunch is from one seeding and the smaller bunch from several seedlings, planted at one spot. The experiment has been conducted at Burdwan, at Sibpur also with similar results; and in concluding this paper, I would urge upon you to impress upon cultivators the fact that they simply waste seed by putting in half a dozen or a dozen plants at each spot instead of one, while transplanting paddy. Considering that the cultivator has sometimes to do sowing of paddy twice over, when the season is unfavourable they ought to be very careful in economising seed. The result will be a larger produce not a smaller produce. It is often

said, the Agricultural Department is able to advise nothing that meets [with the poor condition of the raiyats, that all experiments and exhortation with regard to saltpetre, improved ploughs, and centrifugal pumps and oil-engines, are so much energy thrown away. I hope, gentlemen, I have advocated nothing in this thesis which the poorest *raiya*t cannot benefit by, without spending an anna more than what he is accustomed to.

## Rice Manufacture.

BY HENRY H. GHOSH, Esq., CALCUTTA.

THE conditioning, husking and cleaning of paddy or 'the manufacture of rice' as it is briefly termed in America, being associated in this country with the cultivation of paddy, has so far received very little attention. But in America, Burma and Siam it is worked as a manufacturing industry which is the more correct system, as the processes relating thereto are quite distinct from the agricultural operations connected with paddy. This system of separating the agriculture and manufacture of a great produce has been adopted in India with regard to wheat and there are sufficient grounds for introducing it in the case of paddy. The manufacture of rice in this country is an extensive industry. The value of rice produced here far exceeds the value of all the other agricultural product of India put together. At the opening of the Pusa Institute, the Revenue and Agricultural Member, Sir Denzil Ibbetson, said that he calculated the total value of the agricultural produce of India to be £349 millions and the "Agricultural Statistics of India" shows that about 29 million tons of rice valued @ £190 millions are annually prepared in this country. The preparation of rice is therefore the most valuable manufacturing industry in India, and if the statistics of other great manufactures were examined, I should not be surprised if it

turned out to be the most valuable manufacturing industry in the world. This enormous industry is, however, being conducted at present on the most primitive methods which are extremely slow, laborious and expensive, to persist in which would not be sound economy. Apart from the question of reducing the cost of production and thereby lowering the price of the staple food of this country, when you consider the vast amount of time and labour wasted on this industry which may be more profitably employed in others—of which the cultivation and manufacture of cotton may be named—you will agree with me that our industrial economics is still in a very backward condition and urgently needs proper adjustment. Public attention has already been drawn to this manufacture by the 'Statesman' newspaper. Considering the vastness of the industry and the bright vista of economic possibilities it opens up before us, I think this subject commends itself to our very serious consideration. Having manufactured rice for a few years in this province, I think I am able to form some idea of the improvements that may be made in this industry,

The indigenous method of rice preparation in which the pounder (*dhaki*) or the mortar and pestle (*hath-masuli*) plays an important part, is too well-known to need description. The method, apart from being extremely crude, tedious and expensive, does not yield a clean produce, free from impurities. The average cost of preparation by this method is 6½ as. per maund of rice, considering the low value of agricultural labour in this country. This cost increases to about 7 as. for boiled (*ushna*) rice and decreases to about 6 as. for unboiled or sun-dried (*alloh* or *attob*) rice. The working time required by one person to prepare a maund of boiled rice by this method is about 21 hours. This is made up as follows:—1 hour for paddy-clearing, ½ hour for putting into and taking out of water the paddy (the soaking which occupies about 24 hours requiring no attention) 2 hours for boiling and 1½ hour for drying it (although the paddy remains in the sun for about

3 hours) one person working all this time. The husking and cleaning of the paddy in the Dhaki is always done by two persons who would together take about 8 hours. For purpose of calculation, this would be equivalent to 16 hours for one person, making up a total of 21 working hours. Similarly, a maund of unboiled rice would take about 1 hour for clearing, 1 hour for drying and 16 hours for husking and cleaning, making up a total of 18 working hours. Calculating the value of the labour @ 3 as. per day of 9 working hours, the cost of 21 hours' labour would be 7 as. and of 18 hours' 6 as. being respectively the cost of preparing boiled and unboiled rice. This average cost of 6½ as. also coincides with the rate paid to hired-workers for rice preparation in certain parts of Bengal which is generally 6 as. per maund of rice, the worker retaining the half a maund of husk which may be valued at half an anna.

Before going further into this subject, it may be mentioned that the cost of rice manufacture varies mostly with the quality of rice wanted, whether boiled or unboiled, polished or unpolished, but that it also varies slightly with the quality of paddy used. In coarse paddy, the cost is somewhat lower than in fine paddy. The aforesaid cost is for medium qualities only. It may also be observed that the maund of medium quality Bengal paddy would yield about 26 seers of rice, 13 seers of husk (*thoosh*) and 1 seer of meal (*kuro*); and that the yield of rice increases slightly in coarse paddy and diminishes somewhat in fine paddy.

It would not be possible for me to state within the limits of this paper the principles upon which rice is manufactured in America and Burma, but I shall here describe, in the briefest outline, a fairly efficient and economic system by which rice manufacturing may be initiated in this country. This system is very similar in most of its processes to either the Rangoon or the American system and I may add that I attained rather satisfactory results from it.



## CONDITIONING.

*The separation of refraction.*—However much Bengal paddy is fanned at the time of purchase there is always a certain percentage of refraction in it such as balls of mud, bits of stick and straw which have to be separated from the grain. When unboiled rice is wanted, this is done by 'circular-motion separator' as in Rangoon. This separator consists of a set of sieves circulating in one plane and requires very little power to drive. When boiled rice is wanted, the separation of refraction is effected by specific gravity in the soaking process.

*The soaking process.*—Previous to being boiled, paddy is soaked in fresh water for about 24 hours which softens the husk and clears it of all admixture. The balls of mud dissolve in the water, the paddy sinks to the bottom of the vat and the bits of stick and straw float up, which are then easily removed.

*The boiling operation.*—The paddy is then partially boiled which renders the rice wholesome from the consumer's point of view and facilitates the husking processes from the manufacturer's standpoint, as we shall presently see. Par-boiling is done over fire in the indigeneous method but I have found that when effected by steam, the operation becomes infinitely quicker, far less laborious and more easy to regulate. This is done in a boiling apparatus where steam is introduced by means of a connecting pipe. No water is needed and decidedly better results are obtained.

*The drying process.*—Whether for boiled or unboiled rice, paddy is dried in the sun by the indigenous system to facilitate the husking operation. How boiling and drying helps the husking is easily explained. Boiling inflates and drying contracts the body of the grain, the resultant of these two actions is to partially release the husk. Drying alone has this effect to a very slight extent. Unboiled paddy takes about 3 hours and boiled paddy about 5 hours to dry in the sun, but the grain must be stirred now and again.

- I may now say that the question of drying boiled paddy has always weighed heavily on the minds of those acquainted with this industry and interested in its development. In this country there is a very extensive consumption of boiled rice, the unboiled rice being used by poor people, who find it more sustaining. In Burma also both kinds are prepared, perhaps more of the latter, as her exports are of this sort. But in America only unboiled rice is manufactured. This difference of quality is due in a great measure to the various purposes for which the rice of these countries is required. Indian rice is used exclusively for food, Burma rice for food, distillation and strach, and American rice for food and confectionery. But I fear that the difficulty of drying has been greatly exaggerated in this country. Because, by the indigenous method, even unboiled paddy is dried in the sun before being husked, an erroneous idea prevails among some of us that this process would be needed for this paddy, if husked in the machine. But such would not be the case, for both in Rangoon and America, unboiled paddy is husked in the mills without any previous process of drying; and various qualities of Bengal paddy, unboiled and without any special drying, have been husked very satisfactorily in the Engelberg and Cowie's Hullers. Of course, it is always understood that well-matured and naturally dried paddy is to be put into the husking machine. The only question with us, therefore, is the drying of boiled paddy. This can always be conducted under a tropical sun to a limited extent. I have myself dried boiled paddy regularly in the sun on a large platform which, I am told, is also done at the Coconada Rice Mills. Daily a hundred or two hundred maunds of grain can be conveniently dried in this manner if there is sufficient ground for the purpose. But the treatment of larger quantities in this way would become rather cumbrous. Attempts have therefore been made to dry boiled paddy artificially both here and in Burma, but none with any satisfactory result. Hot air has been always used in the process and though the drying has been somewhat successful,

the colour of the rice has never been as clear and white as that of the sun-dried grain. But there is no reason why we should give up hope in this matter, when tea and particularly wheat, about the colour of which consumers are very fastidious, are now being artificially dried. Indeed, I believe it is Gibb's Wheat Dryer that has showed the best results with paddy up to now and it is quite possible that Messrs. Thos. Robinson and Son, Ld. of Rochdale, makers of the celebrated Mallinson's Wheat Dryer will be able to present a perfect Paddy-Dryer, if they find a market for it. I may here mention that Mr. Rakhai Dass Khan, Rice huller maker of Sulkea, has recently supplied to a Chetlah miller a Paddy-Dryer which dries boiled paddy with a certain amount of success. But it does not treat more than about 40 mds. of grain in 8 hours, four coolies working at it. As it stands, therefore, his process is no better nor cheaper than the sun-drying process.

After treatment in the aforesaid manner, the paddy is brought to a condition fit to be husked. There are several machines on the market for preparing rice. In England, rice mill machinery are constructed by Messrs. Hind and Lund, Messrs. William M. Dell and Son, of London, and other makers. In Germany, F. H. Schulze, of Hamburg, manufactures rice plants, notably a polishing machine which is called his 'Pearler'. It is, however, noteworthy that some of the best rice-milling machines come from America and Burma.

#### HUSKING.

The principle by which paddy is husked in the indigenous method, and which is followed up in all husking machines, is the application of friction and pressure. On a small scale the most complete and satisfactory husking machine is the well-known Engelberg Huller No. 2 which husks about 60 mds. of medium Bengal paddy in 8 hours. The price of the huller is Rs. 700. Mr. Rakhai Dass Khan of Sulkea has also constructed a Rice Huller which I believe is giving satisfaction to a Chetlah miller. I am told that it husks about 40 mds. of

paddy in 8 hours and costs only Rs. 300. The cost of replacing wearable parts in this machine is little compared to the expense of changing the blade and screen in the Engelberg. Khan's Huller is therefore well worth a trial. As for the hullers constructed by the late Jogodiswar Ghatak, I regret, I am unable to say anything in their favour. But, the husking machine that has so far given the best results with Bengal paddy is Cowie's Huller made in Rangoon. The machine entails the erection of a plant (with double fan, elevator and direct-acting sift) which cannot be done with a small capital. The outturn of this Huller, made in different sizes, ranges from 100 to 200 mds. daily of brown rice.

#### CLEANING.

When paddy is husked it is technically called 'brown rice' owing to the brown coating below the husk which now appears. The removal of this coating is called the cleaning process in which there is more friction applied than pressure.

A good cleaner for a small mill has not yet been put on the market. Engelberg Huller No. 1 is about the only machine that serves the purpose if the skin in its lower cylinder is replaced whenever it wears out. Unless this is done the rice gets slightly discoloured. The White Rice Cone made in Rangoon is, however, an excellent cleaner, the product from it satisfying the most exacting market. It has a large capacity but is an expensive machine.

#### POLISHING.

When brown rice is cleaned it is technically known as 'white rice'. Polishing is the process by which the surface of white rice is glazed. This treatment is only necessary for rice that is exported. Schulze's Pearler has turned out perfectly polished rice at the Ramkristopur Rice Mills, Ltd.

Rice cleaning and polishing, which is a portion of the industry here advocated, is not new to the country. This system of rice milling entirely for the export trade has been

carried on for several years at Ramkristipur and Chettah, near Calcutta, and the complete manufacture of rice is now conducted by a handful of millers scattered about in North Western India and the Madras Presidency. But the only reason I can attribute to the slow growth of the industry is that, unlike the other countries, boiled rice is largely consumed here and the difficulty of paddy drying has always loomed very large in the minds of those that have from time to time been enquiring about it. Had they been reasonable in their apprehensions, the problem of drying might have been solved ere this. I have often tried to correct false notions regarding this industry but my endeavours have been futile.

By the system above stated the cost of rice preparation per maund would be approximately 2 as. 6 p. for unboiled and 3 as. for boiled rice, unpolished, such as would be needed for home consumption. Rangoon millers reckon an average of 3 as. as the cost of preparing polished rice. If a system of artificial drying is introduced, the cost of boiled rice should be reduced by 6 pies approximately. It will therefore be evident that by the introduction of the Rangoon and American systems of manufacture, the price of the greatest staple food of our country will be reduced by about four annas on the maund and an enormous quantity of labour will be set free for more profitable industries.

## The Jute Crop of India.

BY N. N. BANERJI, Esq., B.A. ; M.R.A.C., F.H.A.S. ; M.R.A.S.I.

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THE modern jute industry of Bengal may be said to have had its origin in the year 1828, when exportation to Europe commenced. Before this time considerable quantities of the fibre were undoubtedly produced, but the entire output was

consumed locally. A footing having been once established in the European market, the value of the fibre was immediately recognized, and the expansion of the trade, has ever since, been constant and rapid.

In a recent article which appeared in the *Times* of London, jute was described as one of the great assets of the Empire, and most certainly it is a most valuable asset for it brings money to our Indian cultivators, to numerous Indian and European dealers, to merchants and ship-owners, and to a host of manufacturers both in Calcutta and Dundee. The demand for jute, in spite of the remarkable expansion in its cultivation in recent years, and the rise of prices to an unprecedented height, still continues to be very keen, and consumption, at the present day, is very near to outstripping production. Not only are old markets asking for increased supplies, but new ones are continually opening out. And jute fibre is further being put to an increasing number of uses every year.

The importance of jute in the sphere of commerce may be gauged from trade reports, which reveal the fact that the exports of raw and manufactured jute constitute one-fifth of India's total exports. Taking the two Provinces of Bengal and Eastern Bengal and Assam, from where practically all jute of India comes, it may be noted that the outturn has risen steadily from 65½ lakhs of bales (of 400 lbs. each) in 1900 *i.e.*, about 325 lakhs of maunds to over 85 lakhs of bales, *i.e.*, about 425 lakhs of maunds—the estimated outturn of the crop for the present year. The total consumption which includes exports, mill-consumption and country consumption, has also similarly risen from 65 lakhs of maunds in 1900 to 81 lakhs in 1905. The consumption this year, will no doubt show a further increase. Side by side, with an increase in production, the jute industry itself has developed enormously in this country; the number of looms at work having increased from 9,841 in 1896 to 23,884 in 1906, and the actual consumption of jute by the mills has doubled during the last ten years.

To pass on to the financial aspect of the jute trade, I do not think that I would be wrong in stating that prices also have doubled during the last ten years. During 1905-06, the average price per bale of 400 lbs. was Rs. 46 and no less a rate than Rs. 70 per bale is also reported to have been paid by purchasers during that year. What is believed to be the highest price on record is the phenomenal price of Rs. 85 per bale which was recently paid for a small parcel of Dacca jute of quite exceptional quality. The transactions of the jute market this year may be expected to disclose that about 37 crores of rupees are likely to change hands, as a result of the general cultivation of the jute crop in Bengal and Eastern Bengal and Assam and of its very limited cultivation in Cooch Behar, Nepal, Madras, and Upper India.

It has been estimated, that jute agriculture brings in over 21 crores of rupees to the growers, and it may bring in as many crores more in another ten or twenty years, if there is the same expansion in its cultivation as there has been during the last decade. The increased payments to cultivators of jute, caused by the rise in price during recent years has amounted to several crores of rupees. They are making very large profits over the crop, and all Bengal *raiyats*, whether jute growers or cultivators of other crops, cannot therefore but be deeply concerned in its improved cultivation.

There is still ample room for the extension of its cultivation and there is decidedly a necessity for improving its quality. Complaints have been frequent of late regarding the deterioration of jute fibre, and it is for the cultivator to rise to the occasion and to remove this defect. Otherwise, the industry is likely to suffer in the near future. If the manufacturers of Europe and America do not get better stuff than what is being sent to them at present, they will surely turn their eyes to other markets than ours.

At present, the seller seems to be quite certain of a market for this fibre, even though it is of inferior quality and adulterated, but he should open his eyes to the fact that in

Java, French Indo-China and West Africa, continuous and in some cases successful efforts are being made to introduce the cultivation of jute. Of course another solution of the dilemma presents itself in adopting other possible substitutes for jute, such as *San hemp* (*Crotalaria juncea*), *Patua* (*Hibiscus cannabinus*) *Dhainche* (*Sesbana aculeata*), American aloe (*Agave Americana*), *Murvi* (*Sansevieria Zeylanica*), *Akanda* (*Calatropis gigantea*), Ramie or Rhea (*Bœhmeria nivea*), *Flax* (*Linum ussitatissum*),—but more is known of the capabilities of jute than of any of the other fibres. Therefore at the present time the cultivator may well be exhorted to look to his jute and jute alone.

There are various causes which lead to the degeneration of jute, such for example as the actual degeneration of the plants grown for fibre, the growth of the crop on unsuitable soils, the use of inferior seed, the cultivation of varieties of jute, which are unsuitable for the particular locality in which they are grown, the want of proper cultivation and of judicious manuring, carelessness in the preparation of fibre for the market and last, but not least, the fraudulent adulteration of the produce in order to increase its weight before bringing it into the market—a notorious and wide-spread malpractice, which is bringing a valuable staple into disrepute in foreign markets, and is damaging the common interests of the trade.

Some hints and suggestions are now added which will be of help to those already employed in jute cultivation in turning out better crops. They also provide sufficient instructions to those who may feel disposed to take up the growth of jute as a fresh industry.

The hints are supplied under various headings to admit of easy reference and study.

(a) *Botanical description, Vernacular names and varieties*—Jute belongs to the natural order *Liliaceæ* and to the *Genus corchorus*. The commercial fibre jute is obtained from the two species known as *Corchorus capsularis* and *Corchorous olitorius*. The former, which has rounded fruit



pods can stand water logging and is very largely cultivated in Eastern and in parts of Northern Bengal. The latter, which bears long cylindrical pods, does not thrive on low lands subject to floods. It is grown to a much more limited extent, being found chiefly on the higher lands towards the south and west. Both the above plants are annual. The flowers vary from a whitish yellow to a yellow colour. The capsules are five celled, but white *Capsularis* has no transverse partitions, *Olitorious* has numerous transverse partitions between the seeds. The tap root of *Capsularis* is thick, while that of *Olitorius* is long and tapering. Some of the varieties of each of the above two species have red stems and others green stems.

Experiments made by the Agricultural Department of Bengal tend to show that the green stemmed *Capsularis* is more prolific than the red stemmed, while quite the reverse is the case with *Olitorious*. There are various vernacular names by which the jute crop is known in Bengal. e.g., *Pat*, *Koshta*, *nalita*, *jhounto*, *nalia*, *narcha* &c.

(b) *Area Sown*.—Before the Partition of Bengal, the forecasts of the Agricultural Department of the Province dealt with the jute crop grown in 27 districts. The area under jute in these districts, amounted to 3,144,600 acres. Thirteen of these districts having been transferred to the new Province of Eastern Bengal and Assam, there are at present only 14 jute growing districts left in the Province. They cover an area of 780,400 acres.

The 27 districts referred to above with the land under jute before the Partition were follows :—

Districts.	Acres.
Mymensingh	795,200
Rangpur	385,000
Purnea	269,000
Tipperah	246,800
Dacca	210,100
Pabna	200,600

Districts	Acres.
Bogra	135,000
Faridpur	134,000
Rajshahi	128,000
Dinajpur	125,000
Jalpaiguri	108,100
24 Parganas	89,900
Howrah	51,000
Nadia	45,000
Jessore	41,300
Murshidabad	40,800
Malda	31,600
Backergunge	18,000
Bhagalpur	17,900
Hooghly	15,800
Burdwan	14,500
Khulna	10,700
Midnapur	10,500
Cuttack	10,200
Noakhali	4,200
Balasure	4,200
Darjeeling	2,200

And the 14 jute districts now of Bengal Proper are,—Burdwan, Midnapore, Hooghly, Howrah, 24 Parganas, Nadia, Murshidabad, Jessore, Khulna, Bhagalpur, Purnea, Darjeeling, Cuttack and Balasure.

The consolidated acreage of the crop given above for the two Provinces does not include the jute areas in Cooch Behar, Nepal, Madras and Upper India, which showed the following outturn in 1905.

	Bales.
Cooch Behar	52,800
Nepal	64,302
From Upper India via E. I. Railway	26,269
From Stations outside Bengal Nagpur Railway	4,257

The cultivation of jute has commenced also in Behar, which at present accounts for only a few thousand bales—(*The Agricultural Department of Bengal has done much to introduce the cultivation of the fibre in this part of the Province, and results have been attained that have been highly encouraging, and it is hoped that jute will become quite an important and profitable crop of Behar.*)

(c) *Soil*.—Jute is a most accommodating crop, being capable of cultivation on almost any kind of soil. It is found growing on clayey homestead lands as well as on high loams, where autumn paddy is generally cultivated. It gives a good return on alluvial soils, and is cultivated also on low lands where water accumulates to a depth of 1 to 5 feet. It grows also on the salt-impregnated soil of the Sunderbans. It is most productive on a rich loam. *Laterite and gravelly soils are not suited to its cultivation.*

(d) *Climate*.—Sufficient moisture, without excessive rain, and a high temperature, *especially in the early part of the season*, are necessary for successful cultivation.

(e) *Rotation*.—As is the case with other field crops, cultivators do not follow any fixed rotation with jute. It has, however, been found that it does very well after pulse crops on uplands. It is often sown after *aus* paddy and grows well in rotation with *aman* paddy and potatoes also. Jute is sometimes grown after jute without any intervening crop, *but this practice is to be condemned*. In some places, *San* hemp is grown as a preparatory crop, *and this rotation is recommended.*

(f) *Preparation of the Land*.—When the crop is cultivated on low lands, which are liable to be submerged by early floods, the field should be ploughed early in the cold weather, so that it may be ready for sowing in March. *It is a bad practice to give the first ploughing just before sowing to February or March.* Altogether some five ploughings will be found sufficient, given at intervals of a week. Care should be taken to pulverise the land thoroughly, *as a deep and fine tilth is most*

essential for the proper growth of the crop. At the final ploughing, care should be taken that all weeds are uprooted and removed.

(g) *Manuring*.—On lands, where silt is deposited during the rains, no manure is required for jute, but on other soils, cowdung may be used with advantage, as from experiment it has been found to be the best and cheapest manure for this crop. Manure experiments with jute at the Burdwan Experiment Station extending over a period of 12 years, have shown that cow-dung gives better results than such manures as castor cake, bonemeal, saltpetre and super-phosphate. *Green manuring with San hemp or some other leguminous crop is also strongly recommended.*

(4) *Selection of Seed*.—As a rule, very little attention is paid by *raiya*s, to the selection of good seed. This is to be much regretted. Ordinarily, a few plants are left to ripen in a corner or on the border of the field, and seed is taken from these for the following year's sowing. *The paramount importance of selecting the most vigorous and best developed plants for seed cannot be too strongly impressed upon cultivators.* The seed, when collected, requires to be *very carefully stored* for the next season's sowing. It should be *kept in airtight vessels.* In choosing seed, it is advisable to select a green stemmed *Capsularis* variety or a red stemmed *Olorious* variety,

From results obtained so far from the Experiments made at Burdwan, of the former *the Deswal of Serajganj, Baran of Mymensingh, Kakaiya Bombai of Serajgang, and Amonia of Faridpur,* and of the latter the *Tosha of Pabna, Satnalla of Faridpur, and Halbilabi* varieties are worth the cultivator's attention.

*Jute seed may be indented for through District Agricultural Associations from the Agricultural Department, Bengal.*

(i) *Sowing*.—As has been already stated, the sowing season generally extends from about the middle of March to the end of April. Later sowings are sometimes done. The land having been thoroughly tilled and cleaned of all weeds, the

seed is broadcasted; generally at the rate of 1 to 1½ seers per Bengal *bigha*, i.e. 3 to 4½ seers per acre, though in some districts the quantity used varies from 2 to 4 seers per *bigha*. Experiments are being conducted by our Agricultural Dept. to compare the effects of sowing seed thinly and thickly, but no conclusions have been yet arrived at, as to which system gives better results. It is a good plan to mix a little dry earth with the seed at the time of broadcasting. The field should be gone over cross-wise by the sower, i.e., once from north to south and a second time from east to west. This ensures a more or less uniform distribution of the seed, a point of much importance in the cultivation of the *jute* crop. The harrow should invariably follow the sowing in order to cover the seed properly. Drilling the seed with a drill in furrows 9 inches apart has been recommended as better than the system of broadcasting, as hoeing is rendered easier afterwards. This system may also be tried.

(f) *After-treatment*.—In many parts of Bengal, no operation intervenes between the sowing and the weeding, but it is a good plan to loosen the earth with a rake about 15 days after the sowing, when the plants have established themselves in the soil. This is especially necessary on clayey lands, where rain and sunsine tend to cake the surface. Thorough eradication of weeds is essential in the cultivation of *jute*. This operation should be begun as soon as the plants are able to stand it, i.e., when they are about 6 inches to 9 inches high. The number of weedings required varies with local conditions. Two to four weedings should, as a rule, suffice.

The next operation is that of thinning the crop. The regulation of the distance between the plants has an important bearing on outturn. When the plants are too thickly crowded, they grow up weak; and when too far apart, they throw out a large number of branches, and proportionally lose in height. From the spacing experiments which have been made at Burdwan, where the plants are thinned to keeping them apart at distances of 4", 6", 8", and 10", it has been

found that the 4" thinning has given the highest yield of fibre of the best quality. Sowing in lines 4" apart has yielded nearly twice as much as where sown in lines 10" apart.

(k) *Harvesting*.—The crop occupies the ground for a period of about four months. The time for harvesting depends on the date of sowing, and extends from the end of June to the beginning of October. The exact stage of growth, at which the plants should be cut, cannot yet be laid down definitely, as the subject is still under enquiry. If the fruit of the plant is allowed to get too ripe, the subsequent process of retting the plants for fibre is retarded and the fibre becomes coarse and rough, though it does not suffer in outturn or strength. If, on the other hand, the crop is cut too early, the fibre, though glossy, becomes weak, and the out-turn is somewhat reduced. *On the whole, opinion is in favour of harvesting when the fruit begins to form.* The plants should be cut with a sickle just a little above the ground. They should be tied in bundles and allowed to lie out thus in the fields for about two days, so that the leaves may wither and fall off. The leaves that remain on the stem should be shaken off before the plants are carried away to be retted, and at the same time the tops should be cut off with the sickle at the points where the plants bifurcate. The bundles should next be stacked preparatory to steeping.

(l) *Retting*.—After the bundles have been stacked on the fields for two or three days, they should be removed to be steeped (retted) in water, in which they should be allowed to remain till the fibre can be easily separated from the woody portion of the stalks. The immersion of the plants in water induces fermentation, by which the fibrous tissues are softened and loosened. The ordinary cultivator is much handicapped in this operation. It is very essential for the production of fibre of good colour, *that steeping should be done in clear and sweet water.* The retting is delayed in running water, as the washing effect of the water interferes with due fermentation. A running stream is therefore not suitable for retting; but, if

possible, the water should not be entirely stagnant. *The best results have been obtained in water that is just moving.* Steeped in muddy or dirty water, the fibre loses its lustre and assumes a greyish colour. Salt water delays the process.

The ordinary *raiya* is content with steeping in the nearest pool and using the same pool for successive steepings. This undoubtedly leads to deterioration in the colour of the fibre. It cannot, therefore, be too strongly recommended to him that wherever practicable, *he should ret his fibre in clean water.*

*The result will repay the extra labour involved.* When steeping, the cultivators generally erect posts on either side of the immersed stems to keep them from floating away, then they place on the bundle, the tops of the stems that have been cut off and the dried leaves of the plants, and finally so weight the bundles that they remain submerged. Sods and earth are sometimes used for this purpose; *but this is a bad plan,* as it tends to make the water muddy. *It is preferable, to use logs of wood and weeds.* The plants generally take from ten days to a month to ret, the period depending upon the maturity of the plants, the temperature, the condition of the water, and the way in which the stems are immersed. After a week or a fortnight, the bundles should be examined in order to ascertain how far the retting has advanced, and the examination should continue from time to time till it is found that the fibre comes off easily. *Care must be taken that the stems are not allowed to remain too long under water,* as overretting produces a dirty dark colour and also weakens the fibre.

(m) *Separation and Washing of the Fibre.*—The stalks, when ready for the separation of fibre, are in some districts beaten against a platform till the pith sticks within are removed. *This process is not recommended,* as the pith often gets broken and mixed up with the fibre, which itself gets knotted and has to be repicked. *It is a much better plan to strip the fibre by hand.*

The next process is that of washing the fibre. This is

generally done by taking handfuls of fibre, swinging them round the head and dashing them against the water. *The separated fibre should always be washed in clean water.* This is a point often neglected by the cultivator, but it is quite possible for him to carry his separated fibre even to a distance, if necessary, and this he should be induced to do. When the washing is finished, the fibre should be left to dry in the sun for two or three days, after which it may be tied in bundles, when it is practically ready for sale.

(n) *Cost of Cultivation and Out-turn.*—The cost of cultivation varies with the condition of the land, with the quantity of manure used and with the rate of labour, etc., but Rs. 35 to Rs. 40 per acre may be taken as a fair average cost. An outturn of 15 maunds may reasonably be expected from this outlay, and this at Rs. 7 per maund would give a return of Rs. 100 per acre. A careful cultivator may therefore reasonably calculate upon a sure net profit of about Rs. 50 per acre from the cultivation of this crop. With good seed and good cultivation, the profit can be raised to Rs. 100 per acre, involving an out-lay of about Rs. 80 per acre.

(o) *Causes of Injury.*—Drought may be regarded as the greatest enemy of the jute crop. Floods and heavy rains, just after the seed has been sown, or when the plants are still young and tender, are also detrimental to the crop. There are several insect pests which attack the crop, the worst being a hairy caterpillar, called in the vernacular *shuapaka*, which generally appears in very dry seasons and eats the leaves of the plants. Another common pest is the *uttaranga*, a cricket, which burrows into the ground and destroys the young plants by cutting the roots. A small black weevil and a green semi-looping caterpillar are also specific pests of this crop. During drought, jute is also attacked by blight. *Any insect pest or fungoid disease should be reported to the Director of Agriculture, Bengal.*

The following method of drenching the leaves with an insecticide may also be tried, but it is a little expensive :—



Take 2 gallons kerosine oil;  $\frac{1}{2}$  lb bar soap and 2 gallons boiling water. Dissolve the soap in the boiling water, then add the kerosine oil, *and mix the whole thoroughly*. When completely mixed, 30 to 40 gallons of water may be added to dilute the mixture. This should be enough for about an acre of land. Drench the leaves of the plants by means of a syringe.

The following inexpensive method may also be tried:— Sew together sufficient strips of cloth to make a piece 14 ft. by 16 ft. Bring together the two ends and sew at the sides. This makes a flat bag. Strong cloth tags should then be sewn to the mouth of the bag on either side of the side seams and one foot from the seams. Bamboos, 2 feet long should then be fixed between the two pairs of tags 2 feet apart at each end of the bag, and the bag is then quite ready for use. On dry lands, the bag can be held by two men on either side and drawn over the plants (at an even height) to trap the caterpillars, which should then be destroyed by plunging them into kerosine oil and water (one part of kerosine oil to ten parts of water.) The bag must be rapidly drawn over the crop.

(p) *Fraudulent Adulteration.*—Cultivators, sellers and purchasers of jute are earnestly exhorted, in their own interests, to refrain from adulterating their jute with sand and water. This practice has led to a most unwarrantable deterioration of the fibre in recent years; and merchants are loud in their complaints regarding the quality of the fibre now being put into the market. In September 1902, the Calcutta Baled Jute Association addressed the Director of Agriculture, Bengal, on the subject of the deterioration of the quality of the fibre. This was followed in January 1902 by a communication to the same effect from the Dundee Jute Inspectors' Association to the Secretary of State for India. As a result, field experiments were started at the Burdwan Experiment Station in 1902, by the Bengal Agricultural Department under the guidance of the Inspector General of Agriculture, India. These experiments continued, and have up to this disclosed very instructive

results, some of which have been referred to in preceding paragraphs but still there exists fraudulent adulteration which impedes the efforts of the Agricultural Department in the matter of improvement of the fibré—repressive Legislation may be sought for, but unless the gravity of the situation is taken in by growers, sellers and purchasers, the quality of the fibre will stand where it is at present and in fact will become worse day by day and year by year. Soon after the commencement of field enquiry into the causes which tend to a deterioration of the crop, it was recognized by Government, that it was necessary to supplement and amplify field work by Laboratory experiments. The work dealing more with the chemical and biological side of question was entrusted to an expert officer in the person of Mr. R. S. Finlow, B. Sc., F. C. S. Mr. Finlow has given much thought and care to his Laboratory investigations and his work has come of much use to the Bengal Agricultural Department in framing a scheme of experimental trials with this crop.

As an outcome of all the activity displayed by the Agricultural Department as regards jute, under the very able presidency of Mr. C. A. Oldham I. C. S., Director of the Department, and his Deputy Mr. F. Smith, B. Sc., it has been possible to enlist the co-operation of the Baled Jute Association whose representatives are annually appraising samples of jute grown at all experimental stations of this Province.

(g) *Commercial divisions, races and markets.* The commercial divisions of jute tracts and the chief races of jute are—

<i>Commercial divisions of the jute tract.</i>	<i>Chief races of jute.</i>
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- |   |   |  |
|---|---|--|
| 1. Uttariya or Northern   | } | Heuti (late) of Rangpur and Jalpaiguri.    |
|   | } | Bhadiya (early) of Rangpur and Jalpaiguri. |
| 2. Serajganji or left bank (really right bank of the Brahmaputra) | } | Kakaya Bombai of Serajganj, Deshi of "     |

3. Narayanganji or right bank (really left bank of the river) { *Boran* or *Barapat* of Mysensingh.
4. Deora or char land ... *Sutpat* of Faridpur.
5. Deshi, i.e., grown near Calcutta. { *Deshi nalpat* of Hooghly.

The *principal* markets for the sale of the fibre are Serajganj (Pabna) Narayanganj (Dacca) Madaripur (Faridpur) Chandpur (Tippera) Domar (Rangpur district) and Chitpur (near Calcutta).

(r) *Uses of the jute plant*—The jute plant is utilized in this country for many different purposes, besides being permanently used for the manufacture of its fibre. It is supposed to be a very good antidote to a noxious weed *bhadulia* which is very destructive to the rice crop, and *raiya's* often grow jute to eradicate this weed.

The leaves and tops of jute plants is a favourite pot-herb in the season, of every Bengali kitchen. The leaves also occupy an important place in Indian Pharmacopoeia. As a green manure crop, jute holds its own against other crops. The stems are used for fuel and for fencing, especially in betel leaf gardens. Jute also supplies sticks for country made matches. The roots of the crop are valuable in the manufacture of paper. An oil for burning purposes can be extracted from it. Its cake also makes a useful though perhaps not a very nutritious food for live stock.

As a fibre, it is used for the manufacture of cordage, cloth and paper which under different conditions and circumstances assume very different names. As cordage, the manufacture ranges from the thinnest twist to the thickest ropes for hawsers. Gunny cloths of different thicknesses are largely made. The coarsest kind which is very loosely woven is commonly used for sails for country boats.

(s) *Jute-growing classes* :—For the information of those who do not belong to this Province, it may be mentioned that the cultivation of jute in Bengal, is not confined to any parti-

cular class or caste of the rural population. All-classes engage in it, irrespective of caste, whether they be Hindus or Mahamedans.

(f) *Concluding remarks.*—In conclusion, it may be mentioned here that two very careful forecasts of the estimated acreage and out-turn of this crop are published every year by our Agricultural Department for the benefit of the mercantile community and of the public in general. And it is hoped that, with all the attention given to its cultivation by Government in its Agricultural Department, there will be an expansion in its area and a development in the industry which has before it a future so commercially brilliant.

## Cotton Cultivation in Bengal.

BY D. N. MOOKERJI, Esq., M. R. A. C,

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THE cotton area in Bengal is steadily contracting. It used to be fairly common within the memory of men still living. But it has completely vanished from many districts within a few decades. But taking India as a whole the area under the crop is expanding. The following table may be interesting :—

Years.	Acreage under cotton	
	in Bengal and Eastern Bengal.	in all India.
1892-93	229,900	13,422,107
1900-01	127,700	14,231,150
1904-05	89,800	19,014,432

It is doubtful if cotton was ever a favourite crop with the Bengal raiyat. Dacca was famous for her wonderful muslin and the district produced the finest cotton in the world. But the cultivation of this cotton does not appear to have been a matter of much profit to the raiyat. John Bebb, Commer-

cial Resident at Dacca under the East India Co, writing in 1790, gave the cost of cultivating an acre of *Photee* cotton as Rs. 28-8. A fair average crop was 9 mds. of seed cotton worth only Rs! 36. This therefore left the raiyat no more than Rs. 7-8 per acre as profit. Indeed, according to Mr. Bebb, the actual cultivators of this cotton "were ground down until a bare subsistence was left them."

Though cotton used to be fairly common only a short time ago, it is doubtful if Bengal ever grew sufficient cotton for her own requirements. There is evidence that about the middle of the 18th century, when her manufactures were still in full activity, if not in the height of their prosperity, Bengal grew only one-eighth of the cotton she required, the quantity imported from other Provinces of India amounting to seven-eighths of the total consumption, (*Vide* Medlicott's *Cotton Hand-Book for Bengal*, P. 44). Cotton cultivation was carried on in Bengal for local purposes only. It seldom appeared for sale even in the village bazars. It was spun by the village women and served to clothe the raiyats and their families after being worked up by the nearest weaver.

The reason why Bengal does not grow much cotton lies on the surface. It is because the soil and climate are suitable for more remunerative crops. The famous *Photee* of Dacca, as we have seen, yielded on an average 9 mds. of seed-cotton per acre. Taking one-fourth of this as lint, the fibre amounted to 180 lbs. This is a very high outturn, for, taking India as a whole, the average yield of cotton per acre does not much exceed a maund only. — *Photee*, though exceedingly fine, was probably a short-stapled variety and we can only speculate as to what its price would have been, if it still continued in existence. But taking such cottons as we now find in general cultivation in Behar or Choto-Nagpur, and taking the outturn even as 200 lbs per acre, if cultivated in the fertile alluvial soil of Bengal, the gross value per acre would not be much above Rs. 45. Now compare this with Jute. An acre would yield on an average 15 mds. of fibre

which even at Rs. 8 per ma., would mean Rs. 120. In the present year of high prices of food grains, the raiyat has reason to be particularly grateful to Jute. For my part, I cannot see any sense in advising the raiyat to take to cotton in place of Jute.

There are millions of women, Hindu and Mahomedan, who are debarred by social etiquette and the exigencies of domestic life from working outside their own homes. You want to find employment for their idle hours. They can spin as their grandmothers used to do, not so very long ago, when *Churka*, was a great feature of every village home. You are ready again to welcome with joy, the rough *Saries* and *Dhuties* of homespun yarn. There is no competition of wages here. There are hundreds of thousands of poor widows who would only be too glad to add something, however small, to their present impossible incomes. Against this idea, so enthusiastically put forth by many of our countrymen to-day, I have not a word to say. I only contend that it is not necessary for our raiyats to grow cotton in place of a more remunerative crop. We can buy the fibre that we want our wives and daughters to spin. There is no lack of cotton in India. Vast quantities are exported to foreign countries, to distant Japan and Germany, for instance. We can import it from the other Provinces as we used to do before.

I could understand the present excitement over cotton cultivation, if the idea was to grow a better crop than is found in the country generally, with the object of regaining our lost markets. Consider for a moment our position in this respect. In the later eighties, Great Britain took between 30 to 40 per cent of the cotton exported from India. In 1899-1900, the amount had fallen as low as three per cent. And though there has been a slight improvement since (in 1903-04, the amount was 6 per cent); yet practically speaking Great Britain has closed her doot against Indian cotton.

Of the world's commercial demand for the raw material the United States alone supply as much as 85 per cent. She

produces on an average 10 million bales (bale = 500 lbs) per year and can increase her supply practically indefinitely, if the demand were to grow and the present prices maintained.

Compare with this, the outturn of cotton in India. In 1904-05, the mill-consumption and exports amounted to 3,390,000 bales. Adding 380 thousand bales, the official estimate of consumption outside the mills, the total comes to 3,770,000 bales. Our bales are 400 lbs each. Reduced in terms of 500 lbs bales, for comparison with the United States figures, our annual output amounts to barely 3 million bales.

India has at present about 19 million acres under cotton, against 28 million acres in the United States. Yet, while the latter produce 10 millions bales of cotton per year, we produce only 3 million bales. Or in other words, while the United States acreage exceeds ours by barely 50 per cent, her annual out-turn exceeds ours by something like 250 per cent. The average yield of an acre in India is about a maund of 80 lbs.; that in the United States is 200 lbs. What is more, American cotton is of superior quality and fetches a much higher price in the market.

As for Egyptian cotton, there is no comparison between it and either American or Indian cotton. The out-turn is about 500 lbs. per acre and the price per pound is quite double that of American cotton. Egyptian cotton rather competes with the Sea Island cotton, the finest cotton in the world, of which Georgia, Florida and South Carolina produce only a few thousand bales every year.

Now can we grow American cotton in Bengal? Can we grow Egyptian or Sea Island cotton? Can we improve the quality and yield of our indigenous cotton by breeding and selection? Can we by suitable manuring so increase the out-turn and profits of cotton cultivation as to make it worth the attention of our raiyats, if not in the Eastern districts, at any rate in Chota-Nagpur and the adjoining districts?

The attempt to improve Indian cotton is not new. It has occupied the attention of the Government of India for nearly three quarters of a century.

It began in 1829, \* by the Court of Directors drawing the attention of the Government to the importance of the indigenous short-stapled varieties and recommending for trial throughout India, the cultivation of the finest of Dacca cottons.

In consequence of this order, Dacca cotton was experimentally planted in many places throughout Bengal, without success, however.

Government spared neither money nor trouble. Large farms, each consisting of several hundred acres, were established under European supervision, and later on, practical and experienced cotton cultivators were brought over from the United States. Sea Island, Egyptian, Upland Georgian, New Orleans, Bourbon, Peruvian and other varieties were tried, but all to very little purpose.

Neither time nor space would admit of my referring even cursorily to the various attempts. I would only refer the student who is interested in the subject to Mr. Medlicott's *Cotton Hand-Book for Bengal* which was published in accordance with the resolution of His Excellency the Governor-General in Council, dated 22nd July, 1861.

The book is a digest of all information available from official records and other sources on the subject of the production of cotton in the Bengal Provinces. By the term Bengal Provinces, however, was meant not only what now constitute Bengal Proper and Eastern Bengal and Assam, but also the United Provinces and a part of the Punjab on the one hand, and Arracan, Pegu, Tenasserim, Singapur and the Andaman Islands on the other.

I shall content myself only with a few words on the work

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\* An earlier attempt was probably that made in 1826 to grow Sea Island cotton in Balasore. This proved an utter failure.



of one of the four American cotton planters who landed in India in January 1841. I mean Mr. Price. He was stationed like his fellow planters in the North West; but later on, *at his own request*, he was transferred to Dacca which had been from time immemorial the best cotton field of Bengal. Mr. Price was according to the Governor-General a person "thoroughly acquainted with the plantations in America, and conversant with all circumstances connected with the production of cotton of the best description."

Mr. Price was, like his brother planters, given a free hand and readily supplied with all that he suggested as necessary for carrying on his experiments.

The course of these experiments which lasted from 1844 to 1849 was attended by a series of disasters. The experiments were a failure in every sense. They not only failed in proving to the native cultivators that fine kinds of exotic cotton could be profitably grown in the district, but they failed in turning out any cotton whatever, at any cost of production, of which the quality was approved by the English brokers, and worse still, they failed to establish any fact as to what varieties of seed were suited, to any of the different localities tried. At the close of the experiment, Mr. Commissioner Dunber, who was throughout its career greatly interested in its success, informs Government that its history does not establish any one fact of general interest, certainly not that the Dacca district is incapable of growing exotic cotton. According to Dr. Royle, the failure was due to the American planters sticking to their preconceived notions and failing to adapt their methods to the soils and especially the climates of India.

At his own request, Mr. Price was allowed to transfer the scene of his activity from Eastern Bengal to Assam where his failure was only worse; but we shall not follow him there.

In America, cotton is grown in the south. It is sown in April and the harvest is finished by November. The average rainfall during the growing period of the plant from April to

September, is about 25 inches. In the early months (April and May) the precipitation is on an average about 3·5 inches a month. The rain-fall, as everywhere else, varies of course from year to year, but, in the Southern States of America, it varies within very narrow limits, and the cotton crop never suffers to the extent of being "half a crop". The crop suffers if the rain-fall in April and May exceeds the normal even by an inch per month.

Now compare our conditions with those of America. In Chota Nagpur, Behar and Orissa, there is practically no rain before June to admit of ploughing or sowing. But then, when the monsoon begins, the downpour is tremendous, often amounting to 10 or 15 inches of rain in a month.

However, where the soil is undulating, the rain does not stand on the ground and this heavy precipitation does less damage to the cotton crop than in the level country. In East Bengal, on the other hand, we have moderate rain in April and even in March. This is very favourable, but unfortunately when the monsoon does break, the rainfall is even worse than in Behar. In many of the Eastern districts, the rainfall from April to September amounts to 70 or 80 inches and even more. Add to this the general low level of the Eastern districts, a condition which is also unsuitable to cotton. American Cotton, as we have seen, is only a moderately moisture-loving plant.

If our conditions are unlike those of the cotton States of America, they are still more different from the conditions of Egypt. In that country there is practically no rain, all cultivation depending upon either irrigation or inundation. The following table gives the average annual rainfall at a few of the important stations :—

	Annual rainfall.
Alexandria	8·1 inches.
Port-said	3·4 do.
Ismalia	2·1 do.
Suez	1·1 do.

The rainfall at Cairo is very uncertain. In many years, the fall does not even amount to an inch.

Cotton is grown only in the Delta of the Nile. This industry, to which Egypt owes her present financial prosperity, is hardly three quarters of a century old. The country used to be inundated by the Nile making it impossible for any crops to be grown during the season of flood. But Mahomet Ali Pasha put up vast embankments to keep the flood water out. He also dug canals to provide for irrigation. Formerly cotton was cultivated to a very small extent as a perennial, only in the enclosures of Upper Egypt. Now cotton is grown everywhere in the Delta, as an annual crop. As in America the sowing takes place in April and the harvesting is finished by November. The crop altogether receives about 14 irrigations of which 9 are given by lifting water from the bed of the river. Almost as in Eastern Bengal, the river begins to rise from early in June, and by August, rises sufficiently high to admit the water through openings in the dykes.

But irrigation, though it certainly means expense, also means regulating the moisture-conditions perfectly. There is on the other hand no controlling rainfall. In America, there is no irrigation for cotton, but there the rainfall is moderate and fairly regular. With us the rainfall is immoderately heavy. The output of Egyptian cotton is on an average 500 lbs. per acre : of American cotton 200 lbs ; while of Indian cotton it is no more than 80 lbs. American cotton is superior to ours in quality while Egyptian cotton is so superior to both that there is practically no comparison between them. Egyptian cotton competes with Sea Island cotton of which America grows only a few thousand bales and the price of which varies between two to three times that of ordinary Upland or New Orleans cotton.

But Sea Island cotton does not grow very well in Egypt nor has America succeeded with Egyptian cotton. , Because, therefore, Dacca used once to grow very good cotton, it does not necessarily follow that she will be successful with American, Egyptian or Sea Island cotton.

Interspersed through the records of failure are instances of success, but very curiously these apparent victories were not followed up. Considering, however, the general fate of the efforts, one may seem too bold to recommend their renewal; but the science of agriculture has advanced a very great deal since the days the American planters worked and failed. When their rule of thumb did not avail them, they were left completely helpless. But it ought not to be impossible now by selection and breeding to produce a plant to suit our conditions. We may take courage by the example of America herself in overcoming the difficulty with the acclimatization of Sea Island cotton, the finest cotton in the world. The story is interesting. This cotton, *Gossypium barbadense*, is a native of the West Indies. It is a perennial or tree variety yielding, in its native home, its harvest in the winter. When an attempt was made to cultivate it in the mainland, where the winter is much severer than in the Island, the plants were killed by frost before bearing any flowers or pods. The stocks were, however, allowed to stand over and next spring some of them threw up new shoots. These bore some flowers and ripened some pods by next autumn, before being again taken over by frost. The few seeds thus secured formed the starting point in the work of acclimatization. These seeds were sown and from the plants that came up, those giving the earliest flowers and pods were selected as mother plants. This simple process was repeated for a few years till a race was obtained yielding its harvest by October and November, like the general Upland cotton.

Not only has Sea Island cotton been acclimatised in the United States, but what is more, it has been so improved by careful selection as to be double the value of the original variety.

I have not space to go into the attempts that are being made in various countries, specially in America, to improve their native varieties of cotton by crossing with foreign varieties, such as Egyptian and Peruvian. Not only are breed-

ing and selection better understood now than before, but also in manuring, we have advanced a long way from the time when the chemical experts of the Government of India recommended a peaty soil for the finest sorts of cotton on the express ground that the plant took the carbon required for its lint from the ground. A tyro now knows that neither cotton nor any plant in the world ever takes any carbon from the ground; they take it, of course, from the carbonic acid of the atmosphere. That cotton required phosphoric acid for its best development had not yet been discovered, nor had the name of super-phosphate been heard of. But I imply no blame to those experts personally who lived before the days of Liebig, Laws, and Gilbert. They merely laboured under the limitations of the infancy of Science. But the fact remains that the ideas of 60 years ago have been revolutionized.

We may, therefore, refuse to accept as final the failure of the forties. In our light, loamy soils, specially in the high lands, we possess a better equipment for the finer grades of cotton than the stiff clay, commonly known as the black cotton soil of Central and Western India. Again in the fine weather we enjoy from October, when the bells open and the cotton is picked, we enjoy the *sine qua non* of cotton cultivation in the matter of weather. The unfavourable features of the climate previously mentioned, though serious, do not seem to be insurmountable.

## Hand-loom Weaving in India.

BY RAO BAHADUR RAOJI B. PATEL, M. R. A. C.,

*Director of Agriculture and Industries, Baroda State.*

IN my paper on Hand-loom weaving, read before the last

Conference at Benares, I tried to show that, if certain improvements be made in the hand-looms and preparatory machines, the increased production would exceed the total imports of cotton piece goods into the country. The following further calculation will make the idea clear :—

The production of hand-looms working in the country is estimated at 165 crore yards. The looms work at an average effective speed of twenty picks per minute, and if this can be increased to 50 picks, the increased production of the same number of looms would be  $247\frac{1}{2}$  crore yards. This increase more than equals the total cloth imports of the country. As this increase can be produced by the same number of men as now engaged on the looms, the price per yard will be cheaper than at present, and their ability to withstand foreign competition will so far be increased.

I have been asked to give in this short paper some idea of the manner in which this consumation can be reached. Before any conclusions can be drawn, it will be necessary to enter into some details of the various classes of cotton piece-goods consumed in the country and to limit the spheres of work of the Indian hand-loom, the Indian Power loom and of foreign looms.

Beginning with the coarsest, cotton goods consumed in India may be divided into the following four classes—

- (1). Very coarse goods, using 6' to 16' counts for warp and upto 20' yarn for weft.
- (2). Coarse Mediums, 20' to 26' warp and 20' to 40 weft.
- (3). Mediums, 26' to 40' warp and 30' to 50' weft.
- (4). Fine, higher than 40' warp and weft.

The following table gives a probable estimate in millions

of yards of these classes of cloth consumed in the country, with their sources of production :—

No.	Class.	Warp counts.	Weft counts.	Indian hand-loom supply, million yds.	Indian Mill supply, million yards.	Foreign imports, million yards.	Total consumption, million yards.	Percentage.
1	Coarse	6 to 16	6 to 20	500	60	300	1,260	25
2	Coarse medium	20 to 26	20 to 40	150	500	1,700	1,750	37
3	Medium	26 to 40	30 to 50	450	40	350	1,240	26
4	Fine	over 40	over 40	150	...	350	500	11
TOTAL				1,650	600	2,500	4,750	100

The bulk of the very coarse classes is woven on Indian hand-loom from Indian mill-yarn. This yarn is made from very inferior cotton and is not given a proper twist for warp. Some of the Bombay Mills tried to produce this class of cloth, but the yarn could not stand the speed of the power-loom, without a sizing of from 50 to 100 per cent., and as the people wanted cotton rather than size in the cloth they bought, the Mills had to give it up as a bad business. This cloth is very thick, warm and durable and is made everywhere in the country for local sale. This class may therefore be considered as coming within the absolute sphere of the hand-loom. Foreign cloth of this class, in coloured designs and checks, is being imported, but the weavers in Gujrat, Northern India and most other parts of the country, including Assam are now producing such cloth and with increased local production, the foreign article may for the most part be supplanted.

The main bulk of the coarse-medium class is made up of imported shirtings and Indian Mill made shirtings, Chadders,

T-cloths &c. This class forms over one-third of the total cloth consumption of the country and the supply is almost equally divided, between the Indian and foreign power-looms in Grey Goods, while bleached and coloured goods of this class come mostly from the United Kingdom. The hand-loom has a very small share and produces goods of mixed colours. Coloured yarn does not take size enough to satisfy the Indian Mill-owners and they would not take to it, so long as the plain business is profitable. Coarse medium yarn is very strong and can stand any amount of rough usage in the power-loom and the hand-loom has therefore no ultimate chance against it. The yarn required for this class can all be produced from Indian cottons and the question of relieving the foreigner is one of time only.

The medium class consists mainly of Dhooties, Saries, &c. consumed by the large body of the Indian middle class. Indian cotton is unsuited to produce warp-yarn of this class, while the weft yarn produced by the Indian Mills is used up in weaving cloth of coarse medium class by power looms. Competition in this class is between the foreign looms and Indian hand-looms, both using foreign yarn. A cheap machine, cheap home labour and the production of stronger cloth on account of proper dressing of yarn, are in favour of the hand-loom workers, while power-loom cannot work so fast on this yarn, as on the coarse medium. If therefore, as postulated before, the hand-loom can be made to produce  $2\frac{1}{2}$  times as much as it now produces, the extra production will cover all the grey goods of this class imported, leaving the supply of bleached and coloured or printed goods to foreigners. The swadeshi protection can help the hand-loom workers in this class a great deal, towards passing over the period of transition.

The production of the fine class is restricted to hand-loom and foreign power-looms, and the speed at which the power-loom can work on fine yarn being still further restricted, the



hand-loom ought to be supreme in this class of work. The difficulty, however, comes in the want of bleaching and finishing. Of the 350 million yards of foreign imports, white Mulls and Nainsooks make up between them 333 millions. Both these cloths can be produced on hand-loom, especially in the humid districts of Madras and Bengal, but the Sun-bleaching process adopted in the country, neither gives a fine feel to the cloth nor preserves its strength. Central bleaching and finishing factories in the fine weaving districts can alone help the weaving to get the upperhand in this competition. Recent experiments have shown the feasibility of producing Egyptian cotton in Sind, Egyptian and long-stapled tree cotton in Gujrat and American cotton in the United Provinces. With these cottons and proper arrangement for humidifying mills in India equipped for fine spinning can easily compete with foreign mills in producing yarn upto 100 counts. When that day comes, the hand-loom can get a still greater advantage with the cheaper Indian yarn.

This enquiry into the details lead us to the conclusion that four factors have stood the greatest friends of the Indian weaver:—

- (1). His slow speed of work ;
- (2). Cheap machine and home labour ;
- (3). Light sizing and proper dressing of yarn ; and,
- (4). Production for local consumption.

In any efforts to improve his lot, these should not be lost sight of, and yet, the speed of his work should be increased in order that, he may live and successfully compete. How far can this be attained is therefore the first point requiring consideration.

**SPEED OF HAND-LOOMS**—Mr. Wallace of the Indian Textile Journal says :—“ The object of the inventors should be to ascertain the best possible working speed, in picks per

minute of the average weaver and then to adapt the mechanism of the loom to withstand this strain of work." Our enquiry suggests the addition of a rider to this proposition to the effect, that this speed should be restricted to the maximum working speed, that the yarn at the weaver's command would be able to stand in the climate at his disposal. Previous experiments undertaken during 1905 with various kinds of looms, and weavers from Gujrat, United Provinces and Bengal showed, that 100 to 120 picks per minute was the highest that an average Indian weaver could do. Experiments during 1906 have shown however, that under the conditions enumerated above, a working speed of steady 70 to 80 picks on a 45 inch loom is all that should be attempted. Higher speed than this brings in its train so many breakages of warp-threads, that the effective speed is greatly reduced. An example taken from a high authority will make this clearer.

Mr. A. Chatterton, the Director of Industrial Enquiries in the Madras Presidency, in a note submitted to the Madras Government says, that at Ahmednagar, Dungary cloth of 10s. yarn 30 inches wide and 28 picks to the inch was made on Churchill looms, the production in a day of 8½ hours being 30 yards. He mentions in the same report that the working speed was 160 picks per minute. The following calculation will show the effective speed.

$$30 \times 3 \times 12 \times 28 = 30,240 \text{ total number of picks in the day.}$$

$$8\frac{1}{2} \times 60 = 510 \text{ minutes, working time.}$$

$$\text{No. of effective picks per minute} = \frac{30,240}{510} = 60$$

The loss of time in stoppages due to breakages must have been great.

**EFFECTIVE SPEED:**—In working every loom, stoppages are unavoidable. They are due to—

1. Changing pirns in the shuttles and breakages in weft.
2. Flying out of shuttle.
3. Fixing temple and taking up cloth.
4. Breakages in warp.

The time taken in changing pirns may be minimised by having a large pirn and a proper winding apparatus. The six inch pirn taking up about a hank of 40s yarn adopted by the power-looms may be taken as the limit in size. With such a pirn, properly wound so as to minimise weft breakage, and the loom working at 80 picks, the time taken in stoppages may be reduced to 4 per cent.

Flying-out of shuttle is mainly due to faults in construction of the loom, unequal wearing of the shuttle and shuttle-race, irregular working and high speed. All these can easily be avoided and even a shuttle-guard can be added to the hand-loom slays. Under proper conditions,  $\frac{1}{2}$  per cent will be ample allowance for this.

The time taken in taking-up cloth and fixing temples every time after weaving six inches of cloth or so, amounts to over 12 per cent. Fixed temples with automatic taking-up motion is thus a necessity, not only for the production of even texture in cloth, but also for the saving of 12 per cent. in weaving labour.

Breakages in warp in what are called Improved Hand-looms take up the most time, and it is due to this, that the Indian weaver cannot be induced to adopt them. If a loom can be shown working faster than his own, on medium counts without more breakages than in his old loom, he would be quite willing and ready to adopt it. These breakages are due mainly to—

1. Bad construction.
2. Bad beaming.
3. High speed.
4. Want of correct hygroscopic condition.

The first cause can be removed by the use of wood-working machinery and proper tools.

Bad beaming has probably a greater influence on breakages than any of the others. Weavers cannot be expected to invest in costly machinery for sizing, dressing and warping and the warps made and dressed in the country fashion, which gives a

special advantage to handloom cloth, cannot properly be beamed by hand. The tension in the threads is uneven and causes a large number of breakages. The same difficulty was found in Baroda and the finding of a cheap beaming-machine for country warps has given us more trouble, than any of the other appliances. We have at last succeeded in making such a machine and breakages are reduced by over 60 per cent.

It is really surprising, how there are practically no breakages up to certain speed, and how fast they increase, as the speed is increased beyond the limit. This limit varies with the kind of yarn, the number of threads per inch in the reed, the breadth of cloth, etc., but a steady working speed of 70 to 80 picks on a 45 inch loom may be taken as a fair limit. The speed should be really limited, not by the number of picks per minute but by the shuttle-velocity. Taking an average maximum shuttle-velocity of 10 miles per hour that the handloom yarn may be expected to withstand under the best conditions, the highest working-speed for the various sizes of looms may be stated as follows :—

Loom to weave 27 inches cloth.....	117	picks per minute.		
Do.	36	„	Do. ....	97 Do.
Do.	45	„	Do. ....	84 Do.
Do.	54	„	Do. ....	72 Do.

These speeds are in the inverse proportion of 5, 6, 7 and 8 respectively.

To maintain a proper hygroscopic condition, the Indian weaver has stuck to his pit for ages. The only advantage of frame-loom is that they can be put upon upper floors where land is dear, but even the power-loom factories have their looms on the ground floor and that ought to teach intending investors in hand-loom, that the nearer they have their looms to the ground, the better it is for their working. When the open part of the warp rests on a pit, in which a pail or two of water may be thrown when necessary, the dry surrounding air has very little action on the warp and it can be kept in proper condition for weaving without breakages. This seems

to be the simplest and cheapest form of humidifiers and suits the handloom conditions admirably.

With these arrangements and a restriction of speed to 70 to 80 picks in a 45 inches loom, the breakages can be minimised and the stoppages due to them reduced to a maximum of say 12½ per cent.

The total stoppages under these conditions, viz., properly constructed looms, with large pirns and good winding, good beaming, a proper taking-up motion and a restriction of speed as above, may amount to as low as 17 per cent. Allowing double the time for stoppages as an average and making it one third, and working at a steady speed of 75 picks per minute on a 45 inches loom, the effective speed would be 50 picks or 2½ times the present effective speed of handlooms. 50 picks effective on 45" loom with 40' yarn, will be equal to 57 picks effective on a 36" loom or nearly the same as Mr. Churchill's loom working at 160 picks on 10' counts. The average effective speed of Bombay Power looms on coarse medium goods is only about 100 Picks per minute or double the effective speed of a properly improved handloom and on medium and fine goods, the power loom will have a still small advantage.

The results of our enquiry may thus be summarized:—

1. The sphere of handloom influence being to some extent limited, all efforts should be directed towards the increased production of very coarse, medium and fine counts weaving, and of mixed, coloured and check designs of all classes of goods, leaving the weaving of coarse medium class to the power-loom.

2. For this work, cheap looms should be constructed with proper taking-up motion and allowing easy working at a steady 10 miles an hour shuttle velocity or 80 picks per minute on 45" cloth to 4' counts, without undue breakages.

3. The best looms for Indian use would be those that can be adopted to general purposes of weaving and not such as can be used for only simple cloth or twill.

4. This speed should be maintained with a full pirn of 6 inches, taking about 840 yards of 40' or half that length of 10' counts.

5. Cheap beaming-machines for properly beaming country dressed warps should be adopted.

6. Proper pirn-winding machines to wind firm conical pirns are necessary.

7. All efforts at producing sizing and warping machines should be directed to preserving the use of the country system of sizing and dressing, and to accelerating the speed of work, sizing machines of the slasher type being entirely unsuited to handloom work.

For the last two years, there has been a great activity in the country in producing handlooms of various designs and machines for preparatory processes, and every maker applauds his own goods. Many people have bought during the last year these so called improved looms and appliances and found them unsuitable, sometimes for want of a proper understanding of the business, but mostly on account of the machines themselves, being unsuitable. There is thus a great necessity of authoritative examination and report of all these machines which the people can take as a guide. There is sufficient material for such an examination in the Calcutta Exhibition, and I would strongly recommend the appointment of an expert-committee by the conference, to thoroughly test the loom section exhibits of the lines suggested by our enquiry, and publish a report. Any time given by busy men to this work and money spent by the conference will, in my humble opinion, be well spent in the country's service and will not be grudged by the assembled patriots.

*Introduction.*—Having thus fixed the best looms and appliances, the next great question will be how to introduce them to the weavers and extend their use as quickly as possible. The most practical ways that suggest to me are :—

1. Weaving Schools.

2. Object Lessons.

3. Monetary help.

• Weaving Schools :—Many weaving schools have been and are being started in the country, but few possess a well equipped weaving factory, and without such a factory attached, where all preparatory processes and weaving in various branches suited to Indian conditions can be practically taught, the benefit derived from such schools will be very little indeed. The committee proposed above should be asked to recommend the proper equipment for school factories, and at least one school, with such a factory attached, should be started in every district. Baroda has sent in a model school factory to the Exhibition and I would request every member of the conference interested in the industry to visit it. Any suggestions for additions and alterations will be gladly received and attended to. Such a factory, completely fitted up, ought not to cost more than Rs. 2000 to any district and I am sure the district leaders can easily find this capital. If proper fees be charged to cover the tuition charges and wastage of yarn and material by new students, a school with a factory as suggested and about 40 students, would pay all its expenses. Both theory and practice should be taught and proper attention paid to designing. It is said that the Indian weaver with his inherited skill cannot be matched in designing, but I am afraid, that is an assumption not borne out by facts. Even in Benares, the home of design-work in India, there are very few designers and all weavers in the sacred city have to dance attendance on these Ustads and their Chelas for the ground-work of their sarees. At least one large well-equipped institution in every Province for training of teachers and designers is also an absolute necessity.

• Object Lessons :—In every weaving centre, nay in every village with a considerable number of weavers, men trained in these schools should be set up with improved appliances to weave the class of cloths, that may be the speciality of the

place. When once the weavers see that more work is turned out than they can do with their looms, they will not require any coaxing to adopt them. This can be done by every Swadesher with a small capital, not as a philanthropic work, but as a business. A few improved looms with a beaming machine can be set up either on his own account or lent to local weavers on condition, that they would pay for them by instalments after perfectly satisfying themselves, as to their usefulness.

**Monetary Help :—**Local capitalists and associations can do a very great deal in this direction. They can advance money for looms and improved appliances, for yarn, store etc., and take the cloth produced for sale. In this way, while helping the weavers, they would help themselves in earning a very good interest on their capital.

The Government of India have recently placed before all local Governments, a comprehensive record of the results of the recent movement in this direction and many of the Provincial authorities are arranging to open weaving schools in suitable centres. The efforts of the Sholapur Municipality in financing the local weaving industry have been crowned with great success, while successful Co-operative Weavers Unions have already been started at Benares and in some towns of the Madras Presidency.

It will not, therefore, be considered too much to hope, that with a cordial co-operation between the Government and the leaders of the people, as represented by the Municipalities, Local Boards and members of the district associations of the Congress and the Conference in this matter, our country may once again attain to one of the highest positions in the production of cloth, and bring back the smile of satisfaction to those engaged in the industry, which holds the second place among the occupations of the country and the first among industries.



## Plantain Fibre.

By J. N. BANERJEE Esq.,

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THE object of the present note is to draw attention to the common plantain as a latent source of an immense quantity of fibre which has hitherto been practically wasted and which might be turned to account by the Indians, to furnish some information about the extractor, the mode of extracting fibre, its out-turn per bigha, its value and the costs of extracting it, &c.

The existence of fibre in the common plantain has probably been known in India from ancient times and its value and utility have been brought prominently to public notice at intervals from time to time. At the time of the temporary suspension of the supplies of Russian hemp to the English market by the occurrence of the Crimean War, the Government instituted an enquiry as to the different kinds and relative values of fibres obtainable in India. The information obtained was interesting and valuable at that time. The main reasons for not making use of the fibre contained in the stems of the common plantain are : (1) general ignorance of its existence; (2) the comparative abundance of other species of fibre-yielding plants which can be easily and profitably grown by the people, and with whose fibres and with the means of extracting them they have long been familiar; and (3) the want of some simple, but efficient machine or appliance, suited to their means for extracting the fibre.

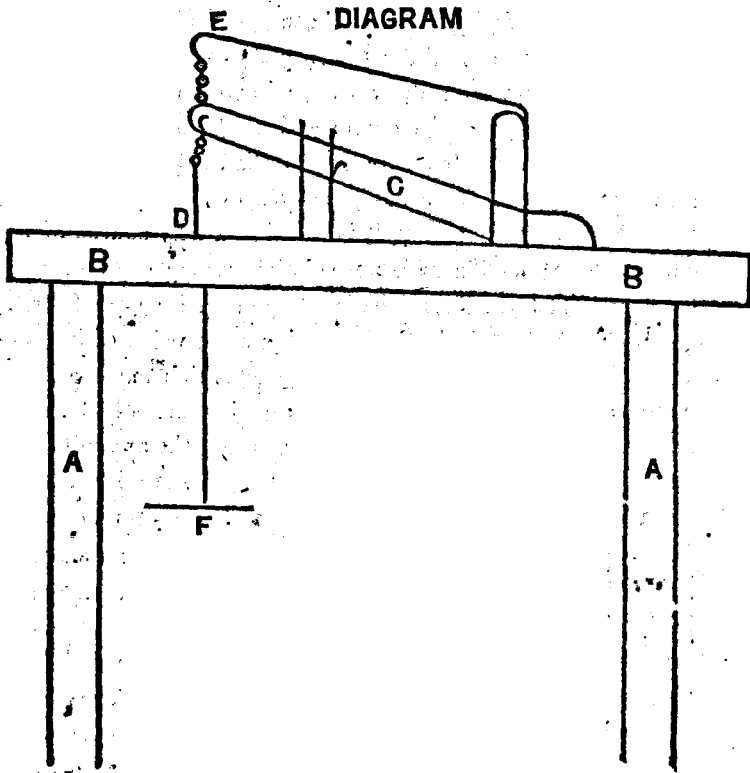
My experiments have shown that an average plantain stem cut for fruit would give about  $\frac{3}{4}$  of a seer of clean lustrous long stapled and commercially valued fibre. An adult with a week's experience can work about 8 stems a day, a boy, being given to assist him in tearing the sheaths into longitudinal pieces of  $\frac{1}{2}$  inch width and in collecting

the broken fibre and in drying them, and these in the sun the fibre extracted. The adult's wages being put down at four annas and the boy's at one-half an anna one will get in a-day seven seers of fibre, for five and a half annas. Even taking the out turn as per experiment granting that especial men are to be engaged for fibre extracting works, the charges of extracting one ton of fibre from plantain stems as they are cut for fruits amount to lbs 2,240  $\times$  5½ as.  $\times$  14 lbs. or Rs. 55 a ton. Add to this Rs. 40 for freight, trader's commission, insurance, bailing, cooly and cartage, &c., the total comes to Rs. 95 or in round figures it reaches to London at Rs. 100. Compare this with the quotation received recently from the London Chamber of Commerce even taking the value at only the lowest price, *vis.* Rs. 35 a ton, there is a net profit of  $35 \times 16$  or Rs. 560 less Rs. 100 or Rs. 460 for a ton of fibre.

On a bigha of plantation in these parts of Bengal are grown about 400 plants ; so the out-turn per bigha will be about 9 maunds, which would draw a clear income of Rs. 150. The profit to the agriculturist owner will not be all the Rs. 150 ; it may be put down at least Rs. 25 a bigha as this means conversion into money of fruit cut stems thrown away to rot on the ground. I venture to say, it is opening a new source of agricultural wealth. There is no special expense to be incurred for fibre industry. Remember that the said income of Rs. 150 per bigha of plantain is over and above the value of fruits and leaves obtained from the plantain stems which may be at least 2 annas a stem and at a minimum net income of Rs. 25 in a bigha, plantain fruit being 18 months crop, the annual income per bigha from both plantain fruits and fibre is Rs. 150 + Rs. 100  $\times$  1½ year or Rs. 250 or Rs. 166 per year (a bunch of fruit is sold from 8 annas to over 12 annas), from a trader's point of view. There is an easier method of presently starting industry. Rather than waiting for 18 months for the growth of plantain tree, the numberless stems available from places scattered here and there over several villages may be utilised, if they can train their men or labourers to extract the

fibre of each stem as it is cut for fruits. This may be stored for sale to the agent of the Central Factory when he may turn up every now and then at their villages for purchasing the available fibre. And there they can make a net profit of at least Rs. 25 per bigha over and above the income from fruits and leaves. Let them therefore induce all plantain-owners to take to the extracting of fibre after the stems are cut. I have arranged to supply the cheapest machine for extracting fibre at Rs. 15 each. This can be seen at the Industrial Exhibition.

The machine is strong and simple in construction, portable and efficient to easily extracting the fibre of plantain seaths. The fibre extracted is so strong that a fine rope may be made out of it equal to aloe or manilla hemp, and when dyed in different colours, it may be manufactured into different kinds of beautiful heavy goods such as carpets, rugs window screens, and good many useful articles.



*A*—Two posts fixed on the ground to support the horizontal beam *B. C.* The links to obtain the required pressure of the blade of the knife on the fibre. If the spring *E.* becomes weak attach the knife to the spring by the shorter link *D.* *F*—a piece of cord tied to the end of the handle of the knife passing through the hole in the horizontal beam. The other end of the cord is tied to a pedal.

How to Manipulate.—The plantain stem should be cut soon after the tree has borne fruit, when it is 18 months old. Each length should be split into strips of  $1\frac{1}{2}$  broad. The length may be cleaned on the same day as the stems are cut down and about an hour after stripping. The inner portion yield a better fibre than the outer and should be collected separately. The strips are placed innerside uppermost, under the open knife, the foot being on the pedal. Keep hold of about 7" of the end of the strips and with both hands draw the strips steadily, after taking the foot off the pedal, first under the gugged portion of the blade and then under the blunt edges.

This should be done 2 or 3 times and then a few time outside the upper most. After the cleaning of one end is finished the other end should be cleaned similarly. Then the fibre will be thoroughly dry in a short time. Sunlight should not be allowed to play between the knife and sole plate and any wearing out of these parts should be detected and rectified.

Planters, Zamindars and especially the villagers who have plantains growing on their estates and in ther gardens might with the aid of this machine, very easily and without much expense obtain all the fibre necessary to make cord and ropes for their own requirements.

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## Indian Sugar Development.

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ALTHOUGH the development of the Indian Sugar Industry is a matter of the utmost importance to the country, I have no desire to burden you with a very lengthy paper on the subject. As a matter of fact, I have written so much on the Sugar Industry, during the last two years, especially without any appreciable results beyond arousing some interest where before there was none, that I fear, a very lengthy paper would at this time be a burden to myself even, keenly interested as I am in the subject, because it could only be a repetition of what I have written so often.

I will therefore be content, as you no doubt will be also, if I simply state a few facts regarding the backward state of the Sugar Industry in this country and make one or two suggestions for improving it. The Sugar manufactured in this country is derived from two sources, viz: The Sugar Cane and The Palm Tree. The area under Sugar Cane Cultivation is anything from 3 to 5 million acres, and it is most difficult to form an estimate of the outturn of raw sugar, but if we take the cultivation at 3 million acres only, and reckon on an average of 20 tons of cane per acre the output of raw sugar should be something like 6 million tons.

The method of manufacturing this raw sugar as carried out by the cultivators must be known, I am sure, to everyone, and is simply this:—

The canes are crushed by country cattle mills, which extract only about 50 per cent. of the juice which is in the cane, and this juice is boiled into "Gur" or "Jaggery" which frequently yields less than 50 per cent. sugar.

You can see some of this raw sugar in the Agricultural Section of the Exhibition. It looks innocent enough in all

conscience, but it is the manufacture of this very article which is at the bottom of the deplorable backward state of the sugar industry of this country for the following reasons :—

In the first place, through inefficient crushing of the canes, the cultivator does not obtain the profit from the crop which he ought to obtain, and the quality of the raw sugar which turns out by his crude methods of boiling, is in most cases, so poor, that is to say, it yields such a low percentage of sugar when refined, that it can only fetch a low price, so the cultivator has absolutely no encouragement to extend his sugar-cane cultivation.

In order to make white sugar, this raw sugar must be made into a liquor for filtering, and as the liquor must be decolorised being of a dirty brown colour caused by the method of boiling it, it is absolutely necessary that it be passed through some medium which will decolorise it to make white sugar, and the only medium that will effect this is Animal Char. Burnt bones possess the necessary chemical or mechanical, whichever you like to call it, properties of effecting this decolorisation of the liquid as nothing else does, but I may here state for the benefit of those who imagine that bones and blood are used in the manufacture of sugar, that when refining the raw sugar, the liquor simply filters through the animal char, and is not mixed in any way with it, and neither is there any blood used in the manufacture of sugar in this country or in any country exporting sugar to India. The use of animal char too, as regards the white sugar consumed in this country, is confined to Indian Refineries only, and simply on account of the manufacture of raw sugar by the people themselves, notwithstanding the fact that they object to the use of animal char, although there is no other means of making the raw sugar, white.

The countries exporting sugar to India do not make raw sugar at all, but manufacture the white sugar straight from the cane-juice and the beet-juice by the sulphurous-acid-gas process, and without the use of animal char.

The losses incurred in the refining of raw sugar are enor-

mous as, in order to keep the refinery working throughout the year, the raw material has to be stored, deterioration takes place, and on refining, frequently, considerably over 50 per cent comes out as uncrystallisable or grape-sugar, what is commonly known as Molasses,

It is this Molasses, which when converted into spirit, brings to the Government such a large annual revenue, and I believe it to be the case that the Madras Government, on the one hand does everything in its power to extend the cultivation of the sugarcane by establishing experimental farms and pumping plants for irrigation, while on the other hand, unknowingly, it encourages the conversion of the sugar into spirit, by paying higher rates for the spirit made from raw sugar only, than for the spirit which is made from molasses only.

The Member of Council who asked the question "Will the Government state what steps are being taken to check the alarming increase in the consumption of intoxicants in Bengal as shewn in the Report of the Commissioner of Excise for 1905-06" at the meeting of the Bengal Legislative Council on the 15th instant, might now know of a way to check the consumption of intoxicants viz., by encouraging sugar manufacture instead.

In the Madras Presidency, there are proprietors of sugar refineries who make the manufacture of spirit to fulfil the Government contracts their chief business and purchase jag-gery for the sole purpose of converting it into spirit, notwithstanding the fact that sugar is much more valuable in its proper form than when converted into material for the fermenting house (I do not refer to the East India Distilleries, which use for the refuse Molasses) One of those proprietors has a refinery which has been closed for the past three years and he was quite unaware of the fact that sugar could be made straight for the cause which grow in abundance round his concern until I told him so.

He nevertheless still lacks confidence through past failures

and instead of purchasing the necessary cane crushing and juice evaporating plant himself, he is looking out for some one else to do so.

There are thousands of people, both Europeans and Indians of the same wrong opinion, that before white sugar can be made, raw sugar has first to be made, and unfortunately the Agricultural Departments have been of the same wrong opinion. The Agricultural Department of the United Provinces, however, have recently been making some experiments in making sugar direct from the juice, but while the apparatus used by Mr. Hadi, which consists simply of several pans placed over a fire, the most important feature being the treatment of the juice with "*dhaulā*" stalks and "*rita*" or soapnut for clarifying and bleaching, is useful enough for demonstration purposes, this method will have to be considerably improved to make sugar manufacture commercially successful which of course is necessary before any development can take place and this can only be done as has already been found in other countries by employing steam plant.

The United Provinces Agricultural Department have evidently recognised this also as it demonstrates the driving of the Centrifugal Machines by a steam engine, and it would have been to great advantage, as Mr. Hadi himself sees, if a steam driven mill had also been obtained to do the work of the numerous cattle-mills which are demonstrating in the best way possible how the juice can be left unexpressed from the canes. It follows therefore that, if steam is necessary for the Centrifugals and Mills, it is also necessary for economising in fuel consumption and for boiling the juice whereby a higher output and a better quality of sugar is obtained.

It will no doubt be very many years before there are sufficient factories in the country to deal with the cane cultivation, and raw sugar will continue to be made by many cultivators but as this raw sugar cannot be made into white sugar without the employment of animal char, then it should be converted into a high class yellow sugar instead, which does not



require the use of animal chat, by using the most up-to-date machinery whereby the maximum amount of sugar and the minimum of molasses will be obtained from it. We must remember also that in dealing with the raw sugar, fuel has to be purchased to work the refinery.

We have been told by the Agricultural Chemist to the Mysore Government, in his fifth annual report that it should be the object of the cultivators to turn out a better quality of raw sugar for the refinery by using the centrifugal machine and extracting the molasses, but in making this statement he could not have given the consideration to the object which it requires.

When the cultivator has once made the raw sugar, the enormous losses have occurred, and no subsequent treatment will recover the quantity of sugar left unexpressed from the canes, or the quantity which has been converted into molasses in boiling. Even if put through the Centrifugal Machine, the high quality of raw sugar left in the basket would fetch such a high price, it would find a most profitable market in that state, and the Refineries which attempted to purchase and work it, would be obliged to do exactly as they did in the United Kingdom and that it, close, as they would not possibly compete with the imported sugar.

If the refinery, refining the "Gur" has a Distillery attached, then it is manufacture of spirit from the molasses which enables it to keep open, and that is exactly what takes place in this country.

In Mysore, there is such a concern, while canes of the best variety in the world containing, according to analysis made, as high as 21 per cent. "sucrose" and only a half per cent. "glucose," are grown. The same thing happens in every part of India, the canes are grown, half the sugar is burnt, and a considerable portion is turned into spirit.

Let us see what is done in the countries which dump the sugar into India.

The canes are crushed by powerful triple crushing plants,

not one three roller mill, but three roller mills in succession, 90 per cent., and even more, of the juice in the cane is expressed, but instead of this juice being boiled into a raw sugar, it is made into sugar straight away, over 90 per cent. of the crystallised sugar being obtained by employing the following method :

The juice as it leaves the Mills is immediately bleached by mixing it with sulphurous-acid-gas, obtained by burning sulphur in a small furnace, and after bleaching, any acidity of the juice is immediately neutralised by the application of lime in the form of milk of lime, in order to prevent, as far as possible, the formation of "glucose," *i. e.*, molasses, which is caused only by the acidity of the juice.

After liming, the filtering of the juice through cloth bags, the evaporation to a thick liquor, the boiling to grain in the Vacuum Pan, and the spinning of the wet sugar in the Centrifugals, are all carried out by the most up-to-date and economical machinery, and in this way, the maximum amount of sugar and the minimum of molasses is turned out by employing the crushed cane only, which goes straight from the Mills to the furnaces, as fuel.

This is white sugar made without animal char filtration, which is unnecessary, as the cane juice is of a clear opaque colour, quite different to the dirty brown *goor* liquor.

That is how the cane-sugar and beet-sugar imported into this country is made and is the method that must be adopted in India also.

It is useless for the poor cultivator to attempt manufacturing sugar, as he has neither the knowledge nor the money required. What is wanted is co-operation on the joint-stock system in order to obtain the necessary capital to purchase the plant. In numerous villages throughout the country where the canes are crushed independently by the cultivators, small steam plants should be established to deal with from 50 to 100 acres per season at a cost of about Rs. 16,500, without a Vacuum Pan, which would cost another Rs. 5,500 say, to which

the cultivators would send their canes. They would thus be freed from the cares and anxieties incidental to the manufacture and sale of the product, and they would be able to give more attention to improving the cultivation which would undoubtedly rapidly extend.

The small steam plants to turn out from 1 to 2 tons of sugar per day, instead of making raw sugar, would make pure white cane sugar, thus avoiding the losses, and the sugar would be of a better quality than the Benares sugar now sold in Calcutta at Rs. 11 per maund of 80 lbs.

These steam plants would be extended also to suit the extension of cultivation and in time there would be large cane-sugar factories where these small ones existed, and probably not a pound of sugar would be imported. From the enquiries which I have received from all parts of the country where the sugar-cane is grown, I am as certain that that is what will take place, as I am that this paper is being read to-day.

It may be said that these factories would only work during the cane seasons,—well!—such is the case in other countries, which have to import Indian labour, rice, cattle etc., and have disadvantages, such as cyclones and cattle-disease to contend against and yet profits are made by sending their product to India. But the cane sugar factory in this country might also be a combination of factory and refinery, making white sugar from the canes grown in its vicinity and yellow crystals from the "*gur*" made by the cultivators in outlying districts, and so would be able to work all the year round. The Baroda State Factory, which I inspected some time ago, was intended to work on these lines, with animal char plant, however; but owing to not having the necessary machinery to obtain a high extraction of juice when the price of the canes was high owing to incompetent management, and the fact that the jaggery was brought up from the south of India in boats and converted itself into molasses on the way, although thousands of tons of Palm Tree Jaggery was available at

comparatively easy distance, it was a failure, as it could only be. So much for the sugar-cane.

The other source of sugar manufacture is the Date or Palmyra Tree, already mentioned. There is a large business done around Calcutta in the former, and in the Tinnevely district of the Madras Presidency in the latter.

Exactly the same thing is done with the juice from these trees when it is collected, as is done with the sugar-cane juice. It is boiled to "*gur*."

The same remedy as I have suggested with regard to the raw cane-sugar should be adopted here also, that is, for the Date Tree *gour* to be made into a high class yellow sugar, which does not require the use of animal char in its manufacture. I would mention here, however, that the sugar turned out by the Calcutta and Madras Refineries, and which is made by employing animal char, finds a ready market in the country and I wonder after all, if the objection to animal char is not only an imaginary one.

To manufacture the white sugar direct from the juice as it is collected from the trees, a difficulty is met with which does not apply to sugar-cane. I mean the difficulty of getting the juice in large quantities to the plant, for while the canes can easily be conveyed by carts, the juice from the trees collected in small pots is not so easily handled. There is one way out of this difficulty, however, for in Queensland and elsewhere, the juice is sometimes conveyed long distances, from the cane crushing mills to the sugar making plants, and an attempt should certainly be made to avoid the enormous losses in sugar by manufacturing from the juice direct.

I would therefore suggest that small steam plants similar to those I have recommended for the sugar cane centres, but without the cane crushing mill where there is no cane cultivation, be established in the centres of the Date Tree Cultivation.

The pots of juice when taken from the trees could be emptied into a tank, and treated immediately with milk of lime

in order to neutralise the acidity thus preventing the fermentation and the consequent formation of molasses.

These tanks of juice, containing say 300 gallons, each, could easily collect the juice from a circle of several thousands of trees, and be conveyed to the plant for manufacturing into white sugar straight away.

The cost of such a plant to turn out  $\frac{1}{2}$  to 1 ton of sugar per day would be about Rs. 6,000, and the sugar would have a value of Rs. 6 per maund, at any rate.

The question is, who is to do this, for like the cane cultivators, the men who collect the juice have not the knowledge or capital, so it must be done on the Joint Stock System.

We are told in another paper on the subject that there are millions of Date Trees growing wild in Central India, and there are millions of such trees growing wild in the forests of the Nizam's Dominions and other parts of India also, of which no use is made, and I am confident that if such small plants were established to manufacture sugar direct from the Sugar Cane and Palm Tree Juice, the Indian Sugar Industry would be revolutionised.

I have often been told that my writings and figures in the various Indian Journals have aroused some interest in the matter and I have been inundated with letters of enquiry from all parts regarding sugar machinery for making white sugar from "*gur*," but when I informed my correspondents that animal char was necessary, I heard no more from them.

I understand that in some quarters, the Government is blamed for the large annual imports of sugar which have a value of seven crores of rupees, but the only blame that can be attached to Government is in not obtaining experts in the manufacture of sugar as well as experts in cultivation, for, to my mind, showing how the enormous wastage of sugar in the country could be avoided and how greater profits could be obtained from the present crops, is of much more importance than showing the cultivators how to grow the cane and convert the sugar into a material only fit for the distillery for

that is exactly what the demonstrations of "*Gur*" manufacture amount to, and what the cultivators know only too well how to do, without being taught.

In the Punjab, and even in Calcutta, the boycotting of imported sugar has taken place, but the boycotting of sugar is only an expression of the people's impotency regarding sugar manufacture, and no amount of boycotting will help the development of Indian Sugar.

If there is any desire to develop what should be the foremost agricultural industry of the country, and to have the indigenous product take the place of the imported one, then sugar must be made as elsewhere, in the most economical manner possible, and without employing any material that will make its consumption obnoxious to the people.

To facilitate the formation of Companies for the purpose of erecting Sugar Factories, I attach to this paper some figures showing what profits may be expected and in view of the profits made by the Cawnpur Sugar Works, Limited, I think my figures are extremely moderate.

In conclusion, I would anticipate the question—"How are we to work such plants when we have no knowledge of the work" ?—by saying, that my firm Messrs. Martin & Co., Calcutta, who have now taken up Sugar work in earnest, will be only too glad to give all the necessary expert advice and assistance to any who wish to take up Sugar Manufacture.

*Balance Sheet of a Sugar Factory to turn out 6 tons of Sugar per 24 hours from sugar-canes during the cane season, and from raw sugar in the off season, without animal char.*

Factory to deal with 50 tons of Cane (2 acres) in 24 hours=5,000 tons of Cane per season of 100 days (200 acres)  
 18" x 30" Two Roller Mill extracts 400 galls. juice per hour=9,600 galls. per day=@ 1,650 galls. juice per ton  
 of sugar=6 tons of all sugar=600 tons per 100 days.

	Rs.			Rs.
<i>Cane Season of 100 days:—</i>				
360 tons (60 <sup>o</sup> / <sub>o</sub> ) 1st sugar @ Rs. 6-8 per md.	65,520	5,000 tons cane @ 5 annas per maund	43,750	
120 " (20 <sup>o</sup> / <sub>o</sub> ) 2nd " @ Rs. 5 "	16,800	1,200 tons Gur @ Rs. 3/8 " "	1,17,600	
120 " (20 <sup>o</sup> / <sub>o</sub> ) Molasses Gur @ Rs. 2 per md.	6,720	Cost of manufacture @ Rs. 20 per ton of produce	36,000	
600 tons		Fuel for Gur Season	12,000	
		Depreciation of Buildings and Machinery @ Rs. 10	8,000	
<i>Gur Season of 200 days:—</i>				
600 tons (50 <sup>o</sup> / <sub>o</sub> ) yellow sugar @ Rs. 6 per md.	1,00,800	Nett Profit	26,250	
240 " (20 <sup>o</sup> / <sub>o</sub> ) 2nd sugars @ Rs. 5 "	33,600		2,43,600	
360 " (30 <sup>o</sup> / <sub>o</sub> ) Molasses Gur @ Rs. 2 per md.	20,160			
1,200	2,43,600			

( 230 )

Declares 25 % dividend on 1 lakh		Rs.
CAPITAL—Machinery on spot	...	60,000
Erection of Buildings and Machinery	...	20,000
Working Capital	...	2,0000
		Rs. 1,00,000

## Sugar Industry in India.

BY H. VENCOBA RAO, Esq.,  
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IN a paper read by me before the South Indian Association, Madras, in August last on the "Problems of Sugare Industry", the full text of which appeared in the September of the *Indian Review*, I discussed at some length the chief problems that engaged the attention of the cane-growers and cane-sugar manufacturers all over the world, with special reference to the condition of sugar industry in this country. I do not think it necessary to repeat here what has been said by me there but would mention in this paper only the chief points of my previous paper. The most prominent defects noticed by me in the Indian sugar industry are—(1) the sporadic cultivation of canes in small plots of land, (2) the waste that occurs in consequence of defective crushing in primitive mills, (3) the manufacture of raw sugar in the form of jaggery or *gur*, (4) the difficulty of transport of canes to the factory and sugar to the market, and (5) the absence of demand from foreign countries for Indian raw sugar. I drew the attention of all those interested in the sugar industry in India to the increasing demand for refined sugar and the inability of the manufacturers in India to meet that demand. It was pointed out by me that cheapness was the sole recommendation in favour of foreign beet sugar. The remedies suggested were—(1) the application to cane of the very same methods as are adopted for the manufacture of sugar from beet on the Continent of Europe, (2) the establishment of central factories on the coast with a view to develop the export trade in sugar, (3) the extension of cane cultivation in the deltaic tracts of such rivers as the Caraveri, the Tamparni, the Kistna, the Godavari and even the Ganges, in close proximity to these central factories, (4) the institution of a sliding



scale of prices in regard to canes delivered on sale into the factories, (5) the arrangement with the Railway Companies for a reduction of fare in respect of canes brought to the factories for sale and of sugar transported to the market for consumption, (6) the utilization of the labour of returned emigrants in cane cultivation. Not being immediately connected with the sugar industry in any way, I had doubts as to whether I had rightly diagnosed the causes of the depression of the Indian sugar industry and had suggested appropriate remedies. I expected that those actually engaged in the industry in India would seize the opportunity to come forward and mention their troubles and difficulties. My object in choosing this subject for my paper, although I am not qualified to express an opinion, was to invite expert opinion and to draw public attention to the rapid ruin which is overtaking an industry which has existed in this country from time immemorial and which is the mainstay of the people and of the state. Another industry which had its birth in India ages ago and flourished as an important item in the export trade of the country has almost ceased to exist owing to German competition. I refer to indigo. The large patches of blue which represented indigo cultivation in the Statistical Atlas of India are left blank now. The huge foreign capital thrown into the industry in Bengal has become a waste and returns no profit now. The foreign capitalists are now thinking whether they cannot grow some other crop in its place. German *savants* appear to me to be the Viswamithras of the *Kali* age, well versed in the art of duplicating nature. Their ire seems to be particularly directed against us, just as Viswamithra's was directed against Vasishta. They invented artificial indigo to suppress the natural indigo of our land. They invented aniline and alizarine colours to suppress our lac dye and other natural colours. The inventor of the artificial sugar—*saccharine*—from coal tar naphtha is an Americo-German chemist named Fahlberg. This sugar is said to be 230 times as sweet as cane-sugar. Although this sugar is

employed in sweetening jellies, puddings and beverages in other lands and patronized by diabetics in this land, of whom the number is increasing. It is an antiseptic but no food which the natural product is. But all the same the German scientific skill has been able to put upon the world's market, at very cheap prices, a natural sugar which has become a formidable rival to cane-sugar. The shining white beet-sugar crystals have ingratiated themselves into the favour of our *Halvais* and confectioners. The northern provinces of India are patronizing German and Austro-Hungarian granulated sugar in increasing quantities. The absence of response to my appeal in this country looks ominous. I once suspected whether the soul has flickered away from the heart of Indian industry. But the much needed galvanic current comes from a distance to revive and inspirit the Indian industry. *Tropical Life*, a journal published in England and devoted to the interests of tropical products such as sugarcane, cocoa, cotton, coffee, &c., in reviewing my paper on sugar industry heads its leading article with the significant title "Sugar Industry in India—Improved Machinery Badly Needed." Probably that is the impression which my paper created in the minds of people abroad competent to express an opinion in the matter. But I would wish very much to get an expression of Indian opinion as to whether I represented the case of the Indian sugar manufacturer correctly. But it is very distressing to find that it is very difficult to make him articulate, and this will be the primary function of the Industrial Conference. The drawbacks of the industry can be learnt only from those engaged in it. Will the Indian Industrial Conference bring about a special conference of sugar-cane growers and sugar manufacturers in India at some centre where sugar manufacture is carried on a large scale? I would prefer Allahabad. Without the co-operation of those engaged in the industry, no attempt at their improvement will succeed. The foreigners who have thrown some capital in the sugar industry in this land are not very well off and labour under very great diffi-

culties in making both ends meet, but they are extremely reticent in disclosing their difficulties.

The future of cane-sugar industry in this country does not, however, look so hopeless. On my presentment of the case of Indian sugar industry the writer in the *Tropical Life* observes as follows :—"This tends to show that if properly exploited by capitalists and sugar-machinery engineers, a great deal more money could be derived from this industry than is the case at present. Out of the world's total production of 8.34 million tons of cane-sugar, India, even by means of her primitive methods, produces 3 million tons or 39 per cent. Given modern machinery, she could easily produce half as much again, if not more, without extending the area under cultivation, whilst cost per pound for manufacturing should be greatly reduced." The same paper quotes in this connection from Mr. Nursey's lecture before the Society of Engineers to show that with maceration and triple crushing, from 81 to 85 per cent. of juice can be obtained from the canes. Another quotation is made from the *Louisiana Planter* to show that with the 12 roller mill 96 per cent. of juice could be obtained whilst if very heavy maceration or saturation of the last bagasse with water is used even a greater percentage than 96 can be secured. "It can therefore be seen", says the writer in the *Tropical Life*, "what a tremendous margin of profit is thrown away every year, when 3 million tons of jaggery are turned out on a 50 to 60 per cent. of juice. If 73 per cent. or 85 per cent. is obtainable, at least another one million tons of sugar could be made." This is the strongest argument even adduced in favour of employing heavy crushing machinery in the Indian sugar industry. Mr. George Osborne, writing in the *Louisiana Planter*, states that, in Hawaii the demand for a high percentage extraction tends to require the 12 roller mill and the vacuum centralizer system in all the large mills of the islands and that there seems to be no question of the advantage of the 12 roller mill where a large amount of work has to be done." What huge efforts

are made in procuring labour and securing facilities for the export of sugar in other lands can be gathered from the fact that Hawaii planters subscribed among themselves 300,000 dollars to cover the expenses of transporting 1,000 or more Portuguese agricultural families from the Azores to work on the sugar estates. Each family will be given an acre of land with a suitable house for abode. The Hawaiian Commercial and Sugar Company which owns the largest cane-sugar plantation in the world is credited with the intention of making the village of Kahului in Mani into a large sea port town. A large harbour is to be constructed and the entire sugar crop of Mani will eventually pass through it. Railway facilities from all parts of the island will be provided. An opinion is gaining ground in some quarters in this country that sugar industry can be put upon a profitable basis with the help of simple and cheap machinery although experience in other countries points to a different conclusion. It has been seen what efforts the small island of Hawaii is putting forth in order to place its sugar industry on a better footing. In Antigua where a central factory was established only recently, the Central Factory Company appears to have realized a net surplus of £3,956-9s. 8d. for the year 1905. During the past few years, the establishment of central factories has gone apace and every imaginable quarter of the globe where sugar cane is grown is ambitious of establishing a central factory. India alone believes in the efficacy of the old methods of crushing canes in small wooden mills, in the profitableness of manufacturing white sugar from jaggery and in the adequacy of home trade for the improvement of its sugar industry. It is wrong to suppose that India is differently circumstanced from other countries. Agricultural conditions in India may differ from those of the colonies and probably some of the colonial methods of obtaining canes for the factory may not be suitable for India. But the method of manufacture of sugar in central factories is the same all over the world, and we in India have simply to copy those methods, and manufacture such sugars,

both raw and refined, as are marketable in any part of the world. The Government is experimenting with the several varieties of canes with a view to find out the most suitable variety for Indian conditions. It is for the Indian capitalists and others interested in the promotion of Indian industries to investigate where to establish factories, how to secure lands for planting canes and how to mass labour thereon. The probable market for Indian sugar should be likewise investigated. We have got at our very doors very cheap labour for which the Colonials are paying heavily. We have an extensive home market which is expanding but which is being exploited not by us but by Germans and Austrians. The whole country should first be mapped out showing the zones of activity of foreign and native sugar, the prices of the respective sugars at several stations in these zones. The present areas of cane cultivation and other areas which possess facilities for cane cultivation should be similarly mapped out. So also the most convenient places for the establishment of big factories by virtue of their having canal, railway, river or sea communications with the other parts of the country or the outside world. It will be a wonder to many why capital and enterprise in India should fight so shy of sugar industry when it has so quickly and unreservedly taken up cotton and jute industries on a large scale, employing the most modern machinery in manufacture and exploits the distant markets. The reason is not that raw material for the cotton and jute industries can be had in more plentiful abundance in the country than for the sugar industry. The average annual estimated production of cotton and jute in India is about 480,000 and 950,000 tons respectively in round figures, while that of raw cane sugar is three million tons. This last estimate is only on a 50 to 60 per cent. basis, but if 96 per cent. could be extracted by means of modern appliances, the figure would mount up to 5 million tons at least, without increasing the present acreage of cultivation even by a single acre. If larger markets outside for Indian sugar could be secured, in view of the Government

providing for more irrigational facilities another million acres will come under the plough producing in all about 7 to 8 million tons of cane sugar or nearly one and a half times of the quantity which the whole world except India now produces. The only reason that occurs to me is the difficulty of concentration at the factories of a large quantity of canes representing 3 million tons of raw sugar and passing the whole quantity through the mills within a short cane season of 3 or 4 months. Cane has to pass through the mills within 24 hours of cutting and cannot be stored up and worked leisurely like cotton and jute. It is a fact well known that sugar factories, however big they may be, have to be idle for a greater part of the year. Another reason is that according to one great authority, who speaks from recorded results, sugar production runs in a four-yearly cycle. In one year, the crop will be very large and the demand of the country considerably over-supplied; there is consequently a very heavy fall in prices. In the second year, there will be a fair crop, as, although no new cane will have been planted there will be a large return from re-growth of last year's ratoons. Internal prices may somewhat improve, but on the whole, they will not prove remunerative. In the third year, there will be a small crop, perhaps barely sufficient for internal consumption. Price will then improve greatly, and in consequence, the planter will again begin to plant on a large scale, so that, in the fourth year, there will be a return once more to a large crop and low prices. This was written of Brazil, but the conditions of sugar industry in that country are so similar to those in India that those remarks may equally apply to the latter country. The sugar industry in that country is said to be heavily handicapped by excessive taxation, deficient means of transport, lack of capital, high rates of interest and heavy railway freights. Some at least of these features may be found in India. As regards railway freights, the *Tropical Life* commenting upon my paper observes as follows :—

At present the cost of railway carriage either to convey the sugar to the

consuming centres, or to transport the coal and machinery to the sugar factory, is a serious drawback in the development of the industry, and handicaps the sale of the sugar in competition with the imported article. With a little organisation in the bulking of freightage, this difficulty could easily be overcome, as it is in Europe with vegetables, poultry, etc., produced in very small lots, but brought to a common centre, and despatched in train-loads at a time. Even in England, which is not always up-to-date in these matters, when the fruit-trains are being despatched, we are told the produce is brought to the station in vehicles of every description, "from a heavy dray to a sugar-box on wheels." If this can be done in Europe with such crops, it should surely be possible to do it in India with an article like sugar, produced in fairly large quantities.

This is a big subject requiring patient investigation with reference to the special conditions of the country and I do not like to dogmatise from a knowledge of the conditions of manufacture in other countries. But one thing I can say. If we wish to improve our sugar industry, we must have an eye to the export trade in raw sugar at least. If that is granted then the raw sugar that we produce must be of the same form and of the same standard as those produced in the colonies, otherwise it is impossible to secure markets for them in Europe and America. Such sugar can be produced in big factories alone. To run big factories, there should be plentiful supply of canes near at hand. To secure it, for the present at least, the plantations should be owned by the factories or they should be under the effective control and direction of factory owners. The plantations should be financed by the factory owners. These methods should be adopted until the agricultural classes learn the advantages of some of the Colonial tenures. It goes without saying that to run the industry on these lines, huge capital is required. I do by no means despise cheaper methods which are constantly being advocated for the acceptance of the sugar-cane growing ryots. They deserve a trial also but nothing should be accepted on authority. When the crash comes, the country's progress will be thrown back by several years. At present, people are embarking upon enterprises having for their object the improvement of industries

in India. Of course, next to cotton, sugar industry merits our immediate attention and we also see some activity in this direction. The promoters require advice and support which no body is in a better position to give than the Indian Industrial Conference, whose duty it will be to procure the best advice from unexceptionable sources.

## Development of Indian Sugar Industry Coupled With Agriculture.

BY HARIDAS CHATTERJI, Esq., M.A., B.L.,  
*Pleader of Khandwa C. P. and Indore C. I.*

IN some Districts of the Central Provinces and in the dominions of most of the Native States in Central India, there are extensive date forests of wild and luxuriant growth. Seeking generally, the date trees in those parts are taller and stouter than those of Bengal ; and they are more numerous in the villages. It is a very remarkable fact, that, while the labourers and the cultivating classes in Bengal, particularly those of Jessore, Nadia, Khulna, Faridpur, &c., derive a handsome income by the manufacture of date sugar, crude as well as pure, by tapping date trees every winter, the Central Provinces and Central India get nothing from their richer possessions of date forests, though, with the exception of one very serious matter, the facilities for the production of date sugar in the Central Provinces and in Central India are great. These facilities consist of cheap fuel and cheap labour ; besides, the climate of the provinces is exceptionally good. The difficulty mentioned above is the entire ignorance of the people, in the date growing tracts of the provinces, how to tap the date trees and to produce sugar from the extracted juice. In some of the Districts in those tracts, there are



some classes of people in the date growing villages who follow the Bombay method of tapping the date trees to make *toddy* for the purposes of intoxication under the Excise Rules in force. Like the Passis of Behar, the date-tree tappers in the Deccan, Central Provinces, and Central India, —known by various names, *Bankaris*, *Bhandarias*, *Talqadias* &c.,—have no other occupation than to sell *toddy* and to supply the liquor to the Abkari contractors of the Excise Department. These tappers are extremely unclean in their habits ; and are, speaking generally, inveterate *toddy* drinkers. The tapping processes they know are widely different from and are very much less artistic than those that prevail in Bengal. It has been found by repeated experiments, continued for nearly three years, in certain villages in the District of Khandwa in the Central Provinces, that by working side by side, the Bengal tappers, called *gachis* and *sheolies*, produced much better results than their brethren of the Bombay Presidency. It is therefore indispensable that to introduce and to develop the industry of date sugar manufacture in the Central Provinces and in Central India, the first essential condition is to impart the knowledge of the Bengal system of tapping the date trees. The side system has the acknowledged merit of being the least injurious to the date trees, and the most effective mode of extracting the largest quantity of saccharine juice from the trees.

2. It is said that the early Bengali settlers in the Central Provinces and in Central India used to wonder why the poor villages in those parts did not utilize the date forests and manufacture crude date sugar. The resources of the owners of the *Sindbans*, as the date forests are called, were great for procuring any amount of the Bengal skill over a considerable area of the Province. And yet what was there to prevent the spread of the industry till now ? The reason was not far to seek. It was the impression of the people that there was no other use of the date trees than that they yield intoxicating drink only. To the conservative and orthodox minds of

the Deccanis of the upper and middle classes, the date trees and their juice have a sort of traditional repugnance, which it has been my endeavours within the last eight years to dispel. In 1898, I imported five *gachis* from Jessore to see for myself what quantity and quality of sweet juice could be derived from the date trees in the Central Provinces, what the outturn of *gur* therefrom, and what the people would say as regards the produce. A village near Khandwa was the place of my first experiment in 1898. I found,—

(1) The yield of juice was a little less than the ordinary yield in Bengal. Only the trees standing in the cultivated fields yielded nearly the same quantity as an average Bengal tree does.

(2) The sugar percentage in the juice was much higher than the same in Bengal. That is to say, while 10 to 11 *seers* of *Jeerun Ras* in Bengal produce after boiling one *seer* of *khejoor gur*, seven to eight *seers* of my juice produced the same quantity of *gur*.

Respectable people of the District, both official and unofficial, used at times to visit my little factory in the village. The villagers from all sides used to flock in numbers to see the processes of tapping the trees and boiling the juice. All those classes of people expressed their surprise to me that though they had considered I was engaged in manufacturing a sort of condensed *toddy* or an intoxicating drug, they found that my produce was an exceedingly fine and flavoury *gur*. The taste they said, was somewhat different from that of the ordinary cane *gur* they were accustomed to use. But in points of appearance and formation of crystals, *gur* produced was declared to be better than the sticky mass of the inspissated cane-*gur* so largely imported in the province. The superior results of the date *gur* I made, just noticed above, are due to one fact; namely, the trees growing in the moist soil of Bengal yield more watery juice than those on the dry land of the Central Provinces and Central India.

3. I continued my experiments in another village of the

same District (Khandwa) next year, when I sent a quantity of date *gur* for analysis to the Rosa Sugar Refinery of Messrs. Carew and Co., in Shahahanpur in the United Provinces. I was glad to read in their report that though my date *gur* was badly made, the sugar percentage therein was very high, being nearly 55 p. c. Contrast with this the ordinary Bengal percentage. Sometime ago I read some official statistics of the date sugar industry in the District of Jessore. It is stated there that the quantity of pure sugar was about 37½ p.c.; while the rest was treacle. Following the custom of Bengal, I have made *Khejoor gur* cakes, called *patali*, and by pouring the *rab* to cool in earthen pots, produced semi solid mass of sugar crystals mixed with treacle. I have worked the latter in the Centrifugal with success which I can hardly conceive to be possible in Bengal. I sold the separated brown sugar crystals in local Bazars from Rs. 6 and Rs. 7 a *maund* (80 lbs.). The treacle driven off from the Centrifugal basket is readily saleable for the use of the *gooracco* makers at the rate of Rs. 2-8 to Rs. 3 per *maund*. I exhibited my date *gur* and date *gur* cake at the Madras Exhibition held in December 1903 and at the previous Calcutta Exhibition. I received from the jurors at both the Exhibitions certificates of merit to say that my article was in no way inferior to what is manufactured in Bengal. I think my article deserved a larger measure of praise with reference to the ordinary sticky *Khejoor gur* of Bengal.

4. While engaged in my works of experiments of manufacturing date *gur* every winter in the villages of the District at Khandwa in Central Provinces, I had an opportunity of being called by the Durbar of the Indore State to begin my operations in a date forest village in the Malwa. The word Malwa means the Territories of His Highness the Maharaja of Indore; a large part of the Gwalior State, the whole of the Jaora State, and the territories of Dewas, Dhar and many other Minor States in Central India. The whole Malwa, for the purposes of sugar industry, may be called a huge forest

land of natural, wild, and spontaneous growth of date trees. It comprises also an area of numerously scattered *Adan* fields of good irrigation facilities where sugarcane is now being grown, and where it can be more widely and successfully grown with better methods and in more improved style. A very limited proportion of the irrigated and irrigable fields is now being utilized for sugar cane by the poor and extremely backward village cultivators of the Malwa country. The reasons for this sad state of things I will not stop to enquire and to discuss. But I have not the slightest hesitation to state that there is considerable room for the expansion of the sugar cane cultivation in the villages of Malwa. Years of scanty rainfall and of famines having depopulated and thinned the villages of the Indore and Gwalior states, the Durbars at Indore and Gwalior have announced their intention to grant concessions and advantages to induce new settlements of tenants from outside. I availed myself of the opportunity afforded; and selected the culturable wastes and the date forest lines in the villages of Morad and Gokhia in the Indore District, which are at distances of five and 10 miles respectively from Indore. This was in the year 1902. Before starting business, I represented to the Minister of the Indore State, Rai Bahadur Nanak Chand, C.I.E., the supreme necessity of importing a set of Bengal tappers to introduce their improved methods in the villages, and applied for the grant of the promised concessions as regards the date trees and the agricultural fields in their vicinity. The Durbar of the Indore State permitted me to take 10 tappers from Bengal at the State expense, and to purchase the requisite tools and plant for the manufacture of date *gur* and sugar. This I did in the winter of 1902-03; and I am glad to say, the results of my operations were declared to be very satisfactory and hopeful for the further expansion of the industry in the State. In order to enable me to continue my business of sugar manufacture in conjunction with agriculture, the Council of Regency of the Indore State granted me the

privilege of free use of the date trees five years from 1904, and reduced rates of the rental of all the available fields in the villages, rising by slow degrees to the standard assessment rates in the course of the said five years. There are about 8,000 date trees in the two villages named above, besides numberless date plants along the lines. The trees stand in thick clusters and in well defined rows on the borders of agricultural lands of dry and wet cultivation. But they preponderate chiefly along the banks of the numerous *Nallas* and water courses that exist all over the Malwa country. Roughly speaking, we may fairly assume that there are about 3,000 to 4,000 date trees within the limits of a single village in the majority of villages in Central India and in the date growing Districts in the Central Provinces: and in every date forest village there are fertile lands to raise all varieties of valuable crops for which Central India and the Central Provinces are famous. Thus there exist unique opportunities for agriculture, and coupled with it, the cognate industry of manufacturing sugar from date as well as cane throughout the length and breadth of Central India. It is, I am sure, hard to find a similar combination of facilities and advantages in any other part of India. It may be here pointed out that the industry of manufacture of sugar only, from date or cane or both, cannot possibly stand alone. It must be coupled with and be made a subsidiary adjunct to agriculture. The sugar-making industry is of the winter season only. The men engaged therein must find employment for the rest of the year and agriculture is undoubtedly the most profitable employment. This is the prevailing and normal condition of things in all the date and cane sugar producing Districts in Bengal. No departure therefrom is possible or advisable.

5. Here it is necessary to draw a tentative scheme of a project for agriculture with the industry of manufacture of sugar from date as well as cane, taking one village in Central India as a unit for consideration, and setting forth, *inter alia*, the following important particulars:—

I—Description of the date jungles of Malwa and of the Central provinces, their extent, and the number of trees ; how the trees are grouped, the nature of the soil on which they grow ; rent of the land for agriculture and of the date forest land ; and the climatic conditions of the provinces.

II—What are the initial difficulties for tapping the date trees and how they can be met.

III—To show that the only sound way to undertake the business is to start general agricultural farms, where—

- (a) the local crops, such as wheat, grain, opium, cotton, &c., will be grown ;
- (b) sugarcane will be largely cultivated ; and,
- (c) a large sugar industry, both date and cane, will be undertaken in the winter.

IV—Nature of the date juice of the Central Provinces and Central India as compared with that of Bengal, both as to quality and quantity.

V—Available local markets and labour. And,

VI—The resultant profits that can reasonably be expected from the whole business.

To consider the above points serially and in a concrete manner, I will take Morad, the seat of any own farm, as the model, which in many respects it is, to represent the condition of things that exists in thousands of villages in the Central Provinces and Central India. I have there about a dozen plots of land of black sticky *cotton soil*, as the soil of Malwa is ordinarily called, each measuring from about six to 10 *bighas*. I do not speak of similar fields that belong to the other tenants of the village. On all sides of most of these fields there are clusters of grown-up and growing date trees, in straight lines, and at convenient workable distances of from six to nine feet apart from one another. It would appear as if they have been planted with a design to enable the cultivators to follow agriculture for the whole year. and to avail of the slack agricultural season of winter to make date sugar. To facilitate irrigation there are about a dozen good wells of which

four are mine. The level of water in the wells ranges from eight to 20 feet below the surface of land; so that lifting water by the country *Mote* or pump is a tolerably easy and inexpensive work. Over the area of about one acre of land on all sides of the well you can, as I have been doing, raise wheat, opium, potatoes, onions, brinjals, cane, &c.,—reserving the remainder of your farm for the rain crops, *i.e.* jowari, bajri, cotton and pulses. Around each of the fields of wet and dry cultivation, there are, on an average, about 400 date trees sufficient to engage two *tappers* and two *khedis* to assist them. These *kedis* acquire the skill in about two or three seasons. The nature of the land of the date tree lines is the same as that of the adjoining fields, that is, culturable and fertile. But the clustering date trees, young and old, render ploughing hard. It needs hoeing-up by hand, and weeding in the rainy season to foster the growth of the date trees, and to increase their yield of juice. Besides the date trees guarding, as it were, the borders of tenants holdings, wide and thick date forest lines run along the natural water courses, which traversing village after village present the sight of interminable avenues of date trees which are yet untouched by human hand. I have got all my date trees in Morad rent free for five years, as said above. They are about 6,000 in number. But the average rent charge of all kinds of forest land in the villages of the Native States in Central India is very low. It ranges from four annas to eight annas per *bigha*. In the date forests, that means an insignificant trifle for about 200 or 250 date trees that certainly stand over one *bigha* of land. Public health in the whole Malwa country and of the Central Provinces is almost uniformly good.

6. Regarding the initial difficulty of lack of trained men locally, the farmer must for the first two years import about five Bengal tappers and associate with them his local labourers to work as *khedis* or their assistants. My own experience is that the cost of one skilled Jessore tapper for one season, including his railway fare for the forward and backward journeys, and his

wages at the rate of Rs. 15 per month, is about Rs. 100. Thus for five men for two consecutive seasons, an outlay of Rs. 1,000 for importing the Bengali's knowledge of tapping is a part of the necessary sinking capital. One *khedi* for each Bengal *gachi* will not cost more than Rs. 25 for the five months of the tapping season. Rupees 25 per month for the five local *khedis* or Rs. 125 for the season, being added to the cost of five Bengal tappers, the total cost of labour would be about Rs. 625. To this would be added the expenses for pots, ropes, pans, and fuel which would not be less than Rs. 75 in all. I will provide Rs. 100 more to meet all possible contingencies and unforeseen charges. Against this initial cost or debit of Rs. 800 for the first starting year, no one should expect that his produce of *gur* would bring to him an equal credit amount. As a certain amount of labour would be wasted in clearing the date trees, the five *sheolies* and their *khedis* would not be able to operate on the prescribed number of date trees which is at the rate of about 200 trees for one tapper and *khedi*. In the first year only about half the number of the trees would be tapped; and even those trees would not, on their first tapping, yield the proper quantity of juice. Like milch cows, date trees are in need of being annually tapped to bring them, so to speak, to their sap-bearing condition. So, as I have personally seen, the aforesaid batch of workers would not turn out at the rate of more than eight annas worth of *gur* from each tree. That is to say, the first year's income from date *gur* would be only about Rs. 250 for an expenditure of Rs. 800, as said above. In the second year, while the expenditure would nearly be the same, the income would slightly increase, because about 200 or 300 more trees would be reclaimed from the wildness and utilized for the purpose of the industry. But from the third year, the costly item of Bengal labour would be, as it certainly should be, dispensed with and the farmer scores out the sum of Rs. 500 from the debit side of his budget of date sugar expenses. But by this time, his local *khedis* will have become



skilled workmen; and for this additional accomplishment they would charge Rs. 10 a month for the five months of the tapping season. Thus in successive years, the nestling *the-dis* grow to become full-fledged *gachis*, batch after batch, till it becomes possible to sieze all the circles of the date trees that stand within the limits of the farm. Later on, I will set out the prospects of gain, taking agriculture and sugar manufacture from date and cane within the compass of the village industries under consideration, *managed solely by the local agencies.*

7. Reverting again to our model village, Moard, we have, to arrange for the cultivation of our fields, grow all the usual crops thereon, reserving every year certain areas near the wells for the cultivation of sugar cane. But in Morad or elsewhere, in any any village of any district in Central India or in the Central Provinces it is neither possible nor desirable to secure all the irrigation wells and all the available agricultural lands for the exclusive use or home farm of a single person or a group of men working jointly. It should be the constant aim of the enterprising farmaer to foster and improve the agriculture of the village, retaining for himself a certain number of demonstration plots to raise sugar-cane and other crops in improved style, making advance to the poor tenant to grow sugar-cane as largely as possible, and training his own other labourers of the village how to tap the date trees and extract the sweet juice. At the rate, say of 200 trees for a tapper, it will never be possible to entertain 30 or 40 labourers for working in the fields of a single village farmer. You cannot possibly expect to supplant the old resident cultivators in the villages and appropriate all their fields. The wisest and best courses for you to follow would be to purchase potfuls of date juice drawn from the trees growing on or near other's fields. Give me any amount of sweet juice, of cane or of a date, and I shall not delay one moment to set up some kind of improved machinery to produce *gur* or to manufacture sugar in the country. It is not

in the power of any single cultivator or of any group of cultivators,—for they hardly know to combine to work for common advantage, to purchase mechanical contrivances of any sort for *gur* or sugar making in improved style. Whether you take the apparatus contrived by Mr. S. M. Hadi, Assistant Director of Agriculture in the United Provinces, which is set down as one of the important items for demonstration at the present Exhibition, as it was last year at Benares; or whether you adopt the “central factory system” which the leading engineering firm at Calcutta, Messrs Martin & Co., have now taken to introduce in this country to give an impetus to the Indian sugar industry, you must make the poor and illiterate ryots of the country the means to an end; and you must so manage your farm as to make it handy and easily accessible to the neighbouring agriculturists. Mr. A. E. Jordan, the well-known sugar expert and mechanic, has recently joined Messrs. Martin & Co., expressly for the purpose of designing sugar machinery to refine sugar and make sugar in crystals from juice under the “central factory system.” Mr. Jordan is said to have designed an apparatus for a more successful crushing of cane than what obtains in India, and for a better and more scientific process of boiling and treating the juice to secure as much economy and profit, as in the West Indies, Egypt and Mauritius. Mr. Jordan has personal knowledge and experience of the factories of those places which have enabled the people over there to land in this country pure crystal sugar at a cheaper rate than the cost of our country *gur*. The cost of Mr. Jordan's apparatus, made by Messrs. Martin & Co., is likely to be about Rs. 18,000 which will turn out pure white sugar at the rate of nearly two tons a day. That means the daily supply of over two tons of raw cane, or nearly 12 tons of cane juice, or nearly 20 tons of Bengal date juice, or nearly 15½ tons of date juice of the Central Provinces and Central India. How to obtain such a large supply of juice every day throughout the winter season is the most important question connected with the subject of sugar industry in India.

The anwar is, we must follow the method adopted in other sugar producing countries in the world, as explained elsewhere in this paper. I come before you with full knowledge of the local conditions of the Central Provinces and Central India, where I have lived almost the whole of my life, and know no other Province in India where you have so many facilities to develop and to expand sugar industry with agriculture as in Central India. Therefore, my advice to my countrymen is this :—

1. Go and settle in a date forest village in the Indore, Bagli, Dewas, Gwalior, or Jaora State. Apply for land for agriculture and you will have as much as you would require or be able to manage. You will, I am sure, be granted free use of date trees for a number of years till you well settle in business.

2. You will find local labourers at the rate of Rs. 60 a year, and bullocks of the excellent Malwa breed at the rate of Rs. 100 a pair. Go on at the same time purchasing Malwa cows and calves at the rates of Rs. 30, Rs. 40, Rs. 50 per pair. Look after them and tend them properly; and you will have a large stock of cattle for your own use and for the use of other tenants.

3. Retain as much land and cattle, date trees, &c., as you require for the full year's crops including sugar-cane, and date juice from your own date trees.

4. Within the limits of your means and resources, advance money, cattle, seed, and improved agricultural implements to the neighbouring cultivators on easy terms of interest, in cash or in kind; and then you will not run the risk of loss. Offer inducements and facilities to the tenants, their labourers, and their children to learn the art of tapping the date trees that appertain to their holdings, and offer to purchase the date juice they would extract every winter, which, while bringing you profit, after being treated in your central sugar factory, will bring to your neighbours a new source of income. Lend money or your well grown-sugar-cane to extend the cultivation

of cane far and wide under the usual conditions of purchase at the current local rate for the time being.

5. All the above you can not do in a day or in the first year of your operations. You will have to make an honest and sincere beginning at the start, relying on your own means. If you are earnest and steady, and make some progress, you will obtain on easy terms loans from the State concerned, and then you will be able to advance loans yourself in cash or in kind, to other cultivators.

6. Having arrived at this stage of your business, you will find that, while your own agriculture is in full swing, you have paved the way for the supply of date juice and of sugar-cane suited to the requirements of your central factory. Here you must remember that the ordinary country crusher of the best type, or the Behia iron mills extract only about 60 per cent. of the cane juice. So that loss or wastage of 40 per cent. is ruinous for the business of sugar-making. I have heard that the triple crushing system of Mr. Jordan's design secures 90 per cent. extraction of juice, and the crushed cane is readily available as fuel for boiling.

7. For all varieties of your crops, for your manufactured *gur* and sugar, the head-quarters of every Native State,—Indore, Mhow, Neemuch, Gwalior, Bhopal, Jaorah, Rutlam, &c., afford most convenient and ready markets, as grain of every sort sells at rates which are almost uniform all over India. Locally made *gur* sells at the rate of Rs. 5 to Rs. 7 per *maund*, and sugar from Rs. 9 to Rs. 12 per *maund*,

8. I will not enlarge on the subject by stating in detail the prospects in gain of the whole concern of agriculture coupled with the industry of manufacture of sugar from cane and date. Confining my attention to the business of making *gur* and sugar alone, I will briefly state my own experiences of the last eight years, thus :—

(1) One trained tapper with the aid of an assistant can

turn out not less than 20 *maunds* of date *gur* in one season from his circle of about 200 date trees. A locally trained tapper in the Central Provinces and Central India is glad to get Rs. 10 a month. His assistant would be happy if he is paid Rs. 6 per month during the winter season. Date *gur* sells in those Provinces at the rate of Rs. 5 per *maund*. The total expense comes to about Rs. 80 for *gur* worth Rs. 100, leaving a profit of 25 per cent.

(ii) I have raised one *bigha* of sugar-cane at an expense of nearly Rs. 100; *i.e.*, Rs. 45 for cane cuttings, Rs. 5 for rent, and about Rs. 50 for all other items. For *gur* making or chewing purposes, the cane produced is well worth Rs. 150, bringing 50 per cent profit on the outlay. Well cultivated, one *bigha* would grow about 1,200 stalks of more than human height of sugar-cane. At the rate of one pice for one piece, the whole crop is worth Rs. 150 *on the field*. I have seen by detailed calculations and observation that one date tree yields every winter as much juice as can be extracted from about 90 well grown canes. But the difference is that the date trees in the wild forests of Central India are Nature's plantations; whereas the cane fields are the growth of one year's hard labour and expense. In point of saccharine properties, the date juice of the Central Provinces and Central India makes the nearest possible approach to the ordinary cane juice. Hence both kinds of juice can be treated together. The Bengal date juice is nearly half as sweet as the cane juice.

9. In the above paragraph, I have taken a group of 200 date trees and one *bigha* of cane field as the units to indicate the prospects of gain from sugar industry alone in one agricultural farm in the Central Provinces and Central India, of which hundreds can be established if our countrymen wake up and work.

## Indian Essential Oils.

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IN introducing to the Indian Industrial Conference the subject of perfumes one is struck by the fact that so little has been previously written on the subject. India as an Eastern and tropical country is renowned all the world over for its odiferous spices and perfumed blossoms, the essences of which have been extracted by recondite methods for ages past. The sources, uses and preparation of these ancient drugs is a highly interesting historic study and would be out of place to discuss here. I referred to this aspect of the subject about two years ago in an article on 'The Perfumes of the Moghuls' (*Calcutta Review*, Oct., 1904). On the present occasion, it will be my aim to indicate the geographical and botanical sources of the chief commercial essential oils, review the present condition of the trade, and make a few practical suggestions in passing on the future possibilities of the industry.

Essential oils are distinguished by their strong and characteristic odours, and by being evaporated without decomposition and with little or no residue. The composition of essential oils is variable; many like turpentine oil consist of carbon and hydrogen only, others contain oxygen in addition. Their chemical constitution also differs in different cases, the majority being ethereal salts or compound ethers, aldehydes or phenols. Many essential oils consist of hydrocarbons or fluid bodies, mixed with solid oxidised compounds. When the latter are present in considerable amount, a portion usually separates out in a crystalline form. In such cases the solid is often referred to as the *stearoptene* and the liquid is called *elæoptene*. The essential oils are almost all of vegetable origin and exist in the flowers (as the rose), in the leaves (as the basil), in the rind of fruit (as the orange), and the fruits of the umbelliferæ (as the anise and ajwain).

The extraction of the oils is performed by the following methods, but in India the first only is that in general use.

1. Distillation of plants or parts of plants by boiling with water and condensing the steam. Notwithstanding that nearly all essential oils boil at a higher temperature than water, their vapours escape with the vapour of water and collect in the distillate, where they separate. Another modification of this method is to employ steam instead of a naked fire, this prevents the caking and burning of the solid matter at the bottom of the still.

2. The process of the sponge and the ecuelle. In the case of fruits of the orange tribe, in which the oil glands are large and numerous, a portion of the essence can be extracted without distillation. For this purpose either a sponge, or a vessel like a cup with sharp points inside is used for separating the oil from the peel.

3. Expression. In a few cases (orange, lemon, &c.) a part of the essential oil may be obtained by submitting the material to pressure.

4. Maceration in fat. This is to avoid as much as possible the application of heat. The flowers are macerated in vegetable tallow or paraffin, previously melted on a water-bath. The fat, charged with the essence, is afterwards shaken up with alcohol, which removes the perfume. This process is used in Baroda.

5. Enflourage or absorption is another process having the same object. Here layers of fat on glass frames are covered with flowers, and the flowers changed each day until the fat is sufficiently impregnated with the perfume.

For the purpose of illustrating the trade in Indian essential oils, I have prepared a diagram showing the value of the exports for the past twenty-seven years. In 1879, the exports were valued at Rs. 1,20,439; they rose in 1902-3 to Rs. 7,70,872, and have remained at a high figure since then. On consulting the table it will be seen that there are two serious deperions, one occurring in 1896-97 and the other in

1900-01. It will be remembered that these periods coincided with two disastrous famines which were particularly felt in the Central Provinces, the region of the grass oil industry. The famine of 1896-97 affected the Khandesh district and naturally resulted in short supplies of the oil. In 1899-1900, the famine of the Central Provinces was worse in the Western Provinces of Nimar and Betul. In Nimar, the death-rate reached the melancholy height of 105 per mille. The exceptional drought decimated the plants just at the season of distillation, and for some months that year, the Bombay dealers received no stocks. This scarcity not only affected the trade in India but also caused great inconvenience in the European markets; the price had to be raised, and the door was opened to smaller dealers to resort to adulteration. The monsoon that burst in July, immediately after the famine, was very heavy, and the young grass suffered in consequence, but in 1901 and 1902, the industry recovered itself, as will be shown in the table. In studying the essential oil industry in India, where the occupation is chiefly in the open air, one has thus to reckon with drought, floods, frost and other adverse climatic conditions which in certain seasons give the the trade a 'set-back.'

After these general remarks on the Indian trade as a whole, I propose to refer to the various perfume plants which afford commercial oils and specify a few others which might be rendered to some account as trade articles in the future.

One of the most important essential oils in this country is East India geranium or palma rosa oil. It is known in the vernacular as *rusa-ka-tel*, and is referred to in ancient works on perfumes and medicines. The oil is obtained from a grass—*Andropogon Schoenanthus*—now *Cymbopogon Martini* or rusa grass,—which is widely distributed in India. This grass is abundant in the North-east of the Bombay Presidency, in Malwa, Merwara and Rajputana in Central India and in the Central Provinces and Berar. The art of distilling the essential oil from the grass was probably commenced in Khandesh in the 18th century when this



district was in a flourishing condition under its Muhammadan rulers. The original seat of the industry appears to have been at Pimpalnur, but as the oil became in greater request, the manufacture spread to Nandubar, Shahada and Taloda. The Nimar district in the Central Provinces has always been an important centre, so much so that the oil was for many years known commercially as 'Nimar Oil.' It was first brought to the notice of Europeans by Dr. Maxwell in 1825, and Mr. J. Forsyth, in 1827, was the first to make an inquiry into the industry. He found the grass in patches in the jungles throughout Nimar and the Nerbudda Valley, but in greater abundance along the foot of the Vindhyan range in the vicinity of Jaunghat, and 30 miles further west, on the table-land near Nalcha. The plant commences to flower at the end of August and continues to flower vigorously to October and November, and during this time, it gives sufficient oil to cover the expenses of the preparation. The distillation was conducted eighty years ago according to the same methods in use at the present day. The grass is boiled with water in wrought iron stills fitted over an earthen fireplace. From the still-head two straight tubes, from 5 to 6 feet long, conduct the vapours into two copper receivers immersed in cold water. The process occupies about six hours, and as four boilings are made in the 24 hours, a seer of oil can be obtained in that time. One of these still will produce one and a half maunds or 80 quarts of oil during the season. We have no computation of the number of stills employed at the present time, but in 1879-80 there were 197 stills producing 71 cwts. of oil in West Khandesh and 100 of these were in Nandurbar alone.

Within the last few years, there has been a considerable expansion of the industry in the Central Provinces and Berar. In the Forest Administration Report for 1896-97, the distillation was observed to be extending in Nimar district, and was carried on also in Hoshangabad, Betul, Mandla and Seoni. The forest revenue from the grass became an important consideration; in 1901-02, in the Betul district, the

receipts from leasing rusa grass *birs* went up from Rs. 1,325 to Rs. 7,332. Lately, other districts have shown a revenue of over Rs. 10,000 per annum for leasing rusa grass lands.

In Berar, the distillation is carried on in Ellichpur, Amraoti, Buldana, Basim and Wun. Jamod in Akola has been said to be celebrated for the industry. The oil prepared in various localities in Berar is brought to the chief market at Ellichpur town, where it is brought up by dealers and exported to Bombay at Rs. 2 to Rs. 4 per pound according to quality. The grass is everywhere very abundant, and the distillation requires only a moderate amount of skill and a small initial capital. The manufacturer is therefore well recompensed for his labour, which is shown by the late increase in outturn and proved by experiments made by the Forest Department in 1902-03.

There are two kinds of rusa grass oil obtained in the Central Provinces, one of a fine delicate odour and yellow colour called "Motia," and the other darker and more pungent called "Sophia." Ordinary rusa oil has for its principal constituent an alcohol boiling at  $232^{\circ}$ , named geraniol. The amount of this constituent varies from 76 to 93 per cent. Rusa oil is soluble in 3 or more parts of 70 per cent. alcohol. It was formerly adulterated with ground-nut oil, but as this could be readily detected, it was afterwards adulterated with kerosine and turpentine oil. The dealers have lately giving up the suicidal policy of sophistication, and export the oil as it comes from the distillers. A very simple test for this and all other essential oils is to place a drop or two on a piece of white blotting paper and heat it. If volatile oils are present, no stain will be left; but in the case of fixed oils, like ground nut or castor, there will be a greasy stain. The only satisfactory method of testing an essential oil is to ascertain the boiling point, and to separate the constituents by fractional distillation, and separation of its alcohol by potassium sulphite, and other chemical methods.

Rusa grass oil was formerly designated Turkish geranium

oil in the time when the oil entered the European market by way of Constantinople, where it was used on a large scale for mixing with otto of roses. It is used by the Arabs and Turks in making hair oil, but it is most extensively employed in soap manufacture and perfumery.

*Exports of Essential Oils (chiefly Rusa-grass oil)  
from Bombay.*

	gallons.	Rs.
1896-97	8,199	1,49,553
1897-98	10,776	2,09,691
1898-99	16,000	4,04,140
1899-1900	10,400	2,71,005
1900-01	12,834	3,44,670
1901-02	19,641	6,10,783
1902-03	18,872	5,23,630
1903-04	20,680	5,38,774
1904-05	18,742	4,65,209
1905-06	23,436	5,51,425

These figures reveal a five-fold increase during the past forty years, for in 1866-67 we find that 41,643 lbs. (4,627 gals.) were shipped from Bombay to England and ports of the Red Sea. About ten years ago, Egypt, the United Kingdom and Turkey in Europe were the principal consumers; at the present time, while Egypt is still absorbing one-third of the exports, Germany and France have become important buyers.

In former years, as we have shown, East Indian geranium oil always varied in composition and properties, it appeared to be made from a mixture of grasses, and it was often adulterated with other oily products. Within recent years, the situation has changed, and an excellent oil at moderate prices is in the market. It has acquired a distinct reputation in the perfumery industry and is considered a good material for scenting soaps.

From a commercial point of view, a critical stage has been reached. The production of the oil has grown in an unpre-

cedented manner and large parcels of good and medium oil are being regularly thrown on the market. The price last year had never before reached such a low quotation and large supplies this year are threatening still further to depress its value. In consequence of these favourable conditions to purchasers on the Continent, the manufacture of geraniol on a large scale has been taken up and this added to its cheapness will cause other outlets to be invented for its use as a natural or artificial perfume.

Besides Indian, Europe receives fair quantities of geranium oil from Algeria and Reunion, and the Spanish oil in point of quality is not approached by any other kind. The production in Algeria is estimated at 270 cwt., and at least 1,250 acres of the geranium plant (*Pelargonium*) are under cultivation. From Reunion the average exports of oil have been 250 cwts. Notwithstanding this competition, India in the matter of quantity is far in advance of any other country in the production of this perfume.

Lemon-grass oil is another grass oil derived from a species of, *Andropogon*, usually referred to as *Acitratus*, but now called *Cymbopogon Citratus*. Although allied to rusa grass oil in its botanical origin, it is totally distinct in its chemical composition. Lemon grass oil, as its name signifies, has a lemon-like odour and taste. It is a yellowish or reddish liquid of sp. gr. 0.899 to 0.903. It is readily soluble in 2 pts. of alcohol of 70 per cent. The chief constituent is an aldehyde, citral, boiling at 228°, which occurs in the oil to the extent of 70 to 75 per cent. Citral is also found in lemon peel, the leaves of the true verbena of Spain and in other lemon-smelling plants.

Lemon grass oil is prepared in Southern India, and the industry is more modern than that of rusa oil. I can find no earlier record than its importation into England in 1832. For many years it has been prepared on the western slopes of Travancore north of Anjengo as far as Cochin, where the grass can be obtained sufficiently green and fresh for about

six months in the year. In this region, the Malayalis distil the grass in copper stills with an earthen dome, and the condenser consists of a copper tube passing through a tall wooden bucket. Each boiling yields a quart of oil, worth about Rs. 3 in the bazar. In the eastern part of the Travancore State, the Tamils use a round copper boiler, contracted into a neck at the top and about four feet high. The top is covered with a specially prepared earthen vessel which communicates with a copper tube about three inches in diameter which passes through a condenser filled with cold water to a receiving vessel. When the still is charged with grass, all the joints are made air-tight by luting with rags and clay. Distillation is continued for twenty-four hours when about a pint of oil is obtained. The stills are moved about from place to place according to the abundance of the grass, and in the cold weather may be seen dotted over the landscape. In February, the grass becomes coarse and is burnt. The industry and the profits were formerly in the hands of natives, and operations were carried on with grass growing wild in the jungles. Gradually the wild grass of the two States of Travancore and Cochin was insufficient to supply the increasing demand for the oil from Europe. The distillers of Cochin then began to exploit Malabar, where the grass was not known to have any economic value. The owners of the land on account of the new use of the grass, enjoyed the benefit of seeing it rise to fourteen times its former value. Planters have commenced distillation in the Ernad and Walluvanad taluqs, in the Wynaad, and Venieri in Pudukuti. These hilly regions are covered entirely with lemon grass which is sold at a nominal sum, but the question of specially cultivating the grass for oil in suitable lands is now being considered. It has been said that the new industry will provide an outlet for the energies of the Moplahs whose fanaticism is so well known, and perhaps may be traced to the straitened circumstances of their existence. In 1903, there were eleven stills at work at Walavanad, most of them being controlled by Moplahs. The stills

used here are more modern in construction than those used in the south, and are made locally at a cost of between Rs. 200 and Rs. 300 each. The copper boiler is six feet high and twelve feet in circumference. From the head of the still a pipe conducts the steam through a condensing tub filled with cold water and the oil is collected into the vessels used as receivers. An ordinary grass-cutter is paid two annas a headload for the lemon grass, and sixteen of these bundles are sufficient to fill a boiler, which after distillation yield, one bottle of oil. The best oil before it is bottled is always filtered through paper. When Travancore held the monopoly of the industry, the oil was exported from Cochin, but now that the industry has extended northwards into Malabar, Calicut is becoming a centre of distribution. The oil has lately been prepared in Assam.

Lemon grass oil is exported in reputed quart bottles each of which is guaranteed to contain 23 ounces. One dozen of these bottles make a case. The exports from Cochin have risen from 228 cases in 1884 to 2,387 cases in 1889 and 1,917 cases in 1890. At the present time, from 2,000 to 3,000 cases are exported annually from Cochin to Bombay and to various foreign ports, chiefly New York, Hamburg and London.

The following are the exports of essential oils, chiefly lemon grass oil, from Madras during the past ten years :—

		gallons	Rs.
1896-97	...	5,324	79,081
1897-98	...	6,292	1,33,775
1898-99	...	4,278	89,745
1899-1900	...	6,280	1,29,701
1901-02	...	589	27,376
1902-03	...	6,258	2,42,319
1903-04	....	3,889	1,60,505
1904-05	...	2,721	1,41,489
1905-06	...	2,675	1,54,141

A large proportion of the oil is absorbed for the manufacture of citral, and ionone—an artificial violet perfume.

On this account within the last three years the price has quadrupled. These prices must have proved very favourable to the distillers and traders of the Western Coast, but on the other hand, fresh sources of supply have appeared, which may compete with the present monopoly. An export trade in the oil has recently developed in Java. It is also brought in small quantities from Singapore and Ceylon, and experimental batches have been sent from Tonkin, San Thome in Portuguese West Africa, Brazil, and Monserrat in the West Indies. Messrs. Schimmel & Co., certify that the Brazilian and West Indian oils are unable to compete with the East Indian oils on account of their insolubility in alcohol. The demand for lemon grass oil is steadily on the increase in England and the Continent; and all things being considered, there is a very successful future for its manufacture in India.

Citronella oil, although prepared chiefly in Ceylon, should be referred to in dealing with grass oils. This oil is distilled from *Andropogon Cymbopogon Nardus*, a grass cultivated on the slopes of the hills in the Southern Province of Ceylon, and according to statistics, as much as 40,300 to 50,000 acres are under cultivation. The first and principal harvesting period is in July and August, and the second lasts from December until February. The average yield is from 16 to 20 bottles of oil per acre for the summer and from 5 to 10 bottles for the winter season. The stills, of which there are 600, are modern, and the success of the natives, who constitute the majority of the producers, is remarkable. There has been an enormous increase in production and consumption of citronella oil in Ceylon, which is shown by the exports reaching, in 1899, one and a half million pounds in weight. Since that year exports have declined, and the price has fallen to 8d. per pound.

The oil contains citronellal and geraniol; it is occasionally adulterated with fatty oils, petroleum, resin spirit, acetone, and alcohol. It is much cheaper than lemon grass oil, and it is sometimes used for the purpose of adulterating the latter.

Leaving the grass oils which are the chief Indian essential oils that are exported in large quantities, we will consider some of the essences and perfumes which are made and used to a considerable extent in the country. Sandal wood is one of the most important perfumes in the East, as it is one of the most fashionable in the West, and is mainly derived from the province of Mysore where the trees are protected by the State. The annual auction sales of the wood from the roots and stems bring in an annual revenue of five or six lakhs of rupees. The wood is sold in grades varying from Rs. 500 per ton for selected logs to Rs. 85 per ton for mixed chips. The wood is purchased by Muhammadans in Bombay, whose agents attend the Mysore auctions, and is shipped to Europe *via* Tellicherry or Bombay.

The Mysore Government has long had establishments for extracting the oil which is sent to China and Arabia. The oil is procured from the wood by distillation, the roots yielding the largest quantity and finest quality. The yield of the oil is at the rate of 10 ozs. per maund or 2.5 per cent., and the process lasts several days. The average price of the oil in India is Rs. 8 per pound. Two or three private firms have also established stills, but the oil is said not to compare in properties with that made by European distillers. While it appears desirable from a commercial aspect to prepare the oil in the country that produces the raw material, the indigenous stills are not at present capable of dealing with large quantities. At the factory of Messrs. Schimmel & Co., Leipzig, special appliances are used for comminuting the wood, and their stills are constructed for producing daily four cwts. of oil, with an average yield of 3.3 per cent.

In 1902, it was reported from Mysore that the spike disease had appeared in the sandalwood plantations which was threatening the trees with destruction. The disease had first been observed in Coorg in 1900. There has naturally been an upward movement in the price of the oil, in spite of the large quantity of wood sold at the auctions, owing to the numbers



of trees cut down at Hunsur, Chickmagalur, Seringapatam and Coorg which showed traces of the disease. Unfortunately, no successful remedy has as yet been found for the disease; and the future does not look hopeful. A decline in supplies of sandal wood is predicted, as the young trees are particularly subject to the disease, and the growth of new plantations is not at present calculated to keep pace with the consumption.

These remarks on the ancient and favourite perfume of sandal wood oil will appropriately introduce the subject of attars or ottos, of which rose otto is the most important. In former Moghul times sandal oil was generally used as the basis in preparing all ottos. Col. Phillott, an authority in Persian and Urdu literature, has drawn my attention to an old work published in Lahore, describing the preparation of otto of roses. The copper alembic and condensing appliances are carefully detailed, the former is charged with rose petals and water, but before heat is applied a small quantity of sandal oil is to be placed in the receiver with the object of "drawing over" the rose essence. "Each time the otto is prepared sandal wood oil must be placed in the receiving vessel." The resulting essence was no doubt an agreeable perfume; but in modern times, it is more satisfactory to obtain the pure essential oil first, and then blend them in known proportions afterwards.

Rose water is manufactured in Bengal and the Panjab, but a large quantity is imported from Persia. For over two centuries rose water and otto have been made in Ghazipur on the banks of the Ganges from the damask rose (*Rosa damascena*). The oil distilled there is never pure, being adulterated with other oils. One hundred lbs. of rose leaves or one hundred thousand roses are estimated to produce three drachms or 180 grains of otto and 100 bottles of rose water. Rosewater to the extent of about 40,000 gallons annually is imported into Bombay from the Persian Gulf. Two qualities are met

with—Yak-atishi (once distilled) and Du-atishi (twice distilled). Its value is Rs. 4 to Rs. 4½ for a carboy of 20 lbs.

Turpentine oil—the essential oil distilled from the turpentine or oleo-resin of the Chil Pine (*Pinus longifolia*) is prepared by the Forest Department in Northern India. Factories are established at Dehra Dun, Naini Tal, and Nurpur in Kangra. These centres are capable of producing about 20,000 gallons of turpentine oil a year. The whole of this output is consumed in the country, being used in the Medical Stores, Military Department, by several railway companies, and by paint and varnish manufacturers. Samples of the oil have been sent to England and have been favourably reported upon by such eminent authorities as Professor Armstrong and Sir Boverton Redwood.

Eucalyptus or Blue gum oil is now an established industry on the Nilgiri Hills. The blue gum plantations were commenced about sixty years ago, and the wood has been used principally as fuel. About twenty years ago, oil was first distilled from the leaves in the Botanical Garden, Ootacamund. At the time of the influenza epidemic in 1891, the manufacture was taken up by Mr. Wallace, and the oil was readily bought locally and by the Medical Stores depot in Madras. Lately other stills have been erected at Lovedale and Coonoor and the produce finds an appreciative market.

Camphor is a concrete essential oil largely used in India, and in recent years, a great deal has been written regarding the cultivation of the trees in India and Ceylon. It is well known that the camphor of commerce is largely manufactured in Central China, Formosa and Japan, and is one of those articles subject to monopoly and consequently to advancing values. It has been considered a suitable tree for cultivation in this country, but the prospect of waiting fifty to a hundred years for trees to reach a mature enough condition to yield camphor has deterred many from speculating in the enterprise. It has also been suggested that camphor might be made from the leaves of comparatively young trees, but, as I pointed out

ten years ago, there is a small yield of oil in the leaves and the amount of camphor is very variable. Experiments must be made in this direction on a larger scale before definite opinions can be expressed.

Ajwain or ajowan (the seeds of *Carum copticum*) is largely used in medicine, and the oil and water are prepared nearly all over India. The *ark* or distilled water, called *omum* water in South India, is a favourite domestic remedy replacing the well-known 'dill water' of Europe. The oil by spontaneous evaporation at a low temperature yields a crystalline substance or stearoptene known under the name of *Ajowan ke phul*. This substance is identical with thymol, contained in the Western herb, *Thymus vulgaris*. Crude thymol manufactured in Central India has an average value of Rs. 8 per lb. There are other plants of the umbelliferous order, the fruits of which might be conveniently distilled and the oil exported.

Winter-green oil is largely consumed in America on account of its aromatic and medicinal properties. Its special value resides in the fact that it consists chemically of a compound of salicylic acid, and is a strong antiseptic. One or two drops placed in a bottle of ink or gum used on the office table will prevent the formation of mould. An Indian Water-green (*Gaultheria fragrantissima*) grows on the Nilgiris and other mountains in Southern India and its essential oil is easily prepared by using an ordinary copper still.

Dipterocarpus oil (Gurjan balsam or wood oil) is obtained from various species of *Dipterocarpus* growing in Assam and Burma. The balsam or oleo resin consists of a resin acid, gurgunic acid, and an essential oil. The oil is becoming more and more important for the trade owing to its industrial and medicinal applications.

I would now enumerate a few indigenous perfumes which are often asked for by English and Continental dealers. These relate specially to delicate scents which of necessity must be made from fresh flowers and plants, since the raw articles rapidly deteriorate. The preparation of these oils is thrown

out as a suggestion to those who have a small capital and who would be sufficiently enterprising to make experiments.

The essence of Champaca or Champa from the flowers of *Michelia Champaca* is always wanted in perfumery. The small supplies in Europe of this oil are continually being exhausted. The blossoms must be gathered singly just as they expand and must be distilled at once or submitted to the process of enflourage. No way has yet been devised of otherwise preserving them from rapid decay. Where these trees occur in any abundance, a profitable harvest of the aromatic principle could be easily obtained.

Keora essence is another perfume much sought after by European distillers. The flowers have a most delicate scent, but samples of oil placed on the market are usually obtained by steeping the blossoms in sesame oil which destroys all the honeylike characters of the true odour. The keora, known by the English name of Screw pine and by botanists as *Pandanus odoratissimus* (*P. fasciculatus*, Lam.), is a native of India, Persia, and Arabia, and occurs frequently along the Western Coast.

Cassie flowers obtained from *Acacia Farnesiana* yield an excellent perfume for which there is always a demand. The oil consists of a methyl ester of salicylic acid. The tree is wild in most parts of Bengal and the Punjab, and the yellow flower heads perfume the atmosphere very pleasantly. When the plants are cultivated, a tree yields 2 lbs. of flowers valued at three or four pence a pound; an acre thus realising £30 to £40.

At Cannes in the South of France cassie pomade is made by the process of infusion. This consists in infusing the substance in a mixture of lard and beef fat in a water-bath. Two pounds of the flowers are immersed entire in one pound of fat; after immersion in the fatty menstruum for the requisite period the mixture is strained off and the residue pressed. The pomade is preserved in large metal vessels. In India, the animal fat may be substituted by petroleum wax or the con-

crete oil of *Vateria indica*, the Piney tallow of Malabar, or kokam butter—the natural fat of the seeds of *Garcinia indica*.

About fifteen years ago, a large consignment of Indian made cassie pomade was shipped to London and was found to be superior to that grown at Grasse in France. This opinion was confirmed by the eminent firm of Messrs. Schimmel & Co. It is to be regretted that this promising trade was abandoned owing to the death of the gentleman who made this perfume in Naini Tal, but it is hoped that this reference to the excellence of Indian cassie pomade will resuscitate its manufacture.

Patchouli oil is an absolute necessity for perfumery. The true patchouli is prepared from a labiate plant, the *Pogostemon Patchouli*, a native of Malaya and Indo-China. But there are various species of *Pogostemon* in Western India which are marked by their strong perfume and would doubtless yield essential oils, if submitted to distillation.

The following list of raw materials for the manufacture of perfumes in India might be added to the more important ones I have been considering:—

- Meşua ferrea, flowers. Nagkesur.
- Ochrocarpus longifolius, flowers. Lal-nagkesur.
- Ruta graveolens, herb. Rue, Sudáb.
- Zanthoxylum sp., fruits. Pepper flower.
- Toddalia aculeata, leaves. Milakaranai.
- Murraya Koenigii, leaves. Curry leaf tree.
- Citrus sp. Fruits and leaves. Oranges and lemons.
- Ægle Marmelos, leaves. Bél.
- Feronia elephantum, leaves. Wood apple.
- Hardwickia pinnata, oleo-resin. Yenne.
- Prunus armeniaca, seeds. Kubani.
- Prunus insititia seeds. Alu-bokhara.
- Altingia excelsa, balsam. Nantayok.
- Myrtus communis, leaves and fruit. Myrtle.
- Carum carui, fruits. Sujah-jira, caraway.
- Foeniculum vulgäre, fruits. Fennel.
- Pucecedanum graveolens, fruits. Diñ.

- Aralia Pseudo-ginseng*, root. Indian Ginseng.  
*Nardostachys Jataamansi*, root. Spikenard.  
*Blumea balsamifera*, plant. Ngai.  
*Sphæranthus indicus*, flowers. Mundi.  
*Achillea Millefolium*, plant. Biranjasit.  
*Spilanthes Acmella*, flower heads. Pipulka.  
*Artemisia vulgaris*, herb. Wormwood.  
*Saussurea Lappa*, root. Kut-Pachak.  
*Mimusops Elengi*, flowers. Maulsiri.  
*Nyctanthes arbor-tristis*, flowers. Night Jasmine.  
*Jasminum grandiflorum*, flowers. Jasmine.  
*Plumeria acutifolia*, flowers. Khair-champa.  
*Ipomœa sinuata*, leaves. Noyeau plant.  
*Vitex Negundo*, leaves. Nisinda.  
*Vitex trifolia*, leaves.  
*Ocimum basilicum*, herb. Sweet basil.  
*Ocimum sanctum*, herb. Holy basil.  
*Ocimum gratissimum*, herb. Ram-tulsi.  
*Lavandula stœchas*, herb. Arabian lavender.  
*Mentha sylvestris*, herb. Wild mint  
*Origanum marjorana*, herb. Marwa, marjoram.  
*Thymus serpyllum*, herb. Wild Thyme, masho.  
*Piper Betle*, leaves. Pan.  
*Cinnamomum* sp, bark and leaves. Indian cinnamon.  
*Listæa polyalthia*, leaves.  
*Aquilaria Agallocha*, wood. Agar, eagle wood.  
*Salix Caprea*, flowers. Bedmishk.  
*Juniperus communis*, fruit. Juniper berries.  
*Cedrus libani*, wood, oleo-resin. Deodar.  
*Kæmpferia Galanga*, tubers. Chandra mula.  
*Hedychium spicatum*, tubers. Kapur-Kachri.  
*Alpinia Galanga*, root. Greater galangal.  
*Homalomena aromatica*, root. Gondo mati.  
*Acorus-Calamus*, root and leaves. Sweet flag.  
*Nigella sativa*, seeds. Black Cummin.  
*Abelmoschus moschiferus*, seeds. Ambrette.

## Essential Oils.

BY J. N. BANERJEE, Esq., CALCUTTA.

IN some parts of Bengal, there are various kinds of grass which grows luxuriantly from which we can easily extract the essence of Lemon and Peppermint, at a trifle cost. It has a strong lemon and peppermint-like odour which does not usually fade even when cut or dried.

Put the same grass in an earthen pot, half filled with water and close the mouth with a well fitting cover securely fixed with flour paste. Let this cover have a central hole in which is placed a pipe of the shape of an inverted tobacco pipe, and similarly fixed. The whole apparatus is then placed on an oven, and at the end of the pipe is held a glass flask, immersed in a tube full of cold water. The hot water vapour and with it the otto or essence of the grass comes over and is condensed in the flask. At the end, you find drops of a very fragrant oily substance floating on the surface of the water in the flask. These drops should be separated by a piece of new blotting paper. This is, I believe, the lemon-otto or essence, as well as peppermint too, sold in the bazar. When this otto is dissolved in ether or alcohol, the essence is prepared. The water left in the flask will have a very pleasant smell and, I think, might be sold as lemon or peppermint water, for it is in no way inferior to rose water in its scent and refreshing qualities.

I can arrange myself to supply those gentlemen, who intend to cultivate lemon or peppermint grass, with seeds at a very nominal price.

The plain and simple apparatus described above and almost entirely made of earth, and therefore quite inexpensive, is a worthy substitute for the rather costly metal distilling apparatus of the market and can be easily obtained by giving orders to a potter and used with success. Instead of the glass flask, a long-necked pitcher might be used.

## Chrome Tanning.

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HIDES and skins, either in their raw condition or lightly tanned, form important items in the export trade of India. Fluctuating from year to year and dependent to some extent upon the character of the season, they have for some years past averaged about 9 crores of rupees in value, but last year, stimulated by the high prices obtainable in Europe and America, the value of the trade rose to nearly 14 crores of rupees and in the list of Indian exports, arranged in the order of their importance, they have now reached the fourth place. The great bulk of the trade is done in the raw material and mainly from the three Presidency ports of Calcutta, Bombay and Madras. The Calcutta trade is entirely in raw hides and skins, the Bombay trade includes a considerable percentage of tanned hides and skins, whilst in Madras, only tanned hides are exported and in the skin trade nearly two-thirds of the value of the exports are in the tanned condition. Up to the year 1898, the export of raw material from Madras was non-existent, and although now in the skin trade it amounts to nearly 40 per cent., it has not grown so rapidly as was anticipated some four or five years ago.

The demand for leather throughout the world seems to be rapidly increasing and, being in excess of the supply, have had an upward tendency for many years past. Excluding the great stock raising countries such as the Australian Commonwealth and the Argentine Republic, India is one of the few countries which on account of its poverty is still able to export a very large proportion of the hides and skins which it produces. The external trade has risen to nearly 14 crores of rupees, but it is impossible to even roughly estimate the value of the internal consumption. Possibly its



value is as great or greater than that of the external trade and there is evidence that it is steadily rising. Indian skins are of good quality, but with few exceptions, the hides are inferior and it is impossible to obtain a first-class manufactured product from them. Cawnpore is the centre of modern leather trade and Bombay on a smaller scale produces leather in no way inferior. This industry has grown up under the stimulus of demands from the Military Department and its flourishing condition to-day is due not only to the expansion of military requirements but also to indents from other Government departments which in the aggregate require considerable supplies of leather goods. In recent years, a considerable internal demand has grown up for cheap machine-made boots and shoes and it is probable that the Swadeshi movement, especially in Bengal, has benefited local manufactures of such goods. Excluding boots and shoes, the value of which is not given separately, the trade returns show that from 25 to 30 lakhs of rupees worth of leather or leather goods are imported into India yearly. The bulk of this trade is probably in dressed skins for book-binding and upholstery work, in high class leather for belting and machinery and to some extent in fancy leather goods. It is hardly probable that the whole of this not inconsiderable import business could be captured by native manufacturers but there is absolutely no reason, except want of enterprise on the part of the manufacturers, why India should not produce dressed skin equal in quality to any made in Europe and America.

The bulk of the leather consumed in the country is very poor stuff and the methods of tanning are so crude that vast quantities of fairly good hides are converted into most inferior leather. The inefficiency of the indigenous tannery is notorious, and in the aggregate, the annual waste of material amounts to a sum which can only be estimated in crores of rupees. Boots and shoes, sandals, harness, mussacks, paccali bags and bags for lifting water from wells for irrigation are among the chief articles for which the inferior country

leather is in large demand. No information is available regarding this native business. The village chuckler was both tanner and leather worker, but, in the South of India at any rate, the numerous tanneries which have sprung up for dealing with the surplus hides and skins available for the export trade, have also secured a good deal of his business as a tanner. Yet, he is by no means extinct and the enormous increase in the export trade of the last two years indicates the probability that there is still a good deal of valuable material to be rescued from his primitive methods of treatment.

In one direction due to the increase in the number of wells used for irrigation from which the water is drawn by mhotes, there has certainly been a considerable expansion in the local demand for leather. All over India, the mhote or charsa is a familiar object and every year millions of good hides are converted into bad leather for these water lifting appliances. The material is not altogether suited for the work and in constant use, water bags have but a comparatively short life. If anything could be done to improve the quality of the leather and render it more durable it would be conferring a very substantial boon upon the ryot, and, in proportion to the improvement, there would be set free a corresponding number of hides for export. The increasing demand for leather in India is due to the improvement in the condition of the people and sooner or later, it will affect the export trade, unless in the meantime, the available supplies of raw material are treated with greater respect and converted into better and more durable leather than at present. The main object of the present paper is to describe what is being done in Madras to bring about this very desirable result.

The mhote in good working order and with a water bag, the capacity of which is properly proportioned to the weight of the bullocks, is an extremely efficient method of lifting water when only animal power can be employed, but the normal condition of the ryot's mhote is far from satisfactory, as the bag soon becomes brittle and tears and the rents are

badly patched, so that fully a third of the water which is lifted from the well falls back into it, before the bag is emptied. In the matter of repairs, the ryot is entirely in the hands of the village chuckler and if he can be supplied with a better material than the common country leather, there is but little doubt that, as soon as he becomes practically acquainted with its advantages, he will readily adopt it even though it costs considerably more. In the South of India, the piccotah with an iron bucket is almost universally employed in the Coast Districts, where, the water-bearing sands are not more than 12 or 15 feet from the surface and not a few mholes, in use in brick wells, are of composite construction, sheet iron being used for the bag and leather only for the trunk. With care, such mholes are satisfactory, but they are easily damaged and difficult to repair. In many districts, the irrigation wells are large holes sunk into the rock, and in practice, it has been found that the leather bag is superior to the iron bucket, as the latter is so easily damaged against the rocky sides. Moreover, they must be very thin or else the weight becomes excessive and when very thin they require carefully looking after or they rapidly rust through. From time to time, experiments have been made with various substitutes for leather, but nothing seems to have caught on and it remains, therefore, to improve the quality of the leather till a more satisfactory substitute for it can be found.

With those facts very forcibly impressed upon me whilst conducting a series of experiments on various types of water-lift in Southern India, it was only natural, when I learned of chrome-leather and the very slight action which water has upon it, to experiment with it and ascertain whether it was feasible or not to manufacture the leather in the country. The practical tanners of Madras whom I consulted in the matter were unanimously of opinion that owing to the climate chrome-tanning would be a failure. They had made experiments themselves and their experiment led to nothing because their object in view was to produce a

material suitable for export. That was not the way I looked at the matter at all and it seemed to me that though it might be impracticable to manufacture chrome-leather or glace kid which would find a market in Europe or America, yet it might be possible to produce in India chrome leather suited to Indian requirements. Accordingly, the Government of Madras were addressed on the subject and a sum of Rs. 2,000 was placed at my disposal for experiments on the lines which I indicated, the main object being to produce a chrome-tanned leather suitable for use in well irrigation. Neither I, nor my assistant Mr. Brand, who was mainly in charge of the experiments during their initial stages, had any previous knowledge of leather manufacture and naturally we began working on a small scale, tried many experiments and met with not a few failures, but ultimately, we were able to demonstrate the practicability of the original idea. That was probably the easiest part of the work, as we were able to obtain much assistance from such books as Procter's 'Principles of Leather Manufacture' and in working out the local Indian problem, the Secretary of State for India permitted us to enlist the services of a first-class English expert.

The first stage has been successfully passed and we are now engaged in the more difficult matter of persuading the people of this country to give Indian chrome-leather a fair trial. We can manufacture chrome-leather good enough for most purposes and the experience of the last two years has shown that the original anticipations of its superiority have been fully justified. The price-list of our manufactures, which we have issued recently, contains a large number of favourable testimonials from people who have used it, but still the demand from chrome-leather is small when compared with the enormous consumption of leather and only very slowly do sales increase. Nevertheless, we are making progress and have now some sort of assurance that ultimately the chrome processes of manufacture will supersede the crude and wasteful methods of the chuckler.

Many hundreds of water buckets have been manufactured and brought into use in all parts of India and the general consensus of opinion of those who have used them is that the material is in every way superior to ordinary country leather and the life of a bucket very much longer. It is difficult to say what is the relative durability of the two kinds of leather on account of the variations in quality of the hides, but it may be safely assumed that chrome leather made from good hides is at least twice as durable as the best country tanned leather. As will be seen later on, there is no great difference in the cost of manufacturing leather by the two processes, though naturally in an experimental tannery like that attached to the School of Arts in Madras, where the work can only be carried on a comparatively small scale, the cost of making chrome-leather is much heavier than it would be in a large tannery doing a big trade. If we made bark-tanned leather under similar conditions, the cost of doing so would be much greater than it is in an ordinary native tannery.

Having produced chrome-leather suitable for water bags, or kavalais as they are locally known, it was natural to experiment with the leather in other directions, and, boots and shoes, sandals, harness and a great variety of miscellaneous articles have been made from it. The natural colour of the leather is a pale lavender blue, which is almost white when the leather is made in weak solutions. The colour is not at all displeasing and a good deal of it is worked up in the undyed condition, especially for harness in Madras. Usually, however, after the leather is tanned it has to be dyed which can readily be done and black leather and several shades of brown leather are regularly manufactured. Experiments also have been made in tanning skins and preparing glace kid and, though it must be confessed that our productions are not equal in finish to those imported, they have proved serviceable enough and being much cheaper, have found a fairly ready sale. So far our work has been done on a small scale and almost entirely without the aid of machinery, but the

Government of Madras have recently sanctioned the opening of a new tannery in the neighbourhood of Madras in which the manufacture of leather on a much larger scale will be possible. The plans for the new tannery have been prepared and include the installation of a fairly complete set of modern leather-dressing machinery. It will then be possible to do much better work and ultimately we hope to be able to materially displace the leather now imported from Europe and America.

*Characteristics of Chrome Leather.*—I do not propose to discuss these at any length, but it may be well to briefly draw attention to some of the more important points in which it differs from ordinary leather. In the first place, from a given weight of hide substance, the weight of chrome-leather produced is considerably less than when it is converted into bark-tanned leather. In the chrome-process, the hide substance is acted upon by the chemicals in the tanning bath, but very little additional weight is gained by absorption, whereas, as is well known, a very marked increase in weight is obtained when the ordinary bark tanning processes are properly conducted. From ten pounds of flint dry hide, the average weight of bark-tanned leather produced is nearly ten lbs, but the weight of chrome-leather will be not more than  $7\frac{1}{4}$  lbs. The ratio is roughly three-fourths. It therefore follows that bying chrome-leather by the pound, the price will always be at least 33 per cent. more than that of bark-tanned leather, so much so that the loss in weight and decrease in sectional area is actually accomanind by an increase in the strength. Its chief physical characteristic is its extreme softness, which renders it very suitable for boot and shoe uppers. In many cases, however, stiffness is distinctly desirable, and such articles, as solid leather bags and trunks, are much better made of ordinary leather. Chrome-tanned leather, unless very carefully manufactured, tends to stretch considerably more than bark-tanned leather, and that, for certain kinds of work, has been counted a serious disadvantage, especially

when it has to be employed for military equipment. With care it is, however, possible to manufacture chrome-leather which possesses no more stretch than ordinary leather and which at the same time has a considerably greater tensile strength. Harness made from the leather turned out in Madras has proved perfectly satisfactory, and large quantities of belting are in use where centrifugal pumps driven by oil-engines are lifting water for irrigation. This is very trying work for belting, and though we have not yet succeeded in producing an absolutely satisfactory chrome-leather belt, yet those made in Madras are able to hold their own in price and durability when compared with the belts formerly used.

In the manufacture of sole leather, the chrome process yields a material which is extremely durable, and it has been employed in making up thousands of pairs of boots and sandals. The leather is sufficiently soft to make it comfortable to the feet, and it possesses a power of resisting abrasion which has never been approached by the very best English sole leather. For boots and shoes, it possesses one serious disadvantage due to the fact that, when wet, the surface becomes slippery and it is not altogether safe to walk about on chrome-tanned soles in cities which are paved with asphalt or stone flags. This is a matter of no importance in India where pavements are almost non-existent, and the general suitability of chrome-leather for both soles and uppers is attested by the popularity of Madras chrome-leather boots among the planters of India. Thanks to the parcel post system, the planters of Assam and of remote stations in the Himalayas are able to get boots and shoes from Madras as easily and as cheaply as from Cawnpore or Calcutta.

The final property of chrome-leather to which I wish to draw attention is its peculiar behaviour when wetted. Ordinary leather when wetted and dried become hard and stiff, and if soaked in water for any length of time, the water becomes turbid due to the solution of some of the constituents of the leather. On the other hand, chrome-leather, when

wetted and dried, remains quite soft, and prolonged immersion in water has no effect upon it. If ordinary leather be boiled, in a few minutes it is practically destroyed, whereas very little harm is done in the same time to chrome-leather. Chrome-leather is in no sense waterproof, but for practical purposes, it is unaffected by water and is consequently *per excellence* the material best suited for exposure to the action of moisture. It is this property that led us to take it up in the first instance for water bags and it is that which renders it so popular among people who live in damp climates. Ordinary leather to be kept in good condition must be treated with dressings of some kind or other from time to time and, although these preparations may be used for chrome-leather, they are not needed to anything like the same extent and neglect to employ them does very little harm.

*Methods of chrome-tanning employed in Madras.*—

Three years ago, under the orders of the Government of India, a Monograph on Tanning and Working in Leather was specially prepared in each Province of India and those who are desirous of information regarding native methods of tanning, will do well to consult these papers. They can be obtained from any of the Agents for the sale of Government publications, but so rapid has been the change during the last two or three years in the conditions under which the export trade is carried on that they are no longer reliable guides as to the commercial aspects of tanning.

In an addendum to the Madras Monograph, a brief account of the earlier experiments in chrome-tanning is given and in the remainder of this paper, I propose to amplify that note and describe in some detail, the actual methods of working employed in the Chrome Leather Department so that any one who wishes to start this industry or to carry on similar experiments may be able to obtain full information regarding our work in Madras.

*Hides and Skins.*—The purchase of suitable raw material has proved to be one of the greatest difficulties we have had



to contend with, as not only at the outset were we inexperienced in regard to the methods of the trade, but we had little or no knowledge as to what was best suited for the chrome-tanning process. There are a considerable number of tanneries in the neighbourhood of Madras, but they mainly deal with coast hides or Calcutta rejections and it is practically impossible to get suitable hides from them. We soon found that satisfactory chrome-leather could only be produced from good hides, and latterly, for light hides, we rely almost entirely upon those which can be obtained from the Madras slaughter-houses. For a heavier class of hide, the best of which are good enough for harness leather, we mainly rely upon the supply of Nellore cow hides of which hitherto we have been able to get as many as we wanted at very reasonable prices. For water bags, or kavalais as they are locally called, we found light cow hides unsatisfactory and expensive, and, unless specially ordered otherwise, we invariably employ light buffs, which are usually free from brands and are fairly cheap. There is a very considerable demand for chrome-tanned sole leather which has to be made from hides much heavier than those usually obtainable in the local market and we have had some difficulty in getting a sufficient quantity. Buffalo hides are invariably used, and in the wet salted condition, they may weigh from 50 to 100 lbs., depending upon the extent of the spread. One fairly large consignment of hides from Rangoon proved extremely satisfactory in regard to price, but in the absence of machinery for splitting the hides, we found many of them too thick and they could only be worked up by incurring a heavy loss in shaving the leather down to the suitable thickness. Latterly, we have purchased dry salted and arsenically cured hides in the Calcutta market and have found them fairly satisfactory. The demand for our sole leather enables us now to make fairly large purchases at a time, and we have less difficulty, as the business we can offer is becoming worth the while of those in the trade to take up. Good calf skins we have found

if almost impossible to procure, but there has been no difficulty in the matter of goat and sheep skins.

It may be convenient to mention here that we have a very considerable business in tanning skins of wild animals such as those of the tiger, panther, bear and various kinds of deer with the hair on and the results are extremely satisfactory, if the skins reach us in good condition. The hair is unaffected by the chrome liquor and the skins, when finished, possess all the qualities of a good chrome leather. In a similar way, we have tanned a good many crocodile hides and a large number of snake skins, the latter being in the great demand for the manufacture of fancy articles, especially ladies' waist belts. In their natural colour, they look very well and can be readily dyed to any required shade. Snake skins are very plentiful in India, but, so far as I know, this is the first attempt that has ever been made to turn them to practical account. To obtain good results, the skins must not be damaged and special care has to be taken in killing the snakes.

*Processes preliminary to tanning.*—These differ very little from those ordinarily practised in native tanneries but, if good results are to be obtained, it is necessary to exercise the greatest possible care at each stage. The first step is to get the hides back into their natural condition and free from blood and dirt. The dried hides require soaking in water for about 24 hours and, when quite soft, should be washed in several changes of water. The green and wet salted hides merely require to be thoroughly washed, and they are then in a fit condition to be put in the lime pits. Owing to the fact that we are not allowed to establish lime pits on the premises of the School of Arts, this work has to be done outside the Madras Municipal limits in a native tannery and great difficulty has been experienced in getting native tanners to do the work properly. The pits are worked in a series of four, the first pit containing the oldest lime and the last pit containing the fresh lime. The hides pass

through the series of pits remaining in each pit about 2½ days, so that the whole liming process lasts about 10 days. The operations of unhairing, fleshing and scudding need not be described here in detail as there is nothing novel about them. It is most important that, whilst the hides should be well plumped up or swollen by the action of the lime, this should not be continued long enough to allow of the lime dissolving any appreciable quantity of the hide substance. If this is not carefully attended to, the final leather will certainly be unsatisfactory. In the manufacture of good sole leather, this is of the greatest possible importance, and latterly we have considerably shortened liming process by the use of sulphide of sodium. The process adopted is as follows:—

About one pound of sodium sulphide, is dissolved in as small a quantity of water as possible and to the solution from 6 to 8 lbs. of freshly slaked shell-lime is added and the mixture thoroughly stirred. More water is then added to bring it to the consistency of a thick cream. This mixture is allowed to stand for about 3 hours and is then spread over the flesh side of the hides to be unhaired, after which they are folded up, and kept in a cool moist place for about 24 hours, when the hair will be found to be sufficiently loosened, to be removed in the ordinary way.

After unhairing, the hides are washed in water and put into a tub of fresh lime where, in 24 hours, they are sufficiently plumped and are ready for further treatment. After scudding, it is necessary to remove, as far as possible, all traces of lime from the hides, and to this end, they are thoroughly washed in water and well trodded over by the coolies. The last traces of lime are removed by means of lactic acid of which a solution containing ½ per cent. is employed. After being put in the solution, the hides rapidly lose their plumpness and become very slippery to the touch. To test whether the last traces of lime are removed or not, a small piece is cut out of the thickest portion of the hide, and to the cut surface, a drop of the solution of phenol phthalein

in alcohol is applied. If the cut surface turns red, it indicates that there is still some lime left, on the other hand, if no colouration is produced, it may be taken that the has been sufficiently delivered. Every hide is tested in this way and, as soon as it passes the test, it is removed from the lactic acid bath and well washed in clean water.

*Pickling.*—The next operation through which the hides must pass is that of pickling which gives a preliminary alum tannage to the surface of the hides and this prevents to a large extent the formation of a drawn grain when the hides are finally tanned. For the pickling solution, 6 lbs. of potash alum and 4 lbs. of common salt per 100 lbs. of the drained weight of the delimed hides are dissolved in sufficient water contained in a large rotary drum. The hides are put into this solution and kept in it for about 24 hours, the drum being rotated from time to time by hand.

Although chrome-tanning can be carried on in pits or tubs, it is convenient to employ large drums to hold the tanning solution. They are made locally of teak wood and are mounted on a suitable wooden framing. The weight of the drum is carried by two centrally placed brass rings, one on each side, which rest on friction rollers supported by iron pedestals attached to the framing. On one side of the drum is fixed a large cast iron spur-wheel of the same diameter as the drum and it is driven by a small pinion mounted on the framing. The drums we have constructed in Madras range from 6 to 8 feet in diameter and from 3 feet to 4 feet 6 inches in width. At present, they are turned by hand, coolies being employed for the purpose, but it is ultimately intended to drive them all from a line of shafting. By hand power, it is not possible to revolve them more than two or three times a minute, but when driven by a belt from shafting, the gearing will be arranged so that the drums make from 4 to 8 revolutions a minute. For tanning, the slower speeds are sufficient, but for washing and deliming, a more violent action is desirable and the higher speed is

necessary. Inside the drums, strong wooden pegs are fixed so as to turn the hides over as the drums rotate. This greatly quickens the process of tanning and the drums can also be usefully employed for washing, pickling and for removing the last traces of acid after the tanning processes are complete.

*Chrome tanning.*—There are two methods of chrome tanning, known respectively as the single and the double bath process. The latter probably produces the finest leather, but the former is both cheaper and simpler to work and has been adopted in Madras exclusively as it yields sufficiently good results, and with the unskilled labour available, there is much less risk of anything going wrong.

To secure uniform results and to save tanners, who are not chemists, from the risks of buying their own chemicals, a number of tanning liquors have been put on the market ready for use. Experiments on a fairly extensive scale were made with two of these—one, the well-known 'Tanolin', which was supplied to us by the Martin Dennis Chrome Tannage Company of Newark, New Jersey, and the other by Messrs. Lepetit, Dollfus and Gansser of Milan whose 'Chromo-Chrome' produced excellent leather. With both, the results were quite satisfactory, but the leather was no better than that made, using the very simple process described by Professor Procter on page 212 of his Principles of Leather Manufacture. The tanning solution is made by dissolving 10 lbs. of chrome alum in 4 gallons of water. To effect the solution readily the alum should be crushed to a fine powder. Between 3 and 3½ lbs. of ordinary washing soda is dissolved in water and slowly added to the solution of alum. Rapid effervescence takes place and the mixture should be thoroughly stirred. If too much soda is added, a heavy precipitate is formed and there is a waste of valuable chemicals. The chrome alum costs in Madras Rs. 14-8-0 per cwt. or roughly 2 annas a pound and one pound of chrome alum is sufficient for the production of 3 lbs. of finished leather. The carbonate of soda costs Rs. 7-8-0 per cwt., equivalent to slightly more than one anna

a pound and as only one pound of washing soda is required for 10 lbs. of leather, it will be seen that the total cost of the chemicals employed in the tanning solution is very small and is actually less than that of the bark used in the ordinary processes of tanning. The tanning solution prepared in the above proportions contains 25 per cent. of chrome alum and is used as a stock solution. By diluting it with water, solutions of any strength are readily prepared. Usually tanning commences in a one per cent. solution and ends in a solution the strength of which is about 3 per cent.

The tanning is done in the drums already described and usually about 500 or 600 lbs. of pelt are put in each drum. The drums are arranged in a series through which the hides pass, first entering the drum containing the weakest solution and finally passing out of that containing the strongest. To the tanning liquor in the first drum about 15 lbs. of sodium sulphate are added to prevent the formation of a drawn grain. The time occupied in completing the tanning processes depends upon the thickness of the hides. Sheep and goat skins are tanned in a few hours, cow hides in from one to three days, whilst the thick buffalo hides used as sole leather take from a week to 10 days. The process could be quickened considerably if the drums were worked by night as well as by day and it would also be shortened if power were employed to drive the drums at a faster speed and continuously. The hides are considered to be tanned sufficiently when the blue colour produced by the chrome liquor has penetrated right through the hide and there is no white streak in the centre. Experience seems to indicate that there is considerable danger of producing bad leather by over-tanning and that where the hides are of very unequal thickness in different parts they should be rounded off as much as possible before being put in the tanning drums. Leather which has been over-tanned soon becomes brittle and useless and it is impossible to emphasize too much the necessity for care at this stage.

As soon as it is decided that the tanning is complete the hides are removed from the solution and spread out one over the other on a wooden horse where they are allowed to soak and drain for 24 hours. The tanning liquor remaining in the hides contains a considerable percentage of sulphuric acid and it is absolutely essential that this should be completely removed or the leather will perish in a very short time. It may be here remarked that the three principal causes of the production of bad chrome leather are (1) over-liming, (2) over-tanning and (3) acid in the finished leather. It is not difficult to guard against damage arising from these causes once they are recognised, but there is no doubt that a good deal of chrome leather made both in Madras and elsewhere has been unsatisfactory through neglect to take proper precautions to prevent damage arising from the operation of any one or all of them. To remove the acid the hides are first washed in several changes of water and then drummed in a half per cent. solution of borax, the quantity of borax used being 3 lbs. per 100 lbs. of wet leather. Litmus paper is used to test whether or not the acid has been completely removed. When it is ascertained that the leather is free from acid it is taken out of the borax solution and well washed in several changes of water to remove any soluble salts that may have formed in the substance of the leather.

*Fat-liquoring.*—For leather which is not to be dyed this is the final chemical process to which it is subjected, any further treatment being of a purely mechanical nature. The "Fat-liquor" is an emulsion of oil in a solution of soap and when the chrome leather is put into this the oil is absorbed and renders the leather soft and pliable. The soap employed is made in the following way:—

One hundred lbs. of castor-oil selected, because it is both cheap and gives satisfactory results, are placed in a wooden tub and 20 lbs. of caustic potash are dissolved in water and allowed to cool. When cold the caustic potash solution is slowly poured into the castor-oil, the mixture being constantly

stirred and the stirring is continued for about quarter of an hour so as to ensure that the potash and oil are thoroughly mixed. After about 24 hours the soap is ready for use.

To prepare the "Fat-liquor" 7 lbs. of the soap are dissolved in two gallons of boiling water to which is added an equal quantity of castor-oil and the mixture is boiled. It is then placed in an emulsifier which consists of a cylinder made of tin plate about 3 feet 6 inches high and about 10 inches in diameter. In this works a loosely-fitting piston attached to a long handle. The piston is perforated with a large number of small holes and by working it up and down the cylinder, after the mixture of oil and soap has been put in, the emulsification is completed. When it is desired to produce the better qualities of leather 2 lbs. of egg yolk are added to the emulsion and thoroughly incorporated with it. When the emulsion is properly prepared, it will mix with hot water without showing any trace of oil. For leather intended for water bags and rough usage it is desirable to make it absorb as much oil as possible and in practice we find that about 10 per cent. will be taken up by the leather. This gives the surface a dirty appearance but that is a matter of no consequence.

The hides are fat-liquored in a drum, which has been previously heated by means of boiling water. The door of the drum is closed and the requisite quantity of concentrated fat-liquor diluted with sufficient hot water at a temperature of 140°F. is passed in through the hollow axle of the drum which is then set in motion. After drumming for about half an hour, it will be found that the fat-liquor has been entirely absorbed by the hides which are removed and laid over a horse to drain for several hours. Afterwards, the hides are sleeked on stone tables and then stretched on wooden frames to dry. When the hides are dry, they are taken off the frames and subjected to the staking process which gives the leather that softness which is one of its principal characteristics. This completes the process of converting both skins and hides into undyed chrome leather. When it is essential that the leather



should have a good appearance, the percentage of fat-liquor which the hides are allowed to absorb must be reduced and when the staking operations are completed, a little French chalk is dusted over the grain side. As we have no machinery for staking or shaving leather, the flesh side of the leather is necessarily rough and ragged and for any work in which a certain amount of finish is required, the leather has to be shaved by hand.

*Sole Leather.*—The process of unhairing now employed, when the hides are destined for sole leather, has already been described. The tanning takes from a week to ten days and the subsequent removal of the acid has to be carefully attended to, on account of the greater thickness of leather. It seems doubtful whether the process of fat-liquoring is necessary. At present, the leather is drummed in a concentrated solution of the fat-liquor, the proportion employed being about 5 per cent. of the weight of the sammed leather. After fat-liquoring, the leather is brought into a sammed condition either by allowing it to dry naturally or by passing it between a pair of rollers. When nearly dry, it is ready for stuffing. The composition of the mixture employed is as follows:—50 lbs. of Burmese paraffin, 12½ lbs. of tallow and 2½ lbs. of resin. For the stuffing process, it is advisable to use a flat copper or aluminium dish large enough to take the biggest of the butts which go through the process. The dish should be from 6 to 8 inches deep and supported on an iron frame. Underneath a fire is placed and the mixture of paraffin, tallow, and resin melted. The sole leather butts, in a sammed or partially dried condition, are put into the melted mixture, the temperature of which is sufficiently high to cause the air in the pores of the leather and the remaining moisture to rapidly pass off in bubbles. The stuffing penetrates thoroughly into the substance of the leather and when all the moisture has been driven off, as is indicated by the cessation of the stream of bubbles rising from the surface of the leather, it is removed from the dish and allowed to drain. As soon

as it is cold, the leather is rolled under considerable pressure between heavy rollers and is then ready for use.

*Dyed leathers.*—Most of the leather required for boots and shoes, saddlery and similar articles has to be dyed either black or some shade of brown, as the natural colour of the leather meets with but little appreciation. This adds considerably to the cost of the leather and from the beginning, it was recognised that it would be desirable to devise a simple process which could be carried out without having resort to the comparatively expensive aniline dyes. Experiments in this direction have resulted in the production of a very satisfactory brown leather, prepared by subjecting the neutralised leather, after it leaves the tanning solution, to a superficial tannage with avaram bark (*Cassia auriculata*). The tanning liquor contains about 5 per cent. of bark and the hides are drummed in it for about half an hour. They are then removed and washed, and again drummed in a solution of Bichromate of Potash, there being about 8 oz. of the salt to every 100 lbs. of sammed leather. After this, the leather is fat-liquored and finished in the usual way. The depth of colour can be increased by prolonging what is practically a bark tanning process till, in the extreme limit, a combination tannage is produced which will be dealt with later on. The brown leather thus produced was first intended only for the uppers of cheap ammunition boots. When worked up with the ordinary leather dressings, it has proved quite satisfactory for all classes of goods, though many people prefer a much darker colour.

Coloured leathers for boot uppers pass through exactly the same processes as those already described, but it is permissible to allow of a somewhat longer liming so as to produce greater softness and flexibility. It is best to apply a mordant to the leather, after the acid has been washed out of it and before the fat-liquoring process. The dyes employed are all aniline dyes and to fix them satisfactorily, the leather must first be mordanted with some vegetable tanning material.

In Madras, we have found avaram bark both cheap and satisfactory. The leather, after being neutralised, is well struck out on the grain side and then transferred to a drum containing the decoction of bark, of which about 5 per cent. on the weight of the sammed leather is employed. The temperature should be about 140°F. and the drumming should last for about half an hour. The leather, which will then be of a light yellow colour, is removed and washed in several changes of water, after which it is spread out on the sleeking table and thoroughly struck out on the flesh side, so as to remove, as far as possible, all surplus moisture. The leather is now ready for fat-liquoring, about 5 per cent. of which is used on the struck out weight of the leather. The fat-liquoring is done in a drum at a temperature of about 160°F. and when all the oil has been absorbed, the hides are taken out and piled on a table where they are allowed to remain and gradually cool down. Each hide or skin is dipped in hot water and then well struck out on the grain side so as to remove all surface grease, which, if allowed to remain, would make the subsequent dyeing uneven. With the enormous number of dyes now available, any colour and almost any shade of that colour can easily be produced by using suitable combinations. So far, we have not attempted to do anything more than turn out a good black dyed leather or brown leathers in light, medium and dark shades. For experiments in book-binding leathers, a few coloured skins have been produced and a fair number of skins have been dyed scarlet to satisfy the taste of Mahomedans in the matter of chadas.

The dyes we employ are mainly of English manufacture, being phosphine substitute, new acid green, azoflavine R and acid green. The proportion in which they are mixed depends upon the colour required and, as typical mixtures, the following are given :—

- (1) 4 oz. of phosphine substitute and 1 oz. of new acid brown.

- (2) 3 oz. of phosphine substitute, 3 oz. of new acid brown and  $\frac{1}{4}$  oz. of acid green.
- (3) 4 oz. of phosphine substitute and 3 oz. of new acid brown.
- (4) 5 oz. of phosphine substitute, 2 oz. of new acid brown and  $\frac{1}{8}$  oz. of acid green.

These quantities are for a dozen average sized skins. The total quantity of dye stuff required varies with different classes of skins, about half an ounce being required for a sheep skin and little over an ounce for a light cow hide. The aniline dyes are dissolved in boiling water and the solution is filtered to remove any suspended impurities. The dyeing is done in drums at a temperature of about 150° F. About half the quantity of the dye stuff is used at the outset and the rest is added after about quarter of an hour. At the end of another 33 minutes, three-fourths of the dyeing liquor is run out of the drum and egg yolk added to the extent of about 1 per cent. on the struck out weight of the leather, after which the drumming is continued for another 20 minutes, when the goods are removed, horsed up and struck out. The skins are stretched on boards or frames to dry and the grain side is lightly rubbed over with a mixture containing 20 per cent. of glycerine in water. Before the skins are quite dry, they are removed, being then in a good condition for staking, which is entirely done by hand. After staking, the colour may be improved by topping with a half per cent. solution of the dye, used warm and applied with a soft brush. When this is done, the goods should be again staked and then finally dried right out so as to be in a condition to receive a coat of seasoning.

*Seasoning.*—This is made by taking 3 oz. of white of egg and one pound of milk and making up with water to one gallon, adding sufficient of the dye solution to tint the mixture. The seasoning is applied lightly on the grain side and when goods are sufficiently dry, they are glazed in a pendulum machine and afterwards re-staked and then the seasoning

and glazing processes are gone through a second time, at the end of which the leather is ready for use.

*Blacks.*—Experiments with aniline dyes, such as Corvoline B. T., using Cutch as a mordant, have not been very successful and we have obtained better results with Hæmatine or logwood extract, followed by the application of ferrous sulphate. About  $1\frac{1}{2}$  per cent. of logwood extract, calculated on the drained neutralised weight of the leather, is dissolved in water, to which is also added a quantity of washing soda, equal in weight to about one-eighth of the weight of the logwood extract. The leather is first drummed in this solution and in about half an hour, it obtains a deep blue-black colour. The goods are then removed from the drum and sleeked well on the grain side and “pleated,” *i.e.*, skin is laid on the table, doubled down the ridge with the flesh side inside and the shanks and belly are sleeked over so as to stick them together, the idea being to keep the flesh side protected from contact with the iron solution through which the goods are now passed. This consists of a 1 per cent. solution of ferrous sulphate, through which the skins are pulled twice and then immediately washed in hot water and struck out. The iron in the ferrous sulphate acts upon the small quantity of tannin present in the logwood extract and turns the blue-black shade into a thoroughly good black. It is necessary to carefully remove any excess of ferrous sulphate that the leather may contain or the process of fat-liquoring will be unsuccessful. This operation is identically the same as for brown leather and need not be described again. The seasoning for blacks should be of the following composition:—

Two oz. of logwood extract is dissolved in a quart of hot water and allowed to cool;  $\frac{3}{4}$  oz. of ferrous sulphate in  $\frac{1}{2}$  quart of cold water. One pint of blood, 1 pint of milk and  $\frac{1}{2}$  oz. of glycerine are diluted with one quart of water. To this, the logwood extract solution is added and the whole well mixed. Finally, the ferrous sulphate solution is added and the whole made up to one gallon with water. The mixture is

applied with a sponge and the goods glazed for the first time, whilst very slightly damp. The staking, seasoning and glazing may with advantage be repeated after which the leather is ready for the market.

*Combination Tannage.*—For some purposes, chrome leather is distinctly inferior to well tanned bark leather and it is possible by subjecting the hides to both processes to obtain a material which process in a marked degree the good qualities of both tannages. The production of such leathers will, of course, be much more expensive than when either process is used alone and till quite recently, it has been considered outside our sphere of work to attempt to produce the more expensive kinds of leather. In certain directions, however, we have met with a distinct demand for a locally produced leather of high quality and this we have endeavoured to meet by supplying combination tannages.

There are three ways of carrying out a combination tannages. Either process may be carried out first, or the two tanning liquors may be mixed together and allowed to act simultaneously. Most excellent leather has been produced by purchasing from local tanners, hides and skins which have been lightly tanned in avaram bark but not subjected to any process of dyeing with myrabolams or stuffing with grease. These lightly tanned kips or skins were chrome tanned in the usual way and either finished in their natural colour or dyed brown or black. The resulting leather has proved very suitable for many purposes and as the natural colour is not an unpleasing brown, it does not really cost anything more than ordinary chrome leather, dyed brown. In a similar way, sole leather has been made from combination tanned hides, but there has not yet been time to ascertain whether there is any very marked advantage in the process. For highly finished boots, it can certainly be employed, as it lends itself more readily to a neat finish than does ordinary chrome sole leather. So far, it has been mainly with a view to producing good harness leather that we have experimented with combination

tannages and we have arrived at the definite result that there seems to be a limit to the amount of stretch in combination tanned leather and stirrup leathers made from it have proved quite satisfactory and, have shown no stretch whatever, after being made up. Harness similarly has proved extremely satisfactory and, being unaffected by moisture, has proved in every way suited for damp climates and wet weather. The combination tannage produces an excellent leather for boot uppers, having rather more body in it than ordinary chrome leather, whilst, at the same time, it is equally soft and unaffected by water.

Experiments have also been made in which the hides are first subjected to the chrome process and then tanned in an avaram bark solution. As already mentioned, this process has been largely employed, more with a view to dyeing leather than to materially altering its properties and so far, it has proved perfectly satisfactory. Experiments with a more prolonged vegetable bark tannage have not been satisfactory and at present, it seems doubtful if this order of tannage will be able to compete with that in which the vegetable process takes precedence. Tanning with mixed solutions has not yet been tried.

*Cost of Chrome Tanning.*—In native Tanneries in the Madras Presidency, the rate usually charged for tanning hides varies from 2 to 2½ annas per lb. on the weight of leather produced. Chrome tanning costs us slightly over 3 annas per lb., so that, if allowance be made for the smaller weight of chrome leather produced from a given weight of hides, the actual cost of tanning a hide by the chrome process is no greater than by the bark process. Dyed leathers, however, cost considerably more, but then, they are only used for superior work, and it would be unfair to compare them with the normal productions of a country tannery. It is important to remember that the chrome process of tanning is a much shorter one and that consequently, much less capital is locked up in the tannery. The saving of capital which is thus effect-

ed is more than sufficient to provide for the extra expense in plant and machinery which a well-equipped chrome tannery involves when compared with the ordinary bark tannery.

*Conclusion.*—The processes of chrome tanning which we follow in Madras have been described in the above general terms not because there is any novelty about them but because there is in India an idea more or less prevalent that chrome tanning involves the introduction of machinery on a large scale and methods of operating better adapted for employment among more advanced communities. Whilst the trade in hides and skins is in a flourishing condition, the art of tanning in India, except in a few tanneries, is in a deplorably backward state. In the Madras Presidency, where the tanned skin trade represents the highest development of native tanning, nearly all the best skins are bought up and exported to Europe or America in a raw state. Last year, the average value of each raw skin exported was nearly Rs. 1-12-0, whilst the average value of tanned skins was only Rs. 1-3-0. The report of the Committee of the Society of Arts, on leather for book-binding, condemned East-India skins tanned with avaram bark as being the worst and most unfit from which to manufacture book-binding leathers. This was not due to any defect in the skins themselves, but solely because avaram bark contains catechol tannin and experiments have clearly demonstrated that to secure the necessary durability in leather bindings, those only which have been prepared with a pyrogallol tannin can be used. The effect of this report has been to restrict the market for Madras tanned sheep and goat skins and to encourage the export of all the best skins in the raw state. Myrabolams and divi-divi both yield excellent pyrogallol tannins. The former are already exported on a large scale and it would probably be wise to ascertain whether these natural products of the soil could not be utilised, not so much to bolster up a moribund industry as, by a re-arrangement of ideas, to create a new one. The hides and skins of the domestic animals of India have come to be an important



asset and it seems desirable that the most that can be made, should be made of this national source of wealth. The abolition of the crude system of branding cattle, which now prevails, would probably add fully a crore of rupees to the value of the exports of hides and the abolition of the village tanner would even lead to greater results. It will probably be a long time before the people can be induced to abandon branding; but, the gradual extension of the chrome process and the keener demand for raw hides, which the enhanced value of leather now enables dealers to offer, will do much to improve the methods of realising the real value of hides and skins.

## Glass-Making.

BY ALAKH DHARI, Esq.,

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GLASS is an article that is mainly formed by fusion, through heat, of two substances, viz., silica and alkali. A remarkable feature of glass is its ductility, that is to say, when in molten condition, it attains a peculiar sort of gluey adhesiveness, which enables it to be gathered round the end of a tube and blown into, expanding and making it hollow from inside, and moulded into any shape or size. On cooling it turns hard, though brittle, and retains the same shining smoothness and brilliant appearance that may be imparted to it, when still hot. Glass can be made of any shade or colour, opaque or transparent. Climatic changes produce no damaging effect on it, nor age cause decay.

Besides the manufactured article, a kind of native glass—called *obsidian*—is sometimes found in the vicinity of volcanic mountains. Obsidian glass is a substance to which, it is generally believed, vitreous lavas turn themselves, on cooling. Samples of obsidian have been analysed and found to contain

silicate of alumina, iron and potash or soda, etc. The name obsidian is said to have been given to it by that famous ancient chronicler and traveller, Pliny, after a certain individual, Obsidious, who, according to Pliny, discovered this substance in Ethopia. It is said that in olden times cutting instruments and rings, etc., were made of this glass in Mexico and other countries.

It will, perhaps, be a news to many that the manufacture of glass is not a new industry in India, for we find Pliny and other historians of yore making mention of glass-articles having been found in India. We also read that "in the tope at Mannikyla in the Punjab, opened by General Cunningham, which appears to date from about the Christian era, was found a glass-stoppered vessel and similar (other vessels or fragments have been discovered in other topes of a latter date" as well. In ancient Egypt, the glass-making industry had actually made wonderful progress and some of the works of art prepared in those days (that have now been unearthed) display an amount of perfection and proficiency that it is difficult to even now surpass.

#### *Raw Materials.*

The principal ingredient of glass is silica, commonly known as sand, and the quality of sand alone does in a great measure determine the quality of glass. A great many impurities are generally present in sand but none of them is so detrimental to the manufacture of glass as the mixture of iron from which, unfortunately, sands are rarely free. Arsenic is sometimes used to nullify the bad effects of iron but it is not always successful; besides, it is never possible to use arsenic in large quantities on account of its high price. The glass-makers, therefore, remain on the look-out for iron-free sands. The presence of iron can very easily be detected by first dissolving sand in muriatic acid and then pouring a few drops of potassium ferrocyanide (dissolved in

water), when, if any iron is present, blue clouds would be formed. This is a most powerful (qualitative) test and has been found to disclose the existence of iron, even where that substance is present in the very small proportion of one part in about two hundred parts of sand. Should any effervescence take place at the time of dissolving sand in the acid, it generally denotes the presence of chalk or a carbonate. Ordinary sands containing a little portion of iron can conveniently be used for green bottle-glass. But for manufacture of white-quality glass, if no better sands are available, the best course is to thoroughly burn sand (or stone from which it is to be powdered) to allow extraneous matters to escape in gaseous form. The process of burning sand consists in placing it on the bed of an oven and subjecting it there to the flame of fire in its passage from fire-place to flues.

A sample of French sand that is regarded as quite pure for ordinary white glass was, on analysis, found to contain :—

Silica	395 Parts
Oxides of manganese, aluminium and iron	2 Parts
Moisture	3 Parts
	in 400 Parts

Hardly less important than the silica is the element of alkali, through whose agency, sand and other raw materials are melted and reduced to glass under heat. There are at present only two alkaline substances that are largely used in the manufacture of glass, viz., potassium and sodium carbonates.

Potassium carbonate had until recently been manufactured from wood ashes. Roughly speaking, the process of conversion consisted in burning piles of wood to ashes and pouring water over the same allowing the soluble portion to flow out. The residue was re-dissolved and calcined forming potassium carbonate of commerce. The mode of manufac-

ture is, however, being abandoned and this substance is now obtained from potassium chloride deposits in Germany and elsewhere; but, on account of its high price, potassium carbonate is not so much used as the sodium carbonate, which, also, was formerly produced from plants in somewhat the same manner as the former, but is now manufactured from common salt by what are known as the Le Blanc, the ammonia soda and the electrolytic processes.

In the LeBlanc method, common salt is subjected to the action of sulphuric acid forming acid sodium sulphate, which is then placed in a reverberatory furnace and turned into anhydrous sodium sulphate. On roasting it with coal and chalk, a black-coloured substance known as the black ash is formed. Lixiviated in a number of tanks, black ash yields a pretty pure carbonate of soda. In the other process, gaseous ammonia has to be passed in a solution of salt and water and played on by carbon di-oxide gas, until it is thoroughly saturated. The acid carbonate of soda, which is thus formed, is heated and turned into the carbonate of commerce. But both these modes of preparing sodium carbonate are being speedily abandoned, as the ever-vigilant and progressive West has now hit upon an electrolytic process, which would effect a great economy in the cost of manufacture,

Attempts have, from time to time, been made to replace the use of sodium carbonate by common salt itself, in order to dispense with the troublesome and somewhat expensive process of converting it into a carbonate. We have read of a Mr. Gossage having experimented the manufacture of glass, by using chloride of calcium, in vaporised state, through a tower filled with heated sand-stones; but the silicate of soda produced by this method was not presumably found suitable or we would have seen this process generally adopted. Later on, we find Mr. George Gore trying to produce the silicate of soda in the glass-pot itself. He devised a mixture of sand, chalk and salt from which steam could only be liberated at high temperatures and thus under conditions most favourable

for the decomposition of salt. A tolerably transparent glass is stated to have been produced, but the cost proved prohibitive. Experiments with sodium chloride (as the alkaline agent) are being still carried on, now and then, and it is not beyond the range of possibility, that a day may soon come, when we would find this knotty problem satisfactorily solved.

Though glass can be manufactured from sand and alkali alone, it is very necessary to include some portion of limestone, as well, in order to make the glass hard and brilliant. Lead is so sometimes used as a substitute of, or as a supplement to, lime to impart a greater brilliancy.

When it is desired to give any colour to glass, we have to mix Oxide of Cobalt for producing blue colour; Oxides of Chromium, Copper or Iron for producing green; Oxide of Uranium for yellow; Oxide of Manganese for violet; and, Oxide of Gold for red colours.

The art of colouring glass is, however, very difficult and subtle. Much depends on the skill of the manufacturer in properly adjusting the degree of heat and in using the materials in due proportions, the least variation producing undesirable results.

I read in a South Kensington museum art handbook that a Mr. Bontemps once, "brought forward some very extraordinary facts in connection with the colouring powers of different bodies. He showed that all the colours of the prismatic spectrum might be given to glass, by the use of oxide of iron, in varying proportions, and by the agency of different degrees of heat, the conclusion being that the different colours are produced in their natural disposition in proportion as the temperature is increased" or lowered. The analyses, made of pieces of ancient glass adds weight to this statement, for therein we find that one and the same ingredient was contained in glasses of different colours. But so long as the modern science of Chemistry does not make any specific discoveries in this respect, and the glass-makers do not find it practically safe to adopt those new

methods, the general practice of using different oxides for producing different colours is likely to remain in force.

In the manufacture of glass, we have to use, roughly speaking, one part of alkali in two parts of sand. The price of alkali is, however, far higher than that of sand and the cost thereof is, therefore, perhaps the largest item in a glass-maker's bill of expenditure. Besides glass-making, alkaline soda is largely used in the manufacture of soap and paper and, in a lesser degree, in cotton-spinning and dying, as well, so that, there is a very great demand for this article in India. The representative of a firm of importers in Calcutta, when he called at our Glass-Works in Ambala last year, informed me that his firm alone had imported about 900 tons of soda the year before. There are several firms in Calcutta and other sea-coast towns whose import business is believed to be in no way smaller than that of the firm above referred to. One can thus imagine what enormous quantities of alkaline soda are imported in India, from year to year. It is a matter of great regret that, inspite of our extensive natural resources, no real attempts have yet been made to establish any factories for this purpose in our country. The many sodium chloride deposits and that extremely cheap substance, known as *reh* or *usar*, which abound in plenty in Northern India, will, it is believed, yield beautiful sodium carbonates, cheap in price, yet strong in alkaline properties, if they are only properly manipulated. Unless, however, the prospective alkali-manufacturer in India devises means whereby the number and the quantity of bye-products is considerably minimised (and good markets found for them, so that the allotment of expenditure on the main product may be lessened) and efforts are made to use the cheap materials available on spot in the manufacturing process, the chances of our being able to compete successfully with the European supplier are far remote.

I hear there are some very fine cobalt ore mines in the Himalayas. The exploiting West discovered one and immediately leased it, securing a monopoly. A great portion

of the vast quantities of cobalt oxide that are used in India and for which we have to pay at about seven hundred to eight hundred rupees a maund are perhaps, nothing else than the Indian ores of cobalt, carried to Europe and refined there to be eventually brought back and sold amongst us, at enormous profits.

*Furnaces, Crucibles and Annealing ovens.*

A glass-maker's work is, however, only partly done when he has brought together and mixed in due proportions the different raw materials. He has next to erect a strongly refractory furnace,—a furnace that would successfully withstand intense heat and, at the same time, be worked with economy in fuel.

Great care ought to be bestowed on the selection of materials from which furnace-bricks are made. Not only should the bricks and clay used be perfectly refractory at the temperature required for melting the glass, but they should also, as far as possible, be free from metallic oxides. The kind of bricks which in England and Germany go under the name of *Dinas* have been found greatly suitable in this respect. They consist entirely of good silica bound together with a small portion of lime. The fire-clays found in Stourbridgeshire (England) are noted for their excellence, but, for ordinary purposes, the fire-bricks of Jubblepore are also quite good. At our request, the Manager of the Perfect Pottery Company, Limited, (Jubblepore), had some samples of his clay chemically analysed, along with some samples of superior quality European materials, and Dr. Schulten, who analysed them, was of opinion that the Jubblepore clays were in no way inferior to the foreign stuff.

The part of the furnace that requires great care in construction and necessitates the use of very excellent material, is the crown or dome. I have not yet been able to ascertain whether the Jubblepore fire-bricks can be used with sufficient

success in building crowns, as well, but there is no doubt that, in other parts of the furnace, we can (with some judicious discriminations) safely use Jubblepore materials.

Among glass-makers of the present day, the furnace wherein heat is produced just below the pots, and the flame rises directly into it, is in common use. It is cheap and simple, and undoubtedly best fitted for manufacture of glass on a small scale. But, in order to produce superior glass, what is known as the gas furnace is preferred. In this, the steam is generated a little way-off and before reaching the crucibles, it gets purified and freed-of unburnt carbon particles. It must be remembered that it is in the furnace only that raw materials are melted and reduced to glass and that its quality, too, greatly depends on heat, which, if insufficient, causes, among other defects, bubbles (unliberated air) and specks (unfused carbon, etc.,) and also gives to glass a sort of dull dimness in colour. To produce pure and transparent glass, a furnace must have a strong, regular and steady flame of fire.

Furnaces, again, are of two kinds. One is called the tank-furnace and in this glass is melted in hollow spaces, built in the body of the furnace itself; but, as the tank furnaces require great attention and large initial out-lay of money, they are not usually built unless it is desired to melt large quantities of glass of only a certain kind. In Europe and elsewhere, tank furnaces are generally found only in factories which manufacture bottle-glass. By far the most commonly-used type is of the pot-furnace. A pot furnace does not, in the first place require much initial outlay. It affords great facility on account of the crucibles (*i.e.*, the pots in which glass is melted) being put in and removed at will.

Crucibles are of different capacities, varying, ordinarily, between two and six maunds and as several of them can be put in a furnace, glass-makers can easily prepare different kinds of glass at one and the same time, which is a great convenience, particularly for small factories that have to cater



for different tastes and in different coloured articles, but are unable to have many furnaces.

Crucibles, too, are made of fire-clay. Raw and burnt fire-clays are ground and mixed together in proportion of about 7 to 9, respectively, but this proportion varies according to the relative qualities of clays used. The clays are mixed together well when still dry. Water is then poured on them and they are kneaded or treaded well by human feet. The latter process is, however, common on account of a supposition being prevalent that the elasticity and warmth of men's feet gives the paste a particularly gluey character. The paste is allowed to rot for about a week.

The crucible used for ordinary glass is open at the top and its walls slightly incline out-wards as they go up, but for fine glass, covered pot is preferred in order to avoid unburnt carbon particles or pieces of clay from the crown falling in and spoiling its quality. The covered pot is provided with a hole on one side through which raw materials are put in and glass taken-out. A fixed and even temperature is maintained in the room in which crucibles are made. Indeed, in winter season, it is desirable to artificially heat the room, in order to keep the air within at an uniform temperature. After the pots are made, they are generally allowed to dry and mature for about four or five months before being used. They are then put in a baking oven and heat cautiously increased, until gradually, in about a week's time, the temperature is raised equal to that of the melting furnace itself. The old pots are then taken out of the (melting) furnace and new (baked) ones put in. The removal of old pots and the putting in of new ones is a work of great courage and pluck. The pots, besides being very heavy, are so hot and the heat of the furnace is so strong that it becomes very difficult to properly handle and control them. After they are put in the furnace the crucibles are glazed all over with molten glass, so that they may become less susceptible to action of alkali, which is a most dreadful enemy the pots have to contend against. It

persistently attacks the crucibles and is sure to corrode in, if there happens to be any weak spot in the sides or base. When alkali has once succeeded in making a breach, it mercilessly continues its onslaughts and makes the aperture deeper and deeper, so that a hole is eventually pierced through and glass flows out. Numerous devices are employed to patch up these holes, but a pot is practically done, for when a hole is once made in it.

The length of the time required to reduce raw materials to glass depends on the size of the pot and the intensity of heat available. In our Glass Works at Amballa, we have at present pots of about five maunds capacity and have a heat of about 1100 deg. Fahr. It takes us about fourteen hours to melt an entire pot of metal (glass). When melting operations are complete, the temperature of furnace is reduced a little to enable the glass to solidify a bit. It is then taken out and moulded in the desired shapes and forms.

Articles thus made are necessarily very hot and as a sudden reduction of temperature causes cracks and breaks, a process of gradual cooling is gone through, for which purpose they are put in annealing ovens, where a small fire is kept burning at the time but it is later on reduced and eventually extinguished. In Japan, the annealing is done by putting glass articles in beds of sand or ashes. Here, too, this method would suit very well, if some cheap method of first heating the sand could be found out.

After annealing the glass articles are given the necessary finishing touches and sent to market for sale.

#### *Skilled Labour and Future Prospects.*

The glass-making industry has a great future before it in this country, but many difficulties have first to be surmounted. The supply of skilled labour is for the present a problem that stares us in the face. We can never hope to compete with foreign manufacturers, if we have to import artificers from

abroad. They have usually to be paid cent. per cent. higher wages than what they get in their own countries. We, too, can not reasonably expect them, to part with those dear and near to them, and leave their homes behind, without our compensating for same in the form of increased salaries.

The only articles available here are sand and fuel, and of these even, there are not many sands in India which may be regarded as pure and in having to powder them from quartz stone, the cost runs high. As regards fuel, our coal or wood is certainly not much cheaper than what these commodities cost abroad. Again, most of the colouring chemicals, as well as alkaline substances and other ingredients, have to be imported from other countries and it will be a considerable time before India would be able to make herself self-dependent in these respects. If we add to this foreign artificers as well, where will our economy lie? Our hope of success must, therefore, rest on our training-up of our own men, and for this purpose, some of our youths should go abroad every year. The efforts made by the Calcutta Association for Industrial development and other philanathropic countrymen in this direction, no doubt, deserve our best thanks; but what I wish to point out is that our present rate of progress falls far short of what the exigencies of the situation demand. In order to fully develop the vast natural resources of our country, we ought to greatly augment the number of our youngmen receiving industrial education in foreign countries.

But even studying abroad is not easy. Foreigners know well that our markets would be closed to them, as soon as we begin to manufacture our own articles; hence they are reluctant to impart any industrial education to our men. We can not very well blame them for their adverse attitude in this respect; for they are naturally anxious to guard their interests. And, it is the lack of sense to understand even the elementary principles of economy and methods of business that has crippled what few industries were even left in the hands of our countrymen. Our youths who proceed to foreign

countries for learning industries must, therefore, properly realise their awkward situation and go prepared to put up with all sorts of troubles and difficulties. There is, however, a strong ray of hope and it lies in the transference of a great part of the treasures of art and industries from human hearts to printed books. As long as these secrets were locked in the artificers' hearts, there was very little chance of our getting at them, but by their publication, the way has become much easy, and if our students can pick up even the rudiments of industrial knowledge, they would be able to greatly expand and improve the same by an intelligent study of books dealing with those subjects. Unfortunately, however, much of the literature on the glass-manufacture is on continental languages of Europe, which our men can not ordinarily understand.

There appears to be a tendency, at present, to send boys fresh from colleges. They usually get no commercial education before they go, and while their advanced literary (non-industrial) education enables them to learn the technical portion of the industries tolerably well, the business or commercial aspects of the same (viz., the adaptability to the Indian soil and resources, as well as to the tastes and conditions of our people) remain in a great part unstudied, and on their return home, they can not turn their knowledge to full advantage. Many a concern has come to grief in India, because its conduct happened to lay in the hands of intellects that were commercially inefficient and on principles that were economically unsound.

It would be well for us to remember that in these days of commercial ascendancy, the extent of a country's progress, in the scale of international civilisation, is greatly measured by its wealth-growing capabilities. We are in the midst of critical times and our country has become an exploiting market for all other enterprising nations of the world. Our hardest battles will, therefore, have now to be fought in the domain of commerce and industries. The nation that has outlived terrible adversities and great trials for thousands of

years, will succumb to this latest calamity, unless the entire population struggles hard to attain commercial supremacy in our own markets, if not in the markets of other countries, as well. Starved and emasculated, the vitality and resisting forces of our nation are fast diminishing; and we must make a tremendous effort to equip ourselves with the requisite energy and enterprise to supply all and every one of our wants by articles of local manufacture. It is evident that no endeavours for the up-building of our nation can ever be perfect or successful, unless and until, we at the same time set right the economic condition of our country, by tapping its industrial resources and keeping our wealth within the land.

I can not better conclude this paper, than by quoting Dr. Johnson's description, in the pages of the *Rambler*, about the five vistas of progress and comfort opened to humanity by the introduction and use of glass-articles, as also the unpromising beginnings from which most productions of art, at times, arise :—

"Who, when he first saw the sand and ashes, by casual intensesness of the heat melted into a metalline form, rugged with excrescences and clouded with impurities, would have imagined that in this shapeless lump lay concealed so many convenience of life as would, in time, constitute a great part of the happiness of the world? Yet, by some such fortuitous liquefaction was mankind taught to procure a body, at once in a high degree solid and transparent, which might admit the light of the sun and exclude the violence of the wind, which might extend the sight of the philosopher to new ranges of existence, and charm him, at one time, with the unbounded extent of material creation, and at another, with the endless subordination of animal life, and, what is yet of more importance, might supply the decay of nature and succour old age with subsidiary sight."

"Thus", continues Johnson, in his own grand and mellifluous style of expression, "was the first artificer of glass em-

ployed, though without his own knowledge or expectation. He was facilitating and prolonging the enjoyments of light, enlarging the avenues of science and conferring the highest and most lasting pleasures ; he was enabling the student to contemplate nature and the beauty to behold herself."

## The Best Indian Woods for the Manu- facture of Matches and Match-boxes.

BY RAI SAHIB UPENDRANATH KANJILAL, F.L.S.,

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IN Sweden, the most noted match-manufacturing country of the world, Aspen (*Populus tremula*, Linn.) is the wood found best suited for matches and match-boxes, and pines occupy the second rank, as regards the former. In India, Aspen does not grow anywhere indigenously. The nearest approach to it, in botanical relationship, is made by a tree which is found in Cashmir and the Punjab Himalaya, as also in countries west of that region, such as Afghanistan and Beluchistan. But, it is nowhere found in great abundance and a great obstacle to increasing its stock is that it very seldom produces any flower or fruit. It can, therefore, reproduce itself naturally, chiefly by the shoots which spring from the roots, or artificially, by means of cuttings. The botanical name of this tree is *Populus alba* and the Kashmiris call it, *Jangli Frast*. The wood of this tree is not wholly unknown even in distant Bengal, for it is in small round boxes made of this wood that we see grapes, sold in the cold weather, by the men known to us as Kabulis.

Although this wood is eminently well suited to the purpose, its small supply will preclude its use anywhere outside the northern districts of the Punjab.

'Pines' is a term applied loosely in commercial parlance to a number of trees which, although coming under the same Natural Order, Coniferae, belong to very different Genera or groups of it. None of the European pines, however, grow naturally in India; we have, therefore, to find their substitutes in the coniferous trees that are indigenous in our forests.

Before proceeding to select the most suitable woods, it seems necessary to investigate briefly what characteristics should be sought for, in such woods.

Both for the purpose of matches and match-boxes, it is necessary that the wood should be easy to split, and at the same time, elastic and strong enough not to break in splitting or in bending to make the boxes; and, for matches, it is also necessary that it should take the fire easily and should continue to burn steadily with a flame, when ignited, and that it should not emit an unpleasant smell in burning. It is also an essential point that the supply should be sufficient locally or be easily available in quantities, where match factories are likely to be established.

To begin with the first characteristic, that of splitting with ease. This depends mainly, on the structure of the wood. Avoiding anatomical and technical details, wood may be said to consist of fibers which run parallel to the axis of growth and which, in dicotyledons, (*i.e.* in plants other than of the nature of palms, bamboos or ferns), are held together by thin fibrous plates, which lie in vertical planes radiating from the centre of the tree. Ease in splitting depends on the length and straightness of the vertical fibres and on the fineness, regularity and abundance of the vertical plates, which are called *medullary plates*. These plates are best seen on a transverse section, where they show as radiating lines, like rays from a luminous point, either continuous or broken, and are usually and more aptly called *medullary rays*. Knotty wood is more difficult to split than wood free from knots, for around knots, the fibres get twisted and are more closely packed, and there is generally much want of uniformity of

structure in their neighbourhood. Some trees naturally grow straight and more or less free from knots, and it is preferably from among these that we have made our selection. When trees are grown scientifically in forests or plantations, they can be forced to grow straight and comparatively free from knots, even though they would not do so in nature.

For the particular purpose of matches, the wood should also be soft and light. A soft and light wood, provided the fibres are straight and elastic and the medullary rays fine, regular and numerous, splits with a smoother and cleaner surface than a heavy and hard wood. A little amount of strength and elasticity must be combined with softness, otherwise, it would be impossible to obtain splinters of any required length, and the match-sticks would break in rubbing to ignite them. It is owing to want of strength that the refuse sticks of the jute plant, known in Bengal as Pát-káti ( পাট-কাটি ) or Pan-kati ( পানকাটি ), though very soft and light, are unsuitable for lucifer matches, although they were excellent for the old-fashioned sulphur matches of two generations ago, for which they were very extensively used.

In modern factories in Sweden, the wood is first turned on lathes against a broad blade which peels off from it a long sheet of wood of the thickness of a match. This sheet is then cut up and split by machinery into separate sticks of the size of matches. But, whatever be the process, the quality of wood sought for will remain much the same.

The second desideratum, that of taking fire easily, is also considerably affected by the softness and lightness of wood, for a soft and light wood takes fire more easily, and, if perfectly dry, also burns steadily, when ignited. A straight-grained, soft and light wood has the additional advantage of drying quickly and thus becoming fit to burn well soon.

In the higher grades of lucifer matches, the combustibility of the sticks is artificially augmented by impregnating them with a hydrocarbon, like paraffin. Some woods like the pines are naturally resinous or oily. They can, therefore, to a



certain extent, dispense with the hydrocarbon bath. Matches of inferior quality are tipped with sulphur to make them burn well.

The third property, that of not giving an unpleasant smell in burning, in respect of our Indian woods, has not yet been sufficiently investigated. But, it will be seen that it is of comparatively small importance, except for the very highest grades of matches; for, although sulphur-tipped friction matches give a strong pungent smell, they hold their own in the market owing to their cheapness.

The question of supply is obviously of very great importance and is really a question of the geographical distribution of the species selected. I have already mentioned *Populus alba*, which would be very suitable for the purpose, but which cannot be depended upon, as we cannot get enough of it from our forests and, as has already been said, there are serious obstacles to artificially increasing its stock.

In the description which I now proceed to give of the woods that seem to be suitable for matches and match-boxes, the above points have been kept in view, as far as possible. I think it but proper to add that, with the exception perhaps of the Conifers and the Poplars, I possess no *certain* knowledge as to the actual suitability of any of the other woods mentioned. All that I have been able to do, during the short time allowed me for the paper, has been to go through the Wood Museum of the Imperial Forest College, Dehra Dun, which is admitted to be one of the finest in the world, and to closely examine those specimens which appeared to me most suitable. For the weights quoted, as also for many other items of information, I am indebted to the classic work of Mr. J. S. Gamble, M.A., F.L.S., F.R.S., C.I.E. (*Manual of Indian Timbers*).

1.—*Magnolia Griffithii*, Hook, F. Vernacular—*Bor, Gahori Sopa* (Assam). Wood soft, greyish white, weight 28 lbs. per cubic foot. Medullary rays fine, numerous, short. Habitat—moister parts of Assam, including Cachar. Apparently not very abundant.

2.—*Bombax malabaricum*, DC. Vern.—*Simul* (Bengal). The well-known Silk Cotton Tree. Wood very soft, greenish brown, containing a large percentage of phosphoric acid. Weight 17 to 32 lb per cub. ft. Medullary rays numerous. Habitat—throughout the plains of India, also Burma and Ceylon, generally affecting damp localities. Easy to grow both from seed and cuttings and very fast-growing.

3.—*Ailanthus excelsa*, Roxb., Vern.—*Maha-nim* (Uriya). *Ghor-karm* (Palamow). Wood white, soft. Weight 23 to 28 lbs. per cub. ft. Medullary rays numerous and close. Habitat—Chota-Nagpur, Northern Circars and the Coromandel Coast. Not very abundant, but can be easily grown from seed and cuttings and is a remarkable fast-grower.

4.—*Boswellia serrata*, Roxb., Vern.—*Salai* (Bengal). Wood white, moderately hard. Weight 28 to 40 lbs. per cub. ft. Medullary rays, rather broad, very short, not very numerous. From point of structure, this wood is not very suitable, but it contains a gum-resin owing to which, it gives an agreeable smell when burnt and matches made of it are likely to burn steadily and well. Habitat—dry hills from Rajputana Chota Nagpur, Orissa and Northern Circars: usually quite abundant where it grows.

5.—*Gomphandra axillaris*, Wall. Wood greyish white, soft. Weight 31 lbs per cub. ft. Medullary rays broad. A small tree of Sylhet and the Malabar coast.

6.—*Holigarna Beddomei*, Hook. F. Wood greyish white and soft. Weight 26 lbs per cub. ft. Medullary rays fine and short, not very numerous. A large tree of the Western Ghats.

7.—*Spondias mangifera*, Pers. Vern.—*Amra* (Bengal). Wood greyish white and soft. Weight 20 to 30 lbs. Medullary rays—some fine and others broader, fairly numerous. Habitat—Sub-Himalayan forests, Assam, Eastern Bengal, Burma and the Deccan. Grows very fast and can be very easily propagated by cuttings.

8.—*Sesbania grandiflora*, Pers. Vern.—*Bak* or *Bak-phul* (Bengal). Wood soft and white, weighing about 30 lbs. per cub. ft. Medullary rays fine, numerous. It is not an indigenous forest tree but can be easily grown in Bengal and most other parts of India.

9.—*Erythrina suberosa*. Roxb. Vern.—*Dholdhak* (Hind). Wood very soft, whitish. Weight 17 to 20 lbs. per cub. ft. Medullary rays short and broad. Habitat—dry forests of India and Burma.

Other species of *Erythrina* of which *E. indica*, Lam., is well known in Bengal, as *Palitamadar* occur in E. Bengal and Burma and have wood very similar to the above.

10.—*Pithecolobium lobatum*, Benth. Vern.—*Tanyin* (Burma). Wood grey, moderately hard. Weight 30 to 35 lbs. per cub. ft. Medullary rays very fine and numerous. Habitat—tropical forests of Burma.

11.—*Gyrocarpus Jacquini*, Roxb. Vern.—*Pitella* (Uriya). Wood grey, soft. Weight about 22 lbs. per cub. ft. Medullary rays very short and moderately broad. Habitat—Orissa to N. Circars and the Deccan, also the Cocos Islands.

12.—*Tetrameles nudiflora*, R. Br. Vern.—*Sandugaja*, (Bengal). Wood white, soft. Weight per cub. ft. about 24 lbs. Medullary rays fine but clearly marked. Habitat—Darjeeling Terai and the Garo Hills: also Burma and the Western Coast. Much used for tea-boxes.

13.—*Anthocephalus Cadamba*, Mig. Vern.—*Kadam* (Bengal). Wood whitish, somewhat hard, weighing about 40 lbs. per cub. ft., often of an unpleasant smell. Medullary rays fine and numerous. Very common in E. Bengal and Assam, and in the Darjeeling Terai. Also found in the forests of Pegu in Burma. Growth very fast.

14.—*Hymenodictyon Obovatum*, Wall. Vern.—*Sirid* (Marahatti). Wood brownish grey, soft and smooth-grained, weighing about 28 lbs. per cub. ft. Medullary rays some fine and close, others broad and distant. A large tree of the W. Ghats.

Very similar, but having a somewhat harder wood, is *Hymenodictyon excelsum*, Wall. Vern.—*Bhalena* or *Bhauran* (Hind.), which is found in dry forests throughout India.

15.—*Cordia Myxa*, Linn. Vern.—*Bahal* (Bengal); *Lassora* (Hind). Wood greyish, somewhat hard. Weight very variable, the average being about 33 lbs per cub. ft. Medullary rays short, moderately broad and fairly numerous. Habitat—India and Burma, mostly in damp forests and ravines up to 5,000 ft.

16.—*Wightia gigantea*, Wall. Vern.—*Bop*. (Lepcha). Wood white, very soft and porous. Weight 14 lbs. per cubic ft. Medullary rays uniform, rather broad. Habitat—Eastern Himalaya and the hills of Assam and Burma.

This wood will probably be found too soft for the purpose and there may be some difficulty in securing a large supply.

17.—*Gmelina arborea*. Roxb. Vern.—*Gamar*, *Gamhari* (Bengal). Wood brownish white, soft and even-grained. Weight about 36 lbs. per cub. ft. Medullary rays short, moderately broad, and fairly numerous. Habitat—the moister regions of India and Burma.

It has a fair demand as timber, especially in Bengal, and will probably be found too valuable to use for matches.

18.—*Trewia nudiflora*, Linn. Vern.—*Pithali* or *Pithuli Bhurkunda* (Bengal). Wood white and soft. Weight about 30 lbs. per cub. ft. Medullary rays fine, numerous, uniform and closely packed. Habitat—Sub-Himalayan damp forests, also forests of Chittagong and Burma. Common about villages in some parts of Bengal.

19. *Excæcoria Agallocha*, Linn. Vern.—*Genwa* (Bengal). Wood very soft and spongy. Average weight 25 lbs per cub. ft. Medullary rays very numerous and extremely fine. Habitat—tidal forests of India, Burma and the Andamans; very common in the Sunderbans and extensively used in Calcutta for bedsteads and other kinds of cheap household furniture.

20.—*Broussonetia papyrifera*, Vent. The Paper Mulberry tree of Japan. Vern.—*Molaing* (Burma). Wood soft

and greyish white. Weight about 25 lbs per cub. ft. Medullary rays rather broad and short, but fairly numerous. Indigenous in the hills of Upper Burma and Martaban, but it can easily be grown in Central and Eastern Bengal to serve the double purpose of supplying wood for matches and bark for an excellent paper stock. The growth is fast and the tree produces shoots copiously from stools and roots.

21.—*Ficus hispida*, Linn. Vern.—*Dumyr* (Bengal). Wood ash colour, soft and somewhat mottled. Weight about 32 lbs per cub. ft. Medullary rays some fine and others broad, in long narrow plates. Habitat—Bengal, Assam and the Outer Himalayan forests up to 3,500 ft.

22.—*Populus alba*, Linn. Vern.—*Jangli Frast* (Kashmir); *Mal* (Punjab). Wood white or redish white, soft, even-grained and elastic. Weight 28 to 44 lbs per cub. ft. Medullary rays very fine, numerous and regular. Habitat—from the Punjab Himalaya, westward through Kashmir to Afghanistan and Baluchistan. This tree has already been mentioned. It is undoubtedly one of the best woods for matches, especially for match-boxes.

23.—*Populus ciliata*, Wall. Vern.—*Bangikat* (Nepali); *Garpipal* (Kumaon). Wood brownish grey and soft. Weight 26 to 35 lbs per cub. ft. Medullary rays fine, numerous and regular. Habitat—Himalaya from the Indus to Bhojan, 4,000 to 10,000 ft.

The wood of this tree may be found almost as good as that of the last preceding species for matches and match-boxes. For a factory established in Bengal, a supply can be obtained from Darjeeling, where another species of the same Genus, called *Sungribong* by the Lepchas, is also found, the wood of which is expected to be of the same quality.

The following trees, belonging to the natural order Coniferae, are commonly known as pines. Some of their nearest allies are very extensively used in Sweden and Germany. Containing resin to a large or small extent, they burn very

well and are, owing to the extreme regularity of the structure of their wood, peculiarly well suited to the purpose.

24.—*Pinus excelsa*, Wall. The Blue Pine. Vern.—*Tong-schi* (Bhutan); *Kail* (Jaunsar). Wood moderately hard, reddish white. Weight about 30 lbs. per cub. ft. Medullary rays fine and numerous but rather irregular. Habitat—Western Himalaya and Bhutan.

25.—*Pinus longifolia*, Roxb. The Long-leaved Pine, Vern.—*Chir* (Hind), *Griet* (Lepcha). Wood moderately hard, reddish brown. Weight 35 to 45 lbs. Medullary rays, as in the preceding species. Habitat—Outer Himalaya from Afghanistan to Bhutan.

26 *Picea Morinda*, Link. The Himalayan Spruce. Vern.—*Rai* (Hind). Wood white, fairly soft, weighing about 30 lbs. per cub. ft. Medullary rays fine and very numerous. Common in the Himalaya, generally above 7,000 ft. from Afghanistan to Bhutan.

27.—*Abies Pindrow*, Späch. The Himalayan Silver Fir. Vern.—*Morinda* (Hind). Wood white and soft. Weight rather less than 30 lbs. per cub. ft. Medullary rays very fine, very numerous and regular but rather short. Habitat—Outer Himalaya, between 7,000 and 9,000 ft. westward from Nepal.

This, as well as the last preceding tree, will probably be found to be the best procurable in India for matches. For match boxes, however, it is feared that they will prove too brittle to stand the usual process of manufacture.

To the above list may be added thick-walled, straight bamboos, like *Bambusa Balcooa*, Roxb., and *Bambusa Tulda* Roxb., so common in Bengal. The inner soft tissue, when sufficiently dry, burns very well; and the internodes can be split into match-sticks most easily, especially when green, without the help of any special machinery.

If match-sticks are made out of bamboos, match-boxes can also be made of the same material, preferably from the more hollow kinds. These boxes of course will be cylindrical instead of the usual rectangular shape. A long internode can be cut up into several pieces of the length of the matches. One of the open ends can be closed with a thin circular disk of any kind of wood to form the bottom, and the lid can be of another piece of bamboo internode plugged by another disk, as made to fit the other end of the tube,—somewhat like the wooden cases, used in Homœopathic pharmacy. The mixture for the friction surface (phosphorus in the case of safety matches and powdered glass and glue in the case of ordinary

friction matches) may be applied on either end of the tube or on a flat surface which can be easily prepared for it on the side. The cylindrical box can be as easily covered with paper and labelled as the ordinary rectangular boxes, perhaps even more easily. The rough sketches given below will explain my idea.

Wooden disk for the lid.

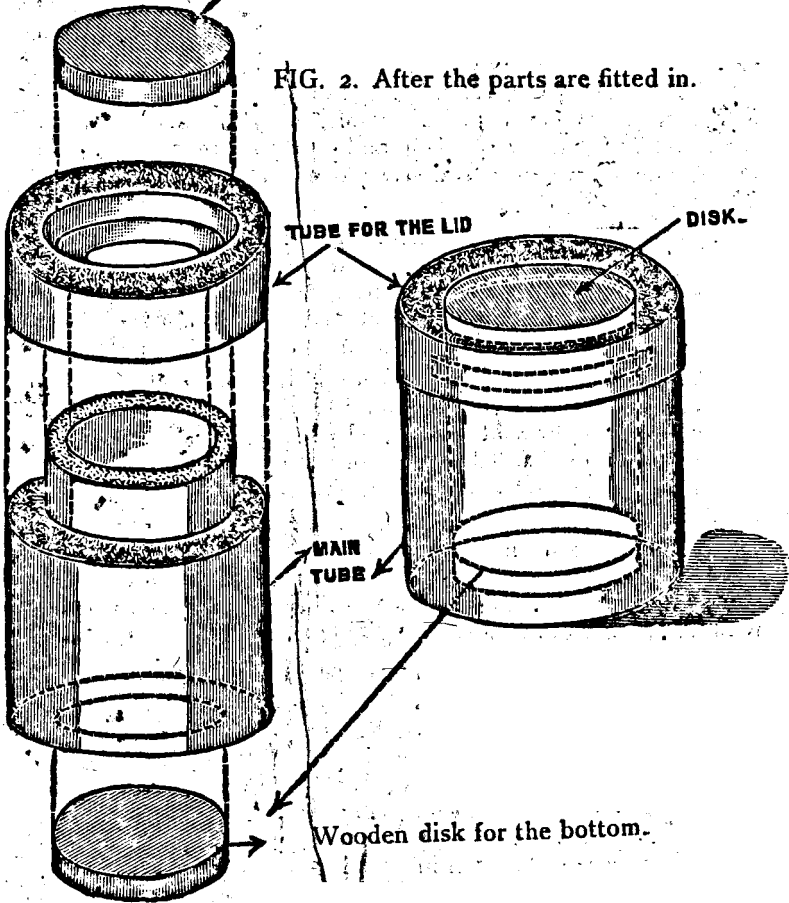


FIG. 2. After the parts are fitted in.

FIG. 1. Before the parts are fitted in.

It is recommended that if a match factory be established in Calcutta or its neighbourhood, trial should first be given to such local trees as *Simul* (No. 2); *Amra* (No. 7), *Genwa* (No. 19) for matches, and to *Kadam* (No. 13) and *Pithali* (No. 18) for match-boxes. If these prove suitable, the expense of obtaining Firs and Poplars from the hills will be saved.

I may add, in conclusion, that if samples be required of woods that are not locally available, application should be made for them to the Imperial Forest Economist, Imperial Forest College and Research Institute, Dehra Dun, who can arrange to have them forwarded from the nearest source.

## Tobacco Culture & Cure.

BY SADDHA RAMASUBBIAH, Esq., MANDALAY.

The subject chosen is Tobacco, its cultivation and cure. Viewed from the medical point of view, the leaf has many injurious effects, all of which have been condemned, in no unmeasured terms, by the most competent, qualified and up-to-date medical experts. Apart from its deleterious effects, the question is one of vital importance; when viewed from its economic aspect, on account of its far-reaching importance, it holds its own in the industrial line. 25% of the whole population of the world consume it in some form or other in chewing, snuffing or smoking. At the present day in England, legislation has been effected to prevent promiscuous smoking among boys under 18 years of age. This is only in accord with our right judgement and sound commonsense. Quite similar to this, is opium which has, up till now, been largely cultivated in India and exported solely to China. Already, the Chinese nation has awakened to the necessity of passing legislation to exclude the introduction of opium, whose baneful effects are only too well known to need any description from me. A like legislation has been passed in Japan. Judged from



these circumstances, the cultivation of Tobacco is no longer justifiable on moral grounds. But, pending any state interference with this affair, there is no reason why this paper should not be read, and, I am glad to be able to acknowledge with sincere thanks to the Secretaries of the Industrial Conference, who have been so good as to allow me, in this great assembly of learned persons, the permission given to me to place my views on such a momentous question as Tobacco.

The botanical name is *Nicotiana Tobacum*. It is supposed to be the native of America, though some assert on the contrary, that it was known in Asia long before America was discovered. It is, however, quite possible that this plant is indigenous both to America and Asia. There is, however, this much known that, in America, wild varieties of this plant are known, while, in Asia, it is not so. From this, we almost conclude that it is indigenous to America. It happens, however, as far as India is concerned, this plant was brought into prominence in the reign of Akbar. The total area of tobacco cultivation in India is about 2,000,000 acres. In the Madras Presidency, this crop, at the present time, is found in all parts. The Coimbatore and Krishna Districts grow nearly half of tobacco produced. Trichinopoly and Dindigal that are famous for the cheroots and cigars, produce very little tobacco. The area under tobacco cultivation there, is not more than a small number of acres. The prominence which these places enjoy is not on account of the superiority of the produce of tobacco, but on account of the superiority of its preparation. In Southern India, the tobacco used in cheroots and cigars is chiefly produced in Coimbatore and Salem Districts. Burmese grow tobacco well, but their curing is far from satisfactory. In Europe, the tobacco is so satisfactorily prepared and cured as to equal the best kinds produced in the West Indies.

Repeated efforts have been made by Government to improve tobacco culture, but unfortunately, without success. In order to acclimatize the potato plant, experiments were per-

sistently made in Europe, for nearly 100 years, and after that time magnificent results were obtained. We should never judge from one or two experiments but we should perform many experiments before coming to any conclusion finally. If the Europeans were not satisfied with the first few experiments of a few years, there would be no potato plant now growing in Europe and the Irish potato would be a thing unheard of.

It is a somewhat serious matter that one of the most serious famines ever known to Ireland, in 1845, is attributed to the over-culture of potato. The fact was that the people to Ireland became so fond of potatoes (because, that is their staple food) that they rejected corn crops and nearly the whole of the land was grown with potato. To non-enterprising people, the temptation is so great as to cultivate the crop which produces a large quantity at a small outlay. The population deteriorated rapidly, livestock was almost altogether neglected and the whole country became almost entirely a potato garden. Many families, at the time, subsisted entirely on potato. This went on for some years, until 1845, when the potato disease broke out and the entire crop was lost. Every plant was rotten by disease. They had no other crop to fall upon and the famine broke out over the whole of the country. This is a very good example of the bad policy of agriculturists to depend entirely upon one crop. We should have various kinds of crops and also of animals, so that if one is attacked by a disease the other may be saved. It very seldom or never happens that all kinds of crops and also of animals are attacked by a disease. There is a homely saying in English—“Never place the eggs in one basket.” We should never have only one crop, because if the disease attacks that crop, we are ruined. Had the efforts made by the Government for the improvement of the tobacco culture, been made in improving the agriculture in general, as they have opened their eyes now, there would have been far better results.

Good tobacco was produced in Southern India from the

exotic seeds, but the failure, generally, has been in the manufacture and the preparation of it for the market. The general complaint in Europe against the Indian tobacco is that it is either so mouldy as to be unfit for any use, or so dry and brittle as to be fit only for making snuff. Good tobacco has been produced in the country where skill and enterprise have been used in selecting the soil, in applying the manure, in curing, etc. It is difficult to combine in one person all the qualities necessary for a producer and a curer. Tobacco has been sent from this country which has commanded a price 10 to 15% higher than the best tobacco produced in America. Madras exports a large quantity of tobacco worth £ 50,000 to Burma etc. It is worked up to Burma into celebrated cheroots sent back to Madras market with the name and sold at a high price.

For growing tobacco, the climate should be warm and slightly moist (neither too wet nor too dry). It is the extremes of draught and moisture which are objectionable to tobacco. Where the rainfall is too heavy and sudden, the young plants are killed altogether. If on the other hand, they occur when the plants come to maturity, the leaves are torn. Some of the best tobaccos produced in the Madras Presidency are raised on the islands of the Godavery called (Lanka) and is known as Lanka tobacco.

It has been proved again and again, by analysis, that the best tobacco contains but very little nicotin and albumen, while the bad tobacco, which has bad smell and worse taste, contains large quantities of these two ingredients. So well has this fact been established that we can at once determine the value of tobacco by the albumen and nicotin contained in it. The best American tobacco contains about 2% of nicotin while the bulk of the tobacco in Southern India contains about 3½% of nicotin. The bad smell and pungent taste of tobacco are due to the bad curing and not to the tobacco itself.

An important constituent of tobacco is potash, generally found in the state of organic salts. As regards Potash, the

greater the quantity, greater is the value of tobacco. The whiteness or the permanency of the ash of cigar is due to the presence of Potash. The presence of salts of potash improves greatly the bearing capability, the combustion being more regular and uniform throughout. In many Manilla cigars, the ash is white and firm, while in the country cigars, the ash is grey and drifting. The price of tobacco varies greatly, depending upon the peculiarities. However nice our tobacco may be, if it is deficient in Potash, it cannot be called a good tobacco. It is deemed of great importance in order to secure good tobacco, not to have too much lime in the soil, because the lime, if present in large quantity in the soil, is more readily taken up by the plants than potash, which is therefore left aside.

Some of the best tobaccos were produced on Nilgiris which are very deficient in lime. This tobacco yielded about 32% of Potash, while those grown on the plains contained only  $\frac{1}{2}$  or 30% of Potash. Many varieties of tobacco of Southern India were analysed and the result is they contain generally 3 $\frac{1}{2}$ % of nicotin and 8% of Potash. The tobacco grown on the foot of the Western Ghats in the Tinnevely, Madura, and Coimbatore districts contained about 32% of Potash. The richness of tobacco in Potash is due to soils of those places being washed down from the hills which are formed of feldspar, which is converted into Potash by decomposition.

For growing tobacco, Potash in the soil is essential, but the soil of Southern India is nearly altogether wanting in Potash, because the soil is cropped from time immemorial with different crops without any return to it and thus it is exhausted of Potash and other ingredients. In order to grow good tobacco, we must select the soil where there are granite rocks or where agriculture is not practised to a great extent. It is true that the best tobacco can be grown only on the best soils, but we can grow second class tobacco on an inferior soil, by farming and good manuring. The

better the soil, the better is the results. As a rule, rich, friable, loamy sandy soil is best suited for its culture. Too much of clay is prejudicial, because we can not find in it fine tilth necessary for the culture. Too much lime is objectionable, as it prevents potash from being absorbed by the plants. Too much sand is injurious, because the land dries rapidly.

In selecting land for tobacco culture, we should take care to select that piece of land that is well drained and also not too much exposed. If the field is too exposed, the high wind tears the leaves and lessens their commercial value. The tobacco crop may be commenced either by sowing the seeds in nursery bed or direct in the field. In parts of the country where it is grown without the aid of irrigation, it is customary to sow the seeds at once in the field. However, in Southern India, generally, the universal practice is to sow the seeds. The nursery bed is prepared in the following manner:

The ground is first dug deep and thoroughly pulverised, in the process manure being at the same time thoroughly mixed with the soil, care being taken, when fold yard manure is used, to use it in well decayed state. After this preparatory work, the land is divided into small beds. The width of these beds being regulated so that we can, with ease, reach the centre on either sides. The length of the bed may be anything we like, but the width should not be more than 4 feet. A bed 4 feet wide and 9 feet long will yield seedling plants enough to plant one acre of ground. The surface of the beds should be slightly raised. There is a good plan practised, in America to spread over the seedling beds, a layer of brushwood and to set fire to it, in order to kill the eggs of insects on the surface of the ground and also to destroy the seeds of weeds.

As the insects are averse to ashes, this plan prevents or deters the depredation of them and their little maggots and grubs, when the plants are above ground. Another advan-

tage is that these ashes contain potash and thus they contribute to the support of the plants. There is perhaps no seedling plant, when young, more liable to be injured by the heavy rain or the rays of the sun than the tobacco plant ; and hence it is of great importance to take measures to protect the young seedlings by some shade when coming out of the ground. In America, it is usual to erect a stake and to spread a piece of calico cloth over it. The cost of the cloth is very small, because only three square yards of the cloth will be required for the bed of seedlings sufficient to plant one acre. Light also penetrates through and keeps the plants in good healthy state. In some places, they cover the beds with palmyra leaves etc. When palmyra leaves are used, light does not penetrate and therefore the plants suffer. The plan of using calico is far superior to that (adopted in India) of using palmyra leaves, etc. The latter affords shelter to obnoxious insects and when they are removed, the growth of the plant is suddenly checked for a time by sudden exposure to severe light. During cloudy weather, or at night, the calico may be temporarily removed.

Coming again to the subject of preparing the nursery-beds :—After the burning of the bushwood on the nursery bed, they are carefully raked over the bed so as to spread uniformly over the ground. The seed is next thrown very shallow in lines across the bed and then the whole surface or the bed settled down (beaten down) to give a little more consistency to the ashes. To raise plant for one acre of ground  $\frac{1}{4}$  of an ounce of tobacco seed is quite sufficient.

It is difficult to distribute the seeds uniformly over the ground ; in order to obviate this difficulty, a fair quantity of sand or ashes is mixed with the  $\frac{1}{4}$  oz. of the tobacco seeds and then mixture is sown uniformly over the lines in beds. The sand is mixed with the seed in order to ensure an equal distribution of the seed over the ground, when the seed is small.

Very small seeds depend entirely upon the soil for their nutrition, plants of very large sizes depend upon their seeds for nutriment in the beginning.

After the tobacco is sown, the next operation is to water the beds, but never to flood them. To secure the best results from the tobacco seeds, we should take care to water the seedlings with a watering pan, which have very fine perforations. If the weather is dry, the beds should be watered every night by simply moistening the ground. When the plants are from 4 to 5 inches high, they are fit for transplanting. It is very important that we should never allow the plants to crowd together. When the plants have germinated, if they are crowded, we should remove those that are weak and leave those that are healthy. In transplanting the seedlings, the land should be thoroughly prepared in the following manner:

The selected land for tobacco culture should be ploughed not less than eight times and should be furrowed with the plough at intervals of 5 feet from each other and this should be converted into an open trench with a depth of 9 inches. These trenches being completed, the land is ready for the reception of night-soil. The night-soil, which we collect in the municipal and union towns, is to be systematically placed in the open trenches, to the depth of three inches, and the soil on each side of the trench is to be raked in over the night-soil and a ridge made with the superfluous soil. This process of disposing of the night-soil is to be repeated till the entire series of trenches have been utilized, when a second set of trenches should be opened between every two covered ones; when these have been similarly enriched with night soil, the area of land will have been fully manured. The land should be ploughed at right angles to the parallel series of manual trenches, so as to spread the manured soil over the land and then two or three ploughings would complete the object in view thoroughly.

When the time for transplanting the tobacco seedlings is

at hand, manure each acre of land with burnt-earth, mixed with bone-dust and lime. If the bone-dust is not available, apply sufficient quantity of the waste products of the manufacture of aerated waters. If we cannot get the above-mentioned manures, apply 10 cart-loads of well-cooked farm-yard manure, with 10 cart-loads of tank silt. In addition to this, sheep manure also can be used. For growing leaves, any amount of manure can be used. For producing grain crops, care should be taken in the application of manure. After scattering the manure, plough the land well. The land should be ridged, having the ridge nearly two feet and a half apart. The seedlings should be planted on the ridges at a distance of from 2½ to 3 feet. We should regulate the distance according to the variety we grow.

It is never wise to grow plants so close together that, when they are grown, they only dash each other, when the strong winds blow. The best time of day to transplant is at 4'clock in the afternoon. Because they have the whole of remaining day and night for them to be established. If we have calico shade, there is no difficulty on transplanting tobacco at any time. It suffers when it is exposed suddenly. By means of calico, it can be gradually acclimatized. As regards planting, it is a practice to use a piece of wood called "Dibble" to make holes for the plant. Bring the seedling plants to the field in a basket covered with plantain leaves. It is very important to have the roots in their natural position. To have that position, the holes must be sufficiently large.

In India, we cannot grow tobacco without irrigation. As soon as the transplantation is over, we must repeatedly irrigate. Watering once a week or ten days will do. There is some barbarous practice in Hyderabad, etc., where 7 lbs of tobacco seeds are sown per acre broadcast.

When the tobacco plants have reached the height of 9 to 10 inches, we should hoe the soil vigorously ; partly, in view to loosen the soil, and partly, to remove the weeds. Weeds



must be carefully removed. When the first hoeing begins, it is customary to remove the leaves growing near the roots, and then to earth up *i.e.*, draw up the soil round the plants. From the day of the first hoeing until the tobacco is cut down, worms should be looked for in the fields. The value of the leaves depends mainly on their not being worm-eaten. Early in the mornings, the worms are on the top of the leaves; when the sun becomes hot, they creep underneath near the roots. They should be carefully searched, for they hide themselves. We should also then remove all the suckers and side-stems. It is much better to pinch them off than to cut them. As soon as the flower-buds appear, we should nip off the heart of the plant, leaving 10 to 14 leaves according to the strength of the plant *i.e.*, the top of the plants which checks the upward growth. The process is called topping. The object of removing the suckers, the flower-buds and tops is that all the energy of the plant may be spent in the development of the leaves. The first result of topping is that the leaves become thicker, heavier and richer.

This is three month's crop. The nipping or topping process should not be applied to plants kept for seeds. As regards the harvesting of the crop, the first evidence of its reaching the maturity is stickiness or gumminess over the leaves. The next is the appearance of yellow patches on the leaves. It is desirable never to cut the leaves too early. In climates like Southern India, we can keep the tobacco plants longer on the ground than in other countries, where we cannot trust the weather, having frequent showers, now and then. The gumminess is very important at the time of curing and therefore the plants are cut when there is most gummy matter. By a shower of rain, the gumminess is washed but it is returned in 3 or 4 days. Therefore, when the gumminess is washed off by a shower, we should wait before cutting the plants until the gumminess is restored.

There are two ways of harvesting: one is to cut down the plant and the other is to gather the leaves separately.

There are advantages as well as disadvantages attending both the plans. We know that the leaves of the lower portion are older than the upper leaves. So, if we wait to allow the upper leaves to mature thoroughly, the lower leaves get more than matured. For these it is better to cut the whole plant and separate the leaves at the time of curing; by this, much labour and danger are saved. Take a knife and holding the top of the plants between the fingers of the left hand run it through the stalk from the top to within two inches of the base. The plant is then cut off above the root. The process of gathering the leaves first is convenient when labour is abundant and the crop is over a small area. Then we gather the leaves that are fit for gathering and leave the others till they mature and in this way, the tobacco leaves do not require sorting. When the leaves are gathered separately, we require a larger area of drying sheds. Tobacco is a crop liable to be injured by small green flies. An application of a mixture of soot and ashes would have a very good effect. \*

In India, tobacco is cured by what is called the rapid fermentation process almost amounting to putrefaction. In England, it is cured by what is called the natural process which is slower than that practised here. In this country, the temperature is allowed to rise as much as 200°, while in Europe, the temperature is 98° to 100°. In America, they adopt a slow natural process which is also by heat. They have tobacco curing houses where the windows may be closed and the temperature reduced or raised by means of pipes. They do not depend upon the outside atmospheric temperature. They perform by this contrivance in 3 or 4 days what is done in India in 3 or 4 months. There, if the tobacco is moist, they give dry air, and if hot, cold air and so on. Though the practice of tobacco curing differs much in some particulars in many parts of this country, yet they all subject the tobacco to a high temperature.

In harvesting, the general plan adopted here is to cut the crop always at 4 o'clock in the afternoon and to allow the

plant to wither (to fade) until the next morning. On the following morning, the plants are collected together in rows placed up-side down with stems upward and covered over with straw. In the evening, the straw is removed and the plants are again spread on the ground, care being taken not to keep them too close together. This is done for 4 days. The tobacco is now carried to the house where it is hung for 4 days. The tobacco is now carried to the house where it is hung in rows either in the house or in the shady veranda for 30 days, by which time, the stems and midribs are quite dry and the leaves are then gathered off the stems. The leaves are then tied in bundles of 25 each; when all the tobacco has been made in bundles, a platform is prepared in a corner of the shed; it is usually raised about six inches from the ground. Split bamboos resting on logs will answer well for the purpose. On this platform, the bundles are piled up in a stock of nearly 64 cubic feet. The stock is then covered on all sides with straw or leaves and the whole is pressed down by heavy logs of wood. In this stock, the fermentation begins. Frequently in dry weather, to facilitate the fermentation, the ryot makes a decoction of the tobacco stems and mixes Jaggery with it. The solution thus made is sprinkled over the leaves; if the fermentation process is carried too rapidly combustion follows. In order to have uniform heat, the ryot turns the heap round and round every ten or fifteen days. By so doing, he brings the outside plants to the centre and the centre one outside. This fermentation is highly objectionable. It ruins the tobacco altogether. By it all the aromatic properties are dissipated and tarry, sticky, and pungent compounds are left behind. In this country, the fermentation is not kept under control and is carried too far. Our great object in curing is to remove the albumen and nicotin. The practice for curing varies greatly according to the climate and soil.

The following is the practice of harvesting and curing tobacco which should be adopted here. The plant should be

cut down when the majority of the leaves are ripe. If the climate be a reliable one, we should not be in too great a hurry to cut down the crop. We should never cut down the plants when wet with dew or rain; never until the gummy matter is restored. We should cut down the plants bodily at 3 or 4 inches above ground. If the topping or suckering process has been properly performed, the leaves will be properly matured and will be thick. It is generally wise, in a hot climate, to cut down the plants in the evening, at 4 o'clock. If any of the plants are inferior, we should leave them on the ground to mature. The general practice is to cut down the plant at night and leave them in the furrows all night, taking care not to crush them. In the following morning, we may take them to the drying sheds, the plants may either be strung on ropes or we may tie the plants in pairs and hung them across on bamboos. The bamboo will answer better than stringing, as the string or rope breaks. The plants may be hung from end to end, leaving 6 inches space at every end, for coolies remove them. The bamboos are generally 7 feet in length. It is sometimes the practice, when the climate is not so hot, to leave the plants on the ground for 3 or 4 days. This practice is not so advisable when the temperature is great. The first great object in tobacco curing is to get rid of the large quantity of moisture the plants contain.

The bamboos are hung across the sheds parallel to and 16 inches apart from each other. The plants are left hung for 8 or 10 days. By this time, the stalks are beginning partly to dry. While the plants are hanging in the sheds, it is very wise to keep off the hot winds. When the heat is excessive, it is occasionally necessary to sprinkle water on the floor. The sudden exposure to sun is highly injurious; for it makes the tobacco thin and papery. We should dry them gradually in shade. When the plants are dried in the shade, we should first collect them in square stock or heap over straw spread on the ground and cover the heap with straw, to put out the

wind. After putting straw, some weights should be placed over it. As the fermentation proceeds, we should increase the weights. Let it remain thus for a fortnight, then open the heap and thrust the arm in the middle. If the tobacco is hot, break up the heap and make it up again; after this, every 8 or 10 days thrust the arm in the heap and when it is hot, break it down and make it up again. Continue this until the heat subsides. The bigger the heap, the quicker does the tobacco ferment. When no more heat appears in the heap, the tobacco is cured. The fermentation process is preliminary to putrefaction. We should never allow the temperature to exceed  $100^{\circ}$  F. in the centre of the heap. If the temperature is found greater, we should immediately turn the heap upside down. If the fermentation is too rapid to be controlled, on account of the much moisture remaining in the plants, we should re-hang them on to the bamboos, but not for a long time; because, the exposure of the plants at the time of curing dissipates the volatile bit contained in it and destroys the fragrance.

Sometimes, it is the practice to tie the plants into bunches of 6 to 8 before building up in the stack to moderate the cost of labour. In the curing process, we should have great precaution. As the fermentation process goes on, we should increase the temperature to  $120^{\circ}$  F. and not more than that. The most valuable constituents of tobacco, to which is due its fragrance, is dissipated by high temperature. When fermentation goes on, we should turn up the heap to secure a uniform heat by bringing the central bunches outside and the outside bunches inward. The object of this turning is first to keep down the temperature and next to secure the uniform temperature. If we allow the temperature to rise above  $100^{\circ}$ , we get the black, sticky, tarry leaf of nascent odour, instead of that of brown golden colour.

The curing operation requires not less than a month. During this period, it becomes generally necessary to hang the plants 3 or 4 times. The tobacco undergoes during this

time several important chemical changes. The albuminoids are broken up and dissipated which evolve and carry with them a certain quantity of nicotia. Generally, a third of nicotia is said to be thus carried away. There is a great uncertainty about the chemical changes going on at the time of fermentation. Even in the case of nicotia, there is a great uncertainty.

After the lapse of one month, we must first ascertain whether tobacco is properly cured or not. The simplest method is to stretch the tobacco leaf; if it stretches without breaking and if the colour of the leaf is uniform throughout and its odour aromatic, then, we must suppose them to have been well cured. If the tobacco is badly cured, we have yellow or different coloured patches over the leaf; the leaf breaks when stretched and the odour is pungent. To retain the aroma, we should not expose the plants too early. After the tobacco is cured, we should strip off the leaves from the plants in moist dull days. If done on a dry day, the tobacco will break and will be fit for snuff only. When the days are hot, we should do it at night. We should then sort the leaves in three qualities and tie in bundles of 25 each. After this, we should stock the bundles in a square heap and cover the whole heap with gunny cloths or any water proof cloth to keep off the wind. If the leaves are very dry, it is the practice to sprinkle a solution of jaggery and tobacco stalks on them. By this process, the tobacco leaves become soft and pliable.

The Americans have adopted a system by which they can cure tobacco within 48 hours and in a very small space. To be successful in tobacco-growing, we should improve both the culture and its cure. If one of them is bad, we have the same bad result as when both are bad. To secure the uniform result on a large scale, we should cure the tobacco in large quantity. If grown and cured in small quantities, the quality varies and there is wholesale purchase of it. There must be a class of men who will only cure the tobacco and a class to

cultivate it. This practice is adopted almost universally in Europe. There, the tobacco curing is monopolized by Government.

Tobacco is a paying crop. An ordinary crop is six hundred pounds of cured tobacco per acre. 100 lbs of tobacco is on the average sold for Rs. 10. The expenditure of labour of curing is very great. But, fortunately, it so happens that the tobacco culture and curing are performed at a time when there is little agricultural work going on.

There are many tobacco growing companies at Manilla, Havanah, Sumatra, Java, etc., in the Far East which have for years been paying, on an average, 30% dividend per annum. For the last quarter of a century, in order to acclimatise the tobacco seedlings in the nursery beds, Americans used a few yards of calico covering over the nursery bed. Now as they have acquired advanced scientific knowledge in agriculture, they invented a cloth called 'cheese cloth' or 'tobacco shade cloth'. Hundreds of acres of tobacco is grown under the shade of this cloth in America, West Indies, etc.

There is a remarkable difference between tobacco grown under cloth and in open space. Tobacco cultivators in America cover the top of the frame work over the field by the said cloth and close the sides of the fields also in the form of walls. Thus, the entire area is enveloped by this cloth. This cloth is made up of hard twisted yarn of superior cotton. Thus these plants are protected from strong wind and rain. The crop grow quickly under the shade of this cloth and the shade of this cloth makes the leaves very superior in quality. This cloth can be used for four consecutive crops for covering purposes.

At Virudupatti and Sivakasi, in the Tinnevelley District, of the Madras Presidency, the Shanars, a very intelligent class of people, produce the best tobacco. They get 75 to 100 Rs. net income on the produce of an acre of tobacco. If these cultivators follow the improved system of tobacco growing under tobacco shade cloth, they will get the best

quality which will fetch higher prices in the market. Indians copy western habits, such as dressing, smoking, etc., but they do not care to master and copy their business habits.

The trade of cigars is a profitable one, because 25% of the population in the world use tobacco leaves in the shape of cigars, snuff, etc.

## A possible source of Wealth.

BY MRS. HIRONMOYI DEVI, MUKERJI,

*Honorary Secretary, Mahila Silpasamiti, Calcutta.*

I do not claim to have any knowledge of the weighty and important subjects which are going to be discussed in this conference; but I understand that one of its objects is to point out to the public the hidden industrial forces of our country and to try to turn them to account.

My only object is to draw your attention to one of these in which I am interested. It is for you to consider how best to bring it into action, to utilize it and make it fruitful. This force that I would speak of is the capability of undertaking productive work now lying latent in ladies of respectable families.

Circumstances have changed with the times—the necessity for earning a livelihood has now-a-days made itself felt even among the women of our middle classes. Also, there are many who, though not actually in want of necessaries of life, would gladly undertake remunerative work, if they could do so, without violating their social customs or forfeiting the respect of their community, if by that means they would be enabled to secure a greater degree of comfort for their family. Women, as a rule, cannot earn money in the same way as men, nor is it desirable, for many reasons, that they should do so. Those that are compelled to earn money outside their homes cannot attend properly to their domestic duties and the chil-



dren, if any,—though they might derive some material benefit from such earnings, they will most probably suffer in more important particulars, for want of proper material care and control. But as no hard and fast rule can be laid down that will apply universally to the great diversity of circumstances that may arise, this discussion is useless here. Personally, I have nothing to suggest regarding the work of those women who have, out of necessity, taken to outdoor professions. For my purpose, it is also unnecessary to speak of the lower classes of women who are engaged in menial work. Where activity in any shape already exists, the problem may be taken to be so far solved.

The question now is how can women of reduced circumstances belonging to the gentle and middle classes, whose number is legion and whose sole aim and endeavour in life is to look after the comfort and happiness of their family and who would for that purpose as well as for their own sakes welcome some addition to their resources, how can they earn some money? The first consideration is obvious—by following some industry at home and in their leisure hours. But, it does not follow that all the industries to which our ladies who work devote their leisure, at present, are necessarily of the productive variety. Proper training is necessary for the acquisition of money by industry—but even training alone will not do. Sufficient demand for the work done and facilities for realising the price, as soon as the work is ready, are also necessary. There can be no doubt that many of our women will be only too glad to set to work, if such facilities are afforded them.

There are many Mahommedan families in my neighbourhood. In most of these, the master of the house earns from Rs. 10 to Rs. 20, a month. This small income is hardly sufficient for the bare necessities of life, yet, I always see their children dressed in new clothes on festive occasions. On enquiring, I found that all the women of the family—mother, daughter and wife—are in the habit of taking in coats to sew

and the income from this source they never spend, however hard up they might be for ordinary domestic purposes, but set it apart for their festivals.

I came gradually to learn all particulars. There are two or three tailors in this locality. A capital of one hundred or even fifty rupees is sufficient for the tailor to start with. Many of these tailors may not know the cut of any other clothes, but they are all well skilled in the cutting of coats. The first business of the tailor is to procure the services of a few old widows about the place. Then he makes up bundles of cut pieces for coats and sends them to all the neighbouring houses through these widows, who are known as *kamwalis* or procurers of work. Every coat has with it the necessary supply of thread, buttons and cloth for bordering. Each family takes as many coats as it can manage to finish. Every evening, the *kamwali* brings fresh work from the tailor, distributes it among the neighbouring families the following morning and takes back the coats which were distributed the day before and have been finished. The tailors sell these to traders. From my enquiries about the matter, and particularly from the fact of taking work, for several days, from the *kamwali*, he probably apprehended that I wanted a share of his work so I could not get the exact address of these traders, but gathered that they belonged to the neighbourhood of the Chandney Bazar. These tailors go searching through the town and buy cheap stuffs at auction sales. They hire men for cutting the coats, if they have more work than they can manage themselves. No *kamwali* receives any fixed pay—she is engaged on the commission system. The price of labour for these coats is so low that one could hardly earn a living exclusively by such work. As an experiment, I worked one day from morning till night, but could not finish more than four of them. These coats are of different sizes—small, medium and large, the remuneration given being—1½ and 2 pice respectively. I have brought some for you to see. These coats are sent even to remote provinces and districts. Besides the

commission from the tailor, the *Kamwalis* also get a commission of one anna in the rupee from the workers. Then again, the *Kamwalis* never pay the women their dues in full and in case any one does not undertake fresh work for any reason whatsoever, she forfeits the arrears of her dues, which the *Kamwali* appropriates to herself.

Notwithstanding the paltriness of the profit which, as I have said before, cannot possibly alone suffice for a living, the women are eager to get this kind of work.

I have dwelt at some length on this matter because it shows how much a little organisation will accomplish, what type of organisation suits our people, and finally, how low a rate of remuneration is acceptable. Considering how difficult it has become for most of our middle class families to make both ends meet now-a-days, it goes without saying that it would be a boon if their women could find proper work for their leisure hours,—under suitable circumstances, both for themselves and for the country, because there are many industries which can be developed much better by women workers than by men. Last year, many young men took to learning hand-loom work forgetting, in their eagerness and enthusiasm, the fact that a weaver does not earn more than 14 or 15 rupees a month, at present, a sum which would not be enough for a gentleman's needs; so they had to give it up after all. In Assam, every family has its loom and the ladies of the highest families weave their own clothes. And, if properly taught, there is no reason why our ladies should not, in the same way, be able both to while away their leisure and supplement their income. Again, the nature of work will differ with the locality. In towns, many gentlewomen earn money by making floral ornaments, but this is not possible in villages. Again, what is often a possible source of income in a village is useless in the town. I may mention here as an instance the spinning of sacred threads or the rearing of Endi silk worms which depend on being able to grow the *Kapas* or the castor oil plant near one's dwelling.

Though the women of our country are not generally much skilled in arts and industries, yet, we come across, here and there, with instances of some who are adepts in some particular branch or other; unfortunately, in such cases, there are no facilities for the sale of their work as people do not come to know of them, and for this reason, the arts, for want of proper recognition and encouragement, are gradually disappearing from our midst.

It is only recently that we have at last been able to understand that gold and silver treasure kept locked up in an iron safe are almost as valueless as they were in the mines. And, a country rich in mines can only be called rich where the mines are worked. This truth applies to most elements which produce wealth. There are many latent forces around us whose value we cannot appreciate on account of our ignorance. Before now, we did not attach any very great value to the Kavery falls, but how profitable they have become now that we have learnt to use them for the production of electric energy. The wealth of our country will be greatly increased if we can similarly make the leisure of our women, much of which is now uselessly frittered away, more valuable. There was a time when our women clothed the country by turning their spinning wheels. With the advent of better days, that may happen again—not that alone but many more things also.

## **The present state and future prospects of Indian Art Industries.**

BY THEODORE C. MALLER, Esq., AMRITSAR.

THE meeting of the Indian Industrial Conference offers a rare opportunity for bringing to the notice of those interested, the decay of Indian arts and handicrafts. This favourable occasion should be taken advantage of for devising ways and

means for the preservation and further development of certain industries that have made India famous throughout the world for many centuries in the past, and also in the present time.

In the following pages, an attempt will be made to show that the task of reviving the ancient arts and handicrafts of India is not one that need be considered very difficult, provided that the members of this Conference have the interests of Indian arts and handicrafts earnestly at heart.

The subject may conveniently be divided into the following sections ;—

- (1) Causes of the decay.
- (2) Means for the revival of the industries.
- (3) Commercial prospects and future.

#### *Causes of the decay.*

The primary cause of the decay of indigenous arts and handicrafts is undoubtedly the lack of interest shown by wealthy and intelligent native citizens in home productions.

It is only the European who keeps alive the last remnants of these once flourishing industries. There is scarcely a European house in India that does not contain a collection of choice specimens of native workmanship, and it seems as if solely the Europeans appreciate the originality and beauty of native-made art-wares. This is not as it should be. For centuries past, rich Indians have taken legitimate pride in the possession of indigenous art treasures, and there is no reason why the wealthy natives of the country should not continue to patronise and encourage the art industries of this country.

Another cause of the ruin of existing art industries arose in several ill-advised attempts that were made to create an export trade with hand-made articles, which, without the aid of mechanical contrivances, could only be turned out in quantity at the expense of quality. It will take years before Indian wares will be able to compete, in point of price and superior finish, with foreign factory-made articles and every attempt in this direction is foredoomed to failure. The export

of quantities of badly finished articles is not the way to revive languishing art industries, but a certain means of extinguishing them entirely. Who does not remember the exquisite specimens of Cashmere, Lucknow and Madras silver work, of Moradabad Brass ware, Punjab wood carvings, Delhi ivory paintings of some 15 or 20 years ago and who can help regretting the decay of these handicrafts, when seeing the poor workmanship of the some wares offered for sale to-day? This general deterioration is due to the endeavour of artisans to produce cheap articles which catch the eye but have no artistic merit. A point has now been reached at which the degradation of articles of the Indian art industry has become such that export has practically ceased and no person of taste would buy goods which have nothing left of their former unique charm but the name.

#### *Revival.*

The export of manufactured wares may be the aim of every industrial enterprise large enough not only to supply the home demand but having a surplus for outside disposal. Indian art wares will have a sufficient market in this country, if steps are taken to develop the latent possibilities of native talent and if Indian gentlemen will make it a point of encouraging existing handicrafts in their own province or presidency. If a fraction of the sum of money spent every year by wealthy Indians on the purchase of foreign-made articles, for domestic use and decoration of interiors, were spent in this country in encouraging native talent, whose industries, now languishing for want of support, could be preserved and revived. Many instances could be quoted where original and highly artistic industries are dying out for want of encouragement. Among others, Hoshiarpur ivory inlaid work, Sialkot silver wire damask work, Lucknow and Krishnagar high-class modelling, Manipuri brass wire inlaid work, Bidri and Tanjore metal work, Bombay pottery work, are industries capable of high artistic development, but are

all, on the point of extinction for want of support and encouragement on the part of well-to-do Indian citizens.

If we desire to improve the standard of excellence of such industries, we must requisition all the means at our disposal for promoting the object in view. The existing "Schools of Arts", supported at considerable expense by the Indian taxpayer, are excellent institutions in themselves but their influence is scarcely felt where one might expect to find results, namely, among the artisans of their respective provinces. Schools of Arts are not commercial institutions, that is to say, they cannot be managed with a view to paying their own way or for showing profits. Their right of existence is based solely on the influence they exert, or are supposed to exert on the art industries in their province. Judging these schools in this light, they must be pronounced a failure up to the present, for they have failed to inspire the arts and handicrafts of their respective province with new ideals and with new ideas. They work exclusively for the benefit of their own few pupils, who are far too insignificant in number to exert a marked influence on existing art industries. The "Schools of Arts" should cultivate all the arts and handicrafts indigenous within their geographical province, they should freely supply designs and patterns to artisans and last, but not the least, they should make it a point to give free advice to any craftsman who may be desirous of information or assistance. Schools of Arts on the European continent are guided by such principles and the results gained have been such that certain handicrafts have developed into national industries of great commercial importance.

With the active assistance of existing "Schools of Arts", an all-India "Society for the Promotion of Indian Arts" (consisting of members of all classes, races, creeds and nationalities of Indian citizens who take an interest in native arts and handicrafts) could do a great deal in preserving, fostering and developing indigenous art industries. The contributions in money from the members of such society

would furnish the means for encouraging superior workmanship and originality in design, by awarding handsome prizes to successful competitors at periodical expositions to be held annually at the different commercial centres. An all-India exposition, every five years, to be held alternately at Presidency towns and provincial capitals, would enable the public to make themselves familiar with the productions of all the Indian art industries and to judge of the progress made after each period.

Government, being desirous of helping those who help themselves, would readily extend all possible facilities to such an undertaking and an annual subvention in aid of such a Society would be the least of the privileges accorded to the active promoters of the scheme.

It may be said that the activity of the proposed Society will encourage artisans to produce more and far too costly articles than will find a market. This will not necessarily be the case, if well-to-do Indian gentlemen will make it a point of duty to make their purchases at the annual expositions referred to. Moreover, the number of tourists from Europe and America is steadily increasing year by year, and to these buyers, no article is too expensive, provided it exhibits superior workmanship and real artistic merit.

#### *Commercial Prospects.*

There are certain industries in India which are capable of enormous development, if craftsmen can be found to engage in them and if a certain standard of perfection can be attained and maintained for the preservation of supremacy in their particular craft. The production of Delhi and Agra embroideries; embroidered pushmina chudders; carved and inlaid furniture; printed cotton hangings; ornamental silver and metal work; of rugs, carpets and ornamental floor coverings, among many other art industries, could be developed into a flourishing export trade, by simply introducing certain mechanical contrivances for giving a superior



finish to the wares. In order to enable artisans to bear the cost of such imported tools and machinery, they must first be helped to produce and sell articles of artistic and commercial value. If the proposed "Society" succeeds in establishing a healthy activity throughout India, the artisans will rise in intelligence and prosperity and the wholesale export of their goods will then only be a matter of time.

With greater appreciation of indigenous handicrafts and their subsequent prosperity, a superior class of men will be attracted to such callings, and one of the burning question of day, namely, employment for the sons of the better social classes of Indians will solve itself. Instead of crowding the so-called learned professions and depending on Government for employment as a clerk in a subordinate position, many a boy, by exerting his intelligence and commercial instincts, will have a chance of earning out for himself an honourable career, which will be to his own benefit and to the honor of his country.

## II. Co-operative Credit Societies.

BY RAGHUNATH MAHADEO KELKAR, ESQ., BARODA.

After a very prolonged education, extending over more than 20 years, both here and in England, the Government of Lord Curzon, at last passed the Agricultural Credit Societies Act in 1904. By the Act, the Government, no doubt, gave some concessions and are trying through their officers to make the provisions popular; but they could have given more concessions to make the scheme successful, if they really wanted to do so. As the writer of these lines was writing in the "Mahratta" of Poona, before the Government scheme was out, and after the bill was introduced in the Legislative Council, he naturally wished to see how far the provisions have advanced the cause of co-operation.

It must be admitted that the Agriculturists in this country, for whom the Act is specially passed, are not generally as well educated as their brethren in Europe, where these Societies have worked wonders and improved the general condition of that class and the Agriculture. Besides the ignorance of the Agricultural class, their poverty, the pressure of the Government assessment, Savkar's debts and the uncertainty of rain fall have shaken their credit and to some extent their honesty in monetary matters, and especially in point of repayment of debts. The Government measures, such as the Deccan Agriculturists Relief Act and the Land Alienations Act, etc., have also contributed to the reduction of their credit. Various other measures have worked their way to disturb the harmony and compact of the old village system and the sympathy among the people for one another is minimised. No doubt, there are many faults of the people, but if the Government showed in their measures more sympathy or encouragement, they might create a desire among the people to try to remove their own defects and to work in these directions much more than they have hitherto done.

It may be noted that among some people, who are not altogether ignorant or uneducated, there is an idea that Government have introduced this measure and are striving for its success simply because Government want to make their Jama-bandī collections more secure. More might be said on this point in the sequel.

At the time of the last year's industrial conference, four papers were read by four different gentlemen. Two of them were the registrars of the Co-operative Credit Societies. One was Sir F. Lely, the late Chief Commissioner of Central Provinces, who was in the select Committee that drafted the final Act for Co-operative Credit Societies. The writer has reasons to believe that Sir Frederick must have had a hand in removing certain defects in the first bill; but every one will admit that all the three gentlemen, being connected with the Government service, were naturally inclined to support the

policy of the Government. The fourth gentleman, Mr. Lallubhai Samaldas, a retired officer of Bhavnagar State, read the paper representing what was done in the Bombay Presidency. Mr. Lallubhai, it is well known, had once come forward to defend the Bombay Government officers in introducing a policy of depriving the Agriculturist of his right of alienation. It can thus be stated, with due deference to these gentlemen, that their views are more or less officialized and are not the exponents of the views of the people. This year too, as far as the list published hitherto goes, a paper has been promised by an officer in charge of the working of the Co-operative Societies Act. It is for this reason that the writer of these lines is induced to send them to lay the views of the other side before the public, as it is likely that the members of the conference might be misled on this subject, which has not attracted the attention of many people as it ought to do.

Looking at the work already achieved in different Provinces by Government Officers for starting Co-operative Societies, one cannot but think that the work done is not small: but, if one reads through the lines, he is likely to be impressed that much of what is done is not done by people with their own lead. The number of Societies in each Presidency or Province is not very large, but even in Germany, where Raiffisai started his Societies, which were kept in view by the Legislature here, it was some years before a second Society was started after the first.

In Bombay, till the end of the 31st March 1906, there were 21 Rural Societies, 10 Urban Societies in eleven districts, of which one has ceased doing work. Out of the remaining, only 10 were settled down and were older than one year. The total loans of the 16 Societies of which the account is given amounted to Rs. 23,800 and odd. Total capital of the Societies was Rs. 35,290 and odd including the deposits and the money borrowed from the members and the Government.

For Madras, till the end of 1905, there were 15 Rural and 5 Urban Societies registered. It will be well here if a quotation is given from a speech of Dewan Bahadur Raj Ratna Moodliar, C. I. E., of Madras, which was delivered lately.

“The development of Agricultural Banks or Co-operative Societies, as they are now called, is most important measure requiring the serious attention of the Government of India. A scheme was proposed some 30 years ago by the then Governor of Bombay, and later on by Sir Frederick Nickolson. After a prolonged discussion, an act was passed in 1904, the effect of which is being watched with great interest, both by the Government and the public. The salvation of the Indian peasantry depends greatly upon the successful working of these Banks. But, so far as one can foresee, there seem to be great doubts as to any substantial result being achieved, under the operation of the present law, within a reasonable period.

“The act is being worked most enthusiastically in this Presidency and, in less than 18 months, as many as 27 urban and rural credit societies, with share capital of nearly Rs. 31,500 have been started by the Registrar, Mr. P. Rajagopalachariar, an officer eminently fitted for the difficult task entrusted to him. The total number of members at the end of March 1906 was 2, 733 and the amount of loans granted was Rs. 98,370.”

Leaving aside the minor matters, the writer would like to draw attention to the following points, which he considers to be the defects in the act.

1. Absence of any provision giving facility for the speedy recovery of the debts of the co-operative Society.
2. Showing a difference in the treatment of recovery of Government dues and debts of the Co-operative Credit Societies.
3. Rural societies not allowed to be started with limited liability with special sanction of Local Government.
4. Allowing no profits to the shareholders at least up to a certain stage.

Let us now proceed to think about these points.

1. It was urged on Government to grant some facilities for the speedy recovery of the debts of the Co-operative Credit Societies, but they have given no heed to these suggestions. It is true that, in Germany, to many of the societies after Raiffisian system, such a privilege was not given; but, as stated above, the Indian Agriculturist differs in his credits and mental strength from his German brethren. Even in Europe, some societies had such a privilege and, if Government had given it here, it would have induced a large number of shareholders to join these societies. The members or shareholders of these societies are necessarily poor people and devoid of any experience of trade. So, if their hard earned money is lost, not only they but their comrades are likely to lose their faith in the scheme altogether. The work of such societies is generally done by the villagers themselves who are surely ignorant of the technicalities of law and their work being generally without remuneration, they will not have all that foresight which the professional Savakars have. It is therefore essential that, at least in their infancies, all these societies should have every support and facilities to recover their money. Let us see what more capable man think about this.

Here is what D. B. Raj Ratna Moodliar says about his own opinion and the opinion of other eminent gentlemen of Madras Presidency:—"The fact of the matter is that the act is defective in many respects. Many useful provisions suggested by a Committee convened by Lord Amptill, at which Sir S. Subrhnania Iyer, Sir V. Bhashyam Iyengar and a few others well qualified to advise on the subject took part, have not been adopted by the Government of India. Existing Banks and firms of established repute and the numerous mutual benefit funds (Nidhis, as they are called) which have been doing excellent work in Southern India have been excluded from the province of the act, that no powers have been given to the societies for the recovery of debts by sum-

mary process through the Civil Courts, a small though important privilege which was strongly advocated by the Committee above referred to."

Let us contrast with this officialised opinion of Mr. P. Gopalcharia, C. S., the Registrar of the Madas Societies :

"I think it is a good thing that the act does not provide any summary procedure for a society to recover money due to it."

On the other hand, it is said that the Bombay Registrar and his subordinate organisers thought that speedy recovery was necessary and could be enforced under bye-laws. One of the organizers at least had given the people to understand this impression when he addressed the people. It is said that the Bombay Legal Remembrancer shared this view, but when the proposal went to the Government of India, they ordered that nothing of the kind was to be done. These official papers do not seem to have seen the light of press; but the following extract from the last annual report of the Bombay Registrar gives some corroboration to the rumour stated above :—

"The question of framing rules regarding disputes and providing a summary method of recovery of sums found to be due to societies by members was raised during the year and draft rules were framed, but further action was found to be impracticable."

Thus it will be seen that the necessity of special summary provisions for the recovery of the societies' debt is felt everywhere, and Government must take action, if they want that these societies should flourish.

2. Now to turn to the second point. It will be seen from section 19 of the Act that the society is given priority over other creditors for its advance under certain circumstances, such as the supply of seeds or purchase of bullocks and so on; but even the credit association cannot get anything, if there be any dues of Government against bank debts. The assessment of the land must have a prior claim over non-

secured debts; but when the cultivator has no cattle or seeds, he cannot cultivate land or sow the land; and where would be the crops? Would it be fair under these circumstances that the societies' claims for money lent for such agricultural necessities should be altogether set at naught, and the Government alone should get the whole of the debtors' property? The most fair thing would be that, in such extreme cases, the co-operative credit societies must get at least a portion of its dues. A Gujarati proverb says that "The mighty is to get the double". Let Government get  $\frac{2}{3}$  and the society  $\frac{1}{3}$  proportion of the attached assets.

Under section 15 of the act, any shares or interests of the shareholders of the societies are not attachable for other peoples' debts—but if the section is read with the section referred to therein, the provision does not seem to apply to Government dues. This leads to a suspicion; that Government wants to create these societies to make the recovery of their dues sure, cannot be said to be quite imaginary. Government can generously apply the provisions even to Government dues or at least they can do so for a limited sum. To recover their dues, the Government have multifarious measures; hence if they introduce such a provision like this, they will be able to induce the people to join the societies.

3. The rural societies are not allowed to be started as limited liability concerns without the sanction of the local Government (Section 7-1). It need not be said how difficult it would be to get Government sanction for a small society. The provision of the act practically enforces the people to start unlimited liability concerns. Now let us see if it would be considered safe or sufficiently tempting to people to join the societies. In an unlimited concern, every shareholder is equally responsible to all the debts. The pith or the chief point in favour of the credit societies is to borrow money at cheap interest and to lend it with a small increase to its members, which increase is generally supposed to be lower than one at which individual debtors can likely obtain money.

It is true that under unlimited liability term, if there are some rich people as members of the society, the depositors would deposit more money if the society pays more interest than the bank interest, or the interest any solvent native or European firm can afford to pay. Under these circumstances, if any solvent man joins the unlimited liability society, he is sure to be ruined, if the assets of the society are not sound. Is it possible under the circumstances that any sane man can take up such a responsibility? Those who have some knowledge of the state of the villages, and especially in recent years, will hardly reply in the affirmative. This must be the cause why many good people do not join the societies. Government do not lose if the limited liability system is given a trial at least in the beginning.

(4) The sub-section 1 of Section 8 runs as follows:—

“(1) No dividend or payment on account of profits shall be paid to a member of rural society, but all profits made by such a society shall be carried to a fund (to be called reserve fund):

Provided that when such reserve fund has attained such proportion to the total of the liabilities of the society, and when the interest on loans to members has been reduced to such rates as may be determined by the Bye-laws of rules made under this act, any further profits of the society not exceeding three-fourths of the total annual profits may be distributed to members by way of bonus.”

One can easily see that the shareholders are not to get anything under this act till the reserve fund reaches equal to a proportion of the liability which can enable the reduction in interest. It is not necessary to say that these societies are expected to prosper generally on the borrowed money which are their certain liabilities. These liabilities must increase year by year unless they are restricted, which means thwarting the business. It would become a great dilemma to the Manager and to the other shareholders of any given society under the circumstances. The members must restrict the



business by limiting the borrowing to a certain limit in order to raise the reserve fund, for it is only then that they can get profits in shape of bonus or they must postpone their desire to get any return for the money subscribed by them. It is possible under the circumstances for poor men that they should not expect anything for their investment. This would induce the members or the share-holders to give a small amount for their shares & whatever they would like to invest they would invest in the way of deposits. This appears to be practically done by the rural societies, for in Bombay till the end of 31st March, 1906, 31 societies are registered, out of which 15 were collecting funds; out of the remaining 16 societies, 5 were urban and 10 rural societies. Of these 10 societies, members have paid fees amounting to Rs. 727 only, while they have deposited Rs. 12, 440 and paid Rs. 320 on debentures while no share money is paid by them at all. Supposing the members withdraw their money, there will remain money borrowed from other people or Government and the loans to the debtors to be adjusted. This state cannot be said to be desirable, looking to the condition of Indian Ryots. Government have lent their money for a limited period. Supposing the debtors will not be able in all cases to repay the debts regularly, the Government will press for their loans and societies' affairs might come to a clash. It seems desirable for the stability of the banks that there should be more funds of its own than more fees to meet the contingency. As stated above, no body will invest as share capital without any hope of return and it is desirable for that to offer him some inducement. It is necessary to follow strictly the Raiffisian societies to raise the standard of patriotism and fellow-feeling among the cultivators but one feels sorry to observe that it will take sometime before they get it. The fear is that if there is a single failure among the ignorant folks, such as the Indian cultivators are, it will be enough to dissuade them. God forbid such a result; its occurrence is not impossible.

It cannot be said that, as human knowledge and foresight have their limits, anything can be perfect, all at once. Difficulties must be felt and, when they are, they should be brought to the notice of the authorities, and their attention should be drawn for their removal. The writer believes that the Government have been working in this connection with a sincere desire to improve the condition of the Ryots, especially cultivators, and also believes that, if the difficulties are pointed out to them, they will think over them. It is with this feeling that these lines are written.

It must be noted that as the Government have been working to popularise these institutions, leaders of the people must also move in this direction. Common folks cannot do much unless they are properly initiated and explained the advantages of these institutions.

Many of the ryots who should take part in these societies are quite ignorant of what is passing on. The promulgation of acts, even in vernacular, hardly awakens them. For many of them are uneducated. The Government Gazette or the few articles in Native Papers do not reach them. The scheme of the Bombay Registrar to appoint organizers is a well conceived idea, but the gentlemen, whatsoever their energies may be, cannot approach crores of people. It is, therefore, necessary that those of the people who can understand the subject must themselves work. In Ireland, if not exactly in the same degree as in India, the condition of agriculturists was not, so to speak, happy. Some members of Parliament, a few years ago, during Parliament recess, formed themselves into a committee which was called the recess committee. They sent some of their own members to foreign countries to make inquiries about the institutions there, and their reports and thoughts were published in a report, entitled the recess committee report. Much in this connection was done by Sir H. Plumcket. In Ireland, they started a co-operative organisation society to initiate people in the principles of co-operation, supply them farms etc., and render them help of all possible

kinds. It will be seen from Mr. Pratt's book on agricultural organizations in European countries and some Irish publications that, though the movement is started lately, much has been done. If, even in India, co-operative unions or organization societies are started by educated people, they will be able to render valuable services to their countrymen, and unless reforms come from within, much cannot be done. In good old days, India was the house of popular institutions. Many things were managed by the villagers themselves; even in monetary matters, they helped one another; they borrowed money in their united capacity for the good of the villagers, — but all these feelings are now vanished. People must now try to introduce institutions in conformity with modern ideas or customs and habits and surrounding circumstances.

The writer humbly thinks that not only the co-operative credit societies, but co-operative institutions of all kinds which have done immense good to people in Europe will do us good if we introduce them with necessary precautions with special needs and circumstances of this country. The writer has infinite faith in co-operation. He thinks that co-operation would prove a remedy to good many of our difficulties. If we co-operate and try to work for our common difficulties, Government will no doubt help us in our efforts, just as the saying goes—"God helps those who help themselves." Government will do what they can.

## The Indigenous Industries in India

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*Mechanical Engineering and its relation to the developments of Industries in India.*

THE history and progress of the Science of Mechanical Engineering is co-existent with the history and improved

methods of the manufacture of iron. Though the extraction of iron and steel from the ores was known to all civilized nations, and though implements of agriculture and weapons of war were manufactured out of iron from the earliest times, yet it was not till the beginning of the 16th century, when all Europe made a determined crusade against the hidden treasures of Nature, not till the foundry was added to the forge, not till the discovery of cast iron was made, that the vocation of the Mechanical Engineer became possible.

#### *Cast Iron.*

Cast iron is the first step in the production of steel and wrought iron on a commercial scale. The uses to which cast iron, wrought iron and steel are put to are so innumerable and important that any lengthy mention of these seems unnecessary for our purpose. The real and useful work of the Mechanical Engineer began with the construction of the steam engine.

#### *The Steam Engine.*

The steam engine, steam ships, guns and machinery have considerably changed the political and social conditions of the civilized as well as the uncivilized nations of the world.

The social work of enforcing peace, order and system, where there was misrule and anarchy; the spread of civilization where barbarism reigned supreme; the dispersing of congestion and stagnation by infusing circulation and activity, have all been made possible by the ingenuity and inventive genius of the Mechanical Engineer. From the manufacture of the most humanitarian clinical instrument, to that of the most terrible torpedo boat, from the manufacture of the most delicate chemical balance of the laboratory, to that of the most massive weighbridges of 450 tons capacity, and a sensibility of  $\frac{1}{10,000}$ , you can judge what varied and extensive technical skill and scientific knowledge must be brought to play for the perfection of the machines.

*The British Engineer of the 19th Century.*

Long before America, Germany and Switzerland were recognized as the chief competitors of the British Engineering Industries, England was in possession of flourishing manufacturing concerns, which practically gave her the monopoly of the world's trade, a monopoly partly due to her fortunate possession of coal and iron, but chiefly due to the genius, inventiveness, perseverance, shrewdness and business acumen of the great British Engineers of the 19th century.

*The Training of Engineer in England.*

The recognized method of training Engineers in England, upto very recent years, was by a course of apprenticeship in works for a period of 5 to 7 years, and all those great men whose names serve as landmarks in the history of mechanical industry in the past have had this training. But the rapid advances in Electrical and Chemical Engineering and the establishment of Technical Colleges have brought about considerable changes; and workshop trained apprentices were compelled to appreciate the great advantage and immense value of scientific knowledge to the Engineer. Thus, in England, regrets have frequently been expressed that the weak point in their system was the want of co-ordination between the Workshops and the Colleges, and this may be seen from the several contributions on the subject of Education of Engineers in the Proceedings of the Institution of Mechanical Engineers during the past few years. It is worth while noticing here the system of training received by Engineers in America and Germany.

*The Massachusetts Institution of Technology, Boston,  
America.*

The object of this Institution, where regular course of instruction began in 1865, was to provide a complete system of Industrial Education, supplementary to the general training

obtained in other institutions thus, equipping the student with a knowledge of scientific and technical principles so as to enable him to apply them to the industrial pursuits of the age. The originators of the institution believed "that the most truly practical education, even from an industrial point of view, is the one founded in the thorough knowledge of scientific principles, and which unites with habits of close observation and exact reasoning, a large general cultivation." They believed "that the highest grade of scientific culture would not be too high a preparation for the labours of the mechanic and the manufacturer," and knew that they had "in the history of social progress ample proofs that the abstract studies and researches of the philosopher are often the most beneficent sources of practical discovery and improvements." There are at present 13 courses of undergraduate study, each course lasting for four years.

#### *The Cornell University, America.*

The object of this University is appropriately expressed in the words of the founder, Ezra Cornell: "I would found an institution where any person can find instruction in any study." This was opened in 1865 and at present is the most beautifully grouped set of University buildings in the world, including 10 Colleges for different departments of study with nearly 400 members on the teaching staff.

#### *The Sibly College.*

The Sibly College is one of the 10 College groups of the Cornell University, for training Engineers. There are 8 departments in this College; the students pass through the same course during the first three years and then specialize in the fourth in Steam, Marine, Railways or Electrical Engineering. The chief feature of this College is its Workshops. A student is advised to get as much academical education as he can before entering Sibly College, being told that his success in the practice of his profession will be found to depend

more and more in future upon the position he may be able to assume among men of education and culture.

*The Berlin Technical High School, Germany.*

The object of the school is to give a specialized training in industrial subjects founded on a preliminary scientific education. The course lasting four years begins with scientific education, and gradually becomes more technical, until in the fourth year, all the subjects are specialized. The absence of workshop practice is noteworthy, but the students get a large amount of drawing office practice of an advanced character.

*General Remarks on the Courses of Study.*

Thus you will find that the kind of training one ought to receive has passed the stage of experiment. In England, the well recognized apprenticeship has done the required service for a good scientific training in Chemistry, Physics and Mechanism in the Laboratory, in the College and in the Workshop is unanimously accepted as a necessary part of an Engineer's education.

The very elaborate and well equipped system in America for training Engineers has given it a position far in advance of all competition. Though at the outset you may be dazzled at the greatness of American industrial developments and its Technical College equipments, we cannot underrate the solid advantages which a training in England would give us; there, we would come in personal contact with the English mechanic and the English workman, the like of whom we cannot meet anywhere else in the world.

*The future of Iron in India.*

Bengal must be considered as the leader for all India. The production of iron for the whole of India in 1905 was 102, 120 tons and the largest outturn was in Bengal, which produced 97, 698 tons or 95 per cent. of the total, where as

the world's production of pig iron on this date was 40½ millions of tons. This is 405 times that of Bengal. By a rough calculation, the demand for iron doubles itself in less than 20 years, and therefore, in 1920, the demand and therefore the production will be about 80 millions of tons of pig iron. Added to the providential distribution of coal and iron in Bengal in close proximity, there is the occurrence of manganese in the Central Provinces, a very valuable ore for the Bengal steel maker. The production of manganese ore in India has considerably increased in recent years, so much so that in 1903, the total production was 171, 806 tons, standing thus second only to Russia. The mining at present is most active in the Central Provinces in about 50 localities and in the Vizianagaram estate. The value of the exported ore is only 15½ shillings per ton, whereas it may be worth according to quality from 30 to 40 shillings a ton to the European steel maker. The heavy cost of transport gives to the Indian exporter just half its market value.

The average annual value of iron and steel imported between 1898-1903 was 3 millions pounds sterling, and this was exclusive of machinery. In 1903, the imports increased to 4 million pounds or nearly 33 per cent. Therefore, you see that there is a steady rise in the consumption of iron in India. The 100,000 tons of iron produced in India valued at £ 6 a ton gives only a money value of £ 600,000 to the local produce. Thus, the country is able to supply only 15 per cent. of its present requirements. Bengal is not wanting in iron ores or in mineral fuel or even in living example of the industry on European lines. The country is now in a position of supplying its whole wants in coal and even of exporting that valuable fuel to Ceylon, Singapore and the Straits Settlements. During the past 20 years, the imports of foreign coal diminished from 850,000 to 200,000 ton, and the local produce has increased from 60,000 to 500,000 tons or over eight times. It must be clearly grasped that Metallurgical industries are the real consumers of coal. At the furnace



door in Bengal, coal costs only Rs. 5 a ton and the same coal costs Rs. 17½ a ton at the factory premises in Madras to-day. This comparison will convince you how a cheap produce is burdened by freight and what a great profit there is in working the industry in localities favourably situated in respect to the ore and the fuel. I am not placing new facts or figures before you, but till the distance between conviction and action is minimised, till the iron industries of Bengal are developed so as fully to meet our demands, there will be this continual hammering of facts and figures before you and by persons far more competent to deal with the subject than myself and doubtless with greater force and with better effect.

There is no chance of reviving the industry in India if smelting is done after the native fashion. The manufacture of iron has developed and attained perfection that competition and improved methods have brought it down to the lowest limit of profit. Bengal is placed in respect to coal and iron in a very favourable position, the ores costing Rs. 2 a ton and coal at the mouth of the pit Rs. 4 a ton. The Barakar Iron Works produces about 100 tons a day. But 1,000 tons a day will not be too much for India when compared to the expected daily production of 222,222 tons for the whole world in 1920.

It is well-known that unless the concern is undertaken on a large scale, it will not pay even under favourable conditions of cheap raw material and fuel. Nevertheless, the importance of iron in the prosperity of a country and, therefore, in the well-being of a nation, is so very great that sooner or later the industry must be organised and worked up, so that Indian capital may remain in India to a very large extent.

#### *The Indian Engineers of the 20th Century.*

If the iron and steel industries in India are equipped with modern machinery and improved methods, a new class of Indian Engineers will rise to meet the emergency, and several new inventions to minimise labour and effect economy will quickly follow, and most important of all, the manufacture of

machinery—a new and a very valuable acquisition to the industrial concerns in India will be established. Our England, America and Japan returned Engineers, should be able to organize and develop new industries; though, at the beginning, they might think of a complete change in the existing state of affairs after the American fashion, yet they will soon learn to have faith in the gradual progress and the gradual evolution of things after the British.

*The Swadesi Movements and Indian Industries.*

The desire for advancement and progress, whether in the direction of developing the resources of the country, or the starting of new or reviving of old industries, or whether in the direction of securing larger or wider political rights, is the direct and natural outcome of long years of peace and prosperity under British rule. The great freedom we now have of travelling all over the world, either for pleasure or for profit or for the acquisition of knowledge, has created in our minds an anxiety to advance; such a tendency has reached its summit and therefore must find an outlet. The leaders have a steady and arduous work before them; their well-thought out and well-planned actions are bound to bear rich fruits in the near future. The duty that devolves on the followers and workers is also very trying. Complete faith in the leaders, co-operation, and mutual confidence are virtues which we have to cultivate to a very great extent. It is said that the Japs believe each other completely and view with suspicion every other of a different nationality. I cannot say to what extent we possess this quality or to what extent the possession of this quality will serve us in all the great national movements projected in India in recent years.

Swadesi movement in India is one of the many weapons with which we have to solve the problem of the development of our Industries. Along with this, there must exist a very powerful backing up of small combinations to help several

small industries with the necessary expert technical skill in each.

Further, our attention must be directed as a preliminary preparation for success, to the different conditions of purity of the raw materials, vegetable or mineral, before it reaches the factory or the foundry. There is ample scope for small men and for smaller capital and great technical skill and scientific knowledge, in India, since the value of raw materials, is in proportion to the purity with which it could be placed at the factory door. There is a great saving in freight and a greater return for the small attention paid for superior turnout of the raw product, in addition to the wide scope such work would give for the employment of the half starved Indian cooly.

#### *The Mineral Wealth of India.*

I can only refer you to the valuable review of Mr. Holland in the Records of the Geological Survey of India, Part I of 1905, for full information on the subject, and invite your attention to the money we have paid for importing glass, glassware, earthen-ware, porcelain, clay and brick in 1903, which amounted to 240,000 pounds sterling. The raw materials are obtainable in India. The cost of production by the foreign manufacturer, the freight and the loss by breakage in transit are now being paid for by us.

#### *The Indian Exhibitions.*

There is one chief difference between invention and discovery in industries. All inventions are mechanical arrangements that come within the province of the Engineer. Though these inventions are patented by the inventor to enable him to get the full benefit of his labour, yet immense advantage will be gained by the student and the mechanics by a careful study of the details of the invention, and many inventions are the result of a close study of other and earlier inventions. Thus we see the great advantage of inventions to mankind. But

in the case of several trade discoveries, there is no opportunity given to any one to approach at the secret of the discovery. Rodgers' penknife, Pears' soap, Morgan's plumbago crucibles and Faber's pencils are a few of the useful industries which cannot be substituted by others. Therefore, it is more to the mechanical side of these exhibits rather to the exhibition of highly finished manufactured articles that we should direct our study. From the latter we get only information as to the prices of the goods and the places of their manufacture, and as to their excellence. The former is the Industrial branch proper and the latter the Commercial branch.

*Conclusion.*

The profession of the Mechanical Engineer in modern times has grown in strength, magnitude and usefulness to a most astonishing extent, so much so that it has risen to the rank of an enviable rival to the three world-accepted "Learned Professions." It has gradually included in its vocation gentlemen of rank and social position, and, at the present day, one cannot do justice to his profession with an ordinary school knowledge of science or mathematics.

## **Sandal Wood as useful and paying Industry.**

BY A. RAMANNA, ESQ.,

*Advocate of the Chief Court and Member of the Representative Assembly of Mysore and of the District Board, Mysore.*

Sandal Wood has always been a very valuable wood. It has always been in the Government monopoly of the countries that produce it. It is very much to be regretted that, as yet,

neither any Government nor any private enterprise has tried to reap the highest profit out of it, though every one is convinced that it could yield greater profits, only if it should be used for better and newer purposes, than at present.

*Its production*—Except in very few places and that too very inferior sort of Sandal grows, in small quantities, no part of the world is blessed with this gift by nature other than the tableland of the Daccan, *vis.*, Mysore Province and its surrounding countries.

Being in entire possession of these articles which no other country produces, we should certainly be able to command the foreign markets and dictate our own prices as regards sandal prepared articles and the oil that could be extracted out of Sandal Wood.

But do we now command the foreign markets? Our command consists now in ordering for a bottle of Sandal Wood Oil from foreign markets, and our dictating our own prices consists in implicitly paying whatever price has been labelled out on these bottles.

Sandal Wood grown is conserved by us and are made into bars and when it is fit for purposes of manufacture, we sell it away for the price of wood and not for the high profits which we are, under the peculiar circumstances, bound to get, if only it is manufactured and sent out as articles of *use, fancy* and admiration. It is Bombay merchants that purchase all Sandal Wood sold in public auction held by different Governments once or twice in a year. They, instead of working out the wood by means of industries and manufactures, in their turn, export at once to foreign markets, making thereby only small profits.

Others that buy for local purposes, buy only very little and burn the same. Their invested capital instead of enriching the country makes, them losers and brings in return ashes and some smell that soon vanishes away.

These are our profits and losses out of nature's special

bounty bestowed on our land and denying the same to the rest of the world.

*Details of Manufacture.*

1. Photo substitute—Every one wishes to have the likeness of himself and his elders preserved for generations. Even the advanced up-to-date Realistoscope requires an instrument and a photo which evidently cannot be preserved for a long time without being affected by worms.

Experts in Mysore and elsewhere prepare out of sandal wood images of many persons or of their family groupes in exact resemblance of such persons and in a manner that these images are identifiable.

Such images or groupes could not be broken except with attempt and being proofs to all elements except fire, and always preserving their glossy appearance and fragrant smell, would be the best means of exhibiting oneself and his elders to the coming posterity. The cost of preparation would not be much when compared to oil paintings, while we command fancy prices in foreign countries for the sandal wood articles.

2. Images of worship, and of holy saints, kings and nobles, as well as figures of beauty could be made out of sandalwood.

3. Beautiful boxes and caskets with engravings for presentation, or preservation in Museums, watch stands and several useful articles of stationery, plates etc., could be made.

4. These articles when set with silver, gold and ivory ornamentations here and there, find places mostly in the drawing rooms of every gentleman, nobleman or prince and fetch fancy prices.

5. *Oil*—Not only sandal oil, as such, produces lot of money, preparations of this oil with jasamines, roses and other flowers of fragrant smell, could be exported as scents with high profits to the country. Also preparations of this oil could be made to meet the requirements of the medical world.

6. *Saw dust and chippings*—While petal dust is imported in large quantities from foreign markets, dust falling when sandal wood is sawn, as also the small chippings that fall off while planing and cutting sandal wood, which are now sold for nominal prices, have not been utilized, now, though the same could more effectively serve the purposes of petal dust.

7. "*Sambrany*" and disinfectants—Saw dust, chippings of sandal, with "Halmuddy" "Nakhā" and other articles, when powdered, would be useful for burning incense before gods, for Hindus and other nations who are in the habit of burning incense.

The same powder may be exported as "house disinfectants or as fragrant smell giver," to foreign countries.

You may be doubtful about the demand for these things. Was there any demand for petal dust in India? You manufacture these things and let only the foreign nations use them once and you can be sure that the demand would be so great that it would be difficult to meet the demand.

In Mysore, I know, there is a class of people called Gudikars. These are the relics of the ancient glory of our land in these manufactures and handicrafts. Like every other industry, this was also dying fast owing to want of encouragement. Time came when several of these excellent men of this high art, had to go and work as day labourers.

But before the ancient learning in this branch was actually lost for ever and before the profession became extinct, thanks to God, that a spirit of *revival of Indian Industry* came forth, ringing to the ears of every one as to the necessity for revival, and spreading itself like wild fire from the Himalayas to Cape Comorin. All that is required is, men with capital to start a business, either in Bangalore or in any other convenient centre. A number of Gudikars from Mysore, as well as experts in other places, may be engaged. Engravers of Delhi would all serve the purpose. There are several apprentices under these Gudikars, working in Mysore Palace. Additional

apprentices may also be engaged to learn work. Articles referred to may be prepared and exported to England America, France, Germany and other foreign markets, where they will command fancy prices.

I know as a matter of fact that these articles have been purchased by Europeans paying 8 or 9 times the price that a Gudikar here would sell the same for. There have been several demands and orders from foreign countries, but, as the matter now stands, there is no constitutional business undertaking of any sort. I want that this work may be undertaken by Swadeshi men i.e., the Indians.

## Weights, Measures and Coins.

BY TRIMBAK NARAYAN ATRE, ESQ., B.A., LL.B.

The state, in which weights, measures and coins are at present in India is highly unsatisfactory and prejudicial to the just interests of the masses. It is proposed to outline briefly how things stand in this respect, and how they affect the poorest and the least articulate classes. It is further proposed to offer practical suggestions to mend matters.

To begin with coins, in British India, there is a standard currency, and every body knows exactly what he is to give or receive. Moreover, Government keep a vigilant eye that small coin does not circulate at a discount or premium. And so far there is nothing to complain of. But India is studded all over with territories of states, native and foreign. Almost each of these has its own currency differing in weight, size and composition from the British Indian currency. We have thus, in India, quite a number of currencies,—English and Portuguese, Baroda and Nizam, Scindia and Holkar, and a host of others, too numerous to mention (for some of which, an inquisitive person is referred to money tables in Mr. Chhatre's



Arithmetic). Whenever therefore a person travels from or into the British territory, he is required to exchange his coin for those current at the place of his destination. For this purpose, he has generally to go to a *bania*, who never fails to extort, justly or unjustly, as much as possible from his needy customers. Poor traveller, in the first place, he is ignorant even of the probable rates of exchange. And even if he does know, he would suffer pecuniary loss rather than immediate inconvenience owing to want of current coin to buy necessaries with, and further bother and expenses in trying in a court the justness or otherwise of the *bania's* dealings. But far greater is the loss suffered, by way of exchange, by agriculturists, petty craftsmen, and labourers. In the majority of cases, the *bania* purchases the produce and wares of the first two classes at their own doors and by quoting false rates of exchange, he deceives them by pies and annas. Labourers too are similarly paid short. And the loss, though insignificant in a single transaction, swells considerably in the course of a season recording several such transactions. The gain so obtained is as unmerited as the loss inflicted on the weaker party. This result is due as much to the ignorance and necessitous circumstances of the masses as the confounding variety and localism of coins. It would, therefore, be an unalloyed boon if the several rulers of India were to unite to eradicate this evil, by adopting a standard currency of uniform size, weight and composition for the whole of India. They can take lead in the matter and induce others to bring their currency upto the standard of the British currency, and permit payment at *par* in all currencies circulating in India. Such a course will not diminish the political importance of any state, native or foreign, nor destroy its individuality, provided each preserves its own impression on the coins of its currency. There will then be no difficulty about exchange. Travellers, agriculturists, petty craftsmen and labourers will not suffer undeserved loss as at present. And lastly, the certainty of the value of the coins of different currencies is bound

to act favourably on the expansion and development of internal trade and the resources of the masses.

The diversity of weights and measures is more appalling than that of coins. To pursue all the several sets of weights and measures obtaining in the several parts of India would be minute to tediousness. Let us take, for the elucidation of this subject, weights and measures in the Maharashtra only, as an instance in point. Broadly speaking, there obtain in the Maharashtra (the Marathi-speaking part of the Deccan) three main native sets of weights and measures :—the Bombay, the Kokanese, and the Deshi. Add to these, English weights and measures adopted in transactions with, and statistics of Government and mercantile bodies, and firms like, Railway Companies, Ralli Brothers, etc. Bombay weights and measures differ in shape, weight, capacity and dimensions from Konkani ones, and both from Deshi ones. It will perhaps be reasonably inferred that these three sets exhaust all variety of weights and measures in the Maharashtra. But no; realities give a lie to any such inference. Let us proceed to develop the point by selecting a typical instance from among the three native sets of weights and measures prevailing in the Maharashtra. Taking Deshi weights and measures alone, it will be found that they are not uniform in all the Desh districts. Weights and measures current in the district of Poona, differ from those in Sholapur; Sholapur weights and measures differ from those in Ahmednagar and Ahmednagar weights and measures differ from the Nasik ones, and so forth. In fine, each district would seem to have its own weights and measures. But closer investigation would further reveal that there is no certainty that weights and measures manifestly prescribed for a certain district are necessarily used throughout that district. There are market towns of one district using weights and measures of another district; and there are villages of one taluka using weights and measures of another taluka. Sirur is a well-known military station and a market town in the District of Poona.

But weights and measures used at Sirur are those prevalent in Ahmednagar. Pimpalgaon Pisa, a village in the Shrigonda taluka of the Ahmednagar District, uses weights and measures different from those in use at the tauka station viz., Shrigonda. The instances, alluded to, cannot be said to be exceptional; and it is legitimate to conclude that there must be many towns and villages exhibiting analogous conditions of market. Passing from Desh to Karnatak, Dharwar weights and measures differ from those used in any Desh District. And in Gujrath, we find that nothing is measured. Everything is there weighed out, even grain. Leaving here weights and measures, which being stamped, bear appearance of standardization and consequently of certainty, we find a still worse state of affairs in rural districts, where land, walls, wells, cloth etc. are measured in the antique uncertain measures of length:—hands and fists and fingers. Lastly, it is to be remarked that gold and silver, medicine and drugs are weighed in *gunjas* and *vals*, as uncertain as hands and fists. This may put lawyers in mind of the once largely believed complaint—"Equity varies with the foot of the Chancellor" and may give a vivid idea of the trouble and loss springing from uncertain weights and measures.

To sum up, weights and measures in India are not *Indian*, that is to say uniform and common to all parts of India without reference to difference of Government, or of territorial or administrative jurisdiction. They are not provincial, that is conterminous with provinces. They are mostly district arrangements, that is to say, they (weights and measures) vary, in shape, weight capacity and dimensions, from district to district. Not seldom are they found to vary with areas smaller than a district or its corresponding local division. In a word, they are local to a fault. And secondly, crude ancient and uncertain weights and measures are yet in dangerously large use.

Let us now proceed to consider the baleful effects of this state of things. Taking first antique weights and measures

too notorious for their uncertainty or variability, we find that superficial areas, *e.g.*, lands, pavements, ceiling, etc., are measured in rural districts with hands, fists and fingers. So also all sort of cloth is measured out in the interior with the same measures. In advanced towns too, cloth intended to be worn by females, is measured in the same crude fashion. There cannot be two opinions how such measures prejudice the interests of the weaker party to a transaction. Hands and fists and fingers vary *ad infinitum*, and it is always the supreme interest of the more intelligent and powerful party to impose upon the weaker, such measures as are best suited to deceive the latter and bring the largest possible profit to the former. Why, even the most intelligent customer cannot escape loss where the measures in use are superlatively deceptive. Who can boast, with confidence, of having secured the longest arm or broadest fingers to measure the cloth he purchased or the masonry or wood work or lands he paid for? In every Indian household, complaints of sarees and bodice cloth measuring shorter than their sworn length or width by the *bania*, have grown quite trite. So do agriculturists and labourers suffer ever recurring loss, in all their bargains, on account of these antique uncertain measures. In the interior, besides the above mentioned measures of length, they also use quaint uncertain measures of capacity represented, say, by a hollow piece of bamboo measuring a hand long. Coming to antique weight, it will be marked that such weights as *gunjás* and *váls* and almonds are current not only in out of the way places but even the most populous and advanced towns and cities. It is easy to imagine how certain is the loss which such weights inflict. It would be a great boon, especially to the poor, if there were standard metallic weights representing *gunjas*, *vals* and such other crude weights. It would be welcome philanthropy if standard measures of length, made of metal, wood, or such material as would ensure certainty, were to replace the *bania's* elastic hands and fingers. Bearing in mind the nature of connection between India and

England and the turn which the latter has given to every phase of Indian life, it may be parenthetically remarked that, it is highly desirable that, if native weights and measures are to be preserved at all, they should, at least, be such as can be readily convertible into corresponding English weights and measures. It is therefore humbly proposed that two hands make a yard and other longer and shorter measures be graduated accordingly. But a far more desirable move in this direction is to supplant out and out native measures of length by English ones. In cities like Bombay, English measures have already found their way into business, private and public. They are again universally adopted in all transactions by Government and big merchantile houses. Moreover famine has made masses familiar with them. Famine metal, roads, tanks, tals, etc. were all measured in inches and feet and relief workers found no difficulty in calculating their tasks and wages. Famine labourers have spread all over the country, and carried their knowledge of feet and yards to the remotest corners. There is therefore strong reason to hold that substitution of English measures of length as standard measures in place of native ones, would tend to establish certainty in business without producing serious inconvenience to the public.

With regard to weights and measures of capacity or volume which, being stamped, bear appearance of standardization, it will be seen that their diversity is hopelessly bewildering. We have seen how they vary with districts, and in some cases, with much smaller areas than a district. This is anything but satisfactory or systematic and the sooner such diversity is removed, the better it is for all, especially the ignorant poor. Again, it is to be regretted that weights are based on the weight of a certain number of rupees, and measures on the weight of a certain quantity of selected grain, e. g., rice. Now it must strike even a most superficial observer that the weight of a rupee has been changing from time to time, from one tola to something like eleven māsās,

and that the weight of grain must vary according to the nature of seed, soil, season, manure, husbandry, etc. It requires no elaborate demonstration to prove how treacherous is the footing on which our weights and measures are based. No weights must be based on something more accurate and stable, and measures of capacity must have fixed dimensions, such as so many cubic feet. It is therefore proposed that a sher-measure of weight represent exactly two pounds, and that a sher measure of capacity one-fourth of a gallon. The remaining weights and measures should be graduated on these footings. A further change, worth considering in the same direction, is to do away with different measure-shers (capacity) e. g. one for grain, another for oil, a third for milk, etc. Would it not be convenient if the same measure be used for grains and all fluids whatever ?

It may be repeated once more, that the fact that the English have an empire of commerce in India should be kept steadily and prominently in view. And as uniform weights and measures for India mean new measures, every endeavour should be made to introduce such weights and measures as can be readily converted into corresponding English weights and measures.

Let us touch briefly how weights and measures in their present babylonish diversity press peculiarly hard in certain particular instances.

It is the justified boast of a French student that he can write his tables of weights and measures on the palm of his hand. A Britisher too can claim a far superior advantage, in this subject, over an Indian student. The latter has in the first place to wade through a double set of tables, English and Indian; which circumstance alone adds considerably to his labours. Further, as he has no opportunity to see English weights and measures and coins, while he is learning them parrot-like in his infancy, he finds great difficulty in fixing them in mind. Then again the Indian tables, being singularly local, he has to learn such which is of no practical use. Like

English tables, he must learn many native tables by rote, because the market of his school-town will not practically demonstrate to him weights and measures obtaining at other places. It is next to impossible to grasp the exact shapes, weights and capacity of the several weights and measures current even in a province, much more in the whole of India. This is probably why books on arithmetic do not attempt to give such tediously minute details of this subject. And therefore, with all his examinations, a student, however clever, is simply baffled when he has to sell or buy in a market other than that of his school or residence. A Bombay student, when out in Poona, does not readily perceive that the other party uses correct weights and measures. Thus, not only is his labour aggravated in the present state of weights and measures, but much of it is positively wasted. A system of standard weights and measures readily convertible into English weights and measures, will not only relieve the student-world of immense labour and simplify the course of primary education, but will assuredly make education much more practical. What they will learn at school, will be fixed in their memory by what they will see and use in the market and will serve them throughout their life.

As to the way in which weights and measures deceive the public in general, the astounding rapidity, with which banias and general merchants build their enviable fortunes, may well be made a subject of much closer investigation than now. It is an oft-heard complaint in every town and village that, as a class, dealers possess and use short weights and measures with impunity. It is moreover a fact of daily occurrence in the mofussal that banias profess to sell articles, e. g., ghee, oil, grain etc. at the same rates at which they buy them of producers, who are mostly neighbouring agriculturists, even though their shops be miles and miles away from the place of their purchase. The fortunes, which their business among villagers and town-folk bring to banias in a remarkably short time, remain inexplicable unless it be

confessed that they ensure their profit by a sleight of the hand with weights and measures, in other words by a cunning use of false or non-current weights and measures. Then again, the difference between rates of articles prevailing in the native bazars and those exacted in shops resorted to by Europeans, is worth more than passing notice. So slight and therefore deceptive are the differences between weights and measures current in any two adjoining districts that even natives cannot follow them accurately, much less can Europeans aspire to succeed in doing it, unless they make them a special study. Native shop-keepers in the bazar do rarely understand European weights and measures, and therefore fail to procure business among Europeans. There is thus a mutual difficulty of native shopmen understanding English weights and measures; and Europeans understanding native weights and measures. And the result is that European custom is monopolised by European, Parsee, Bhora and Goanese merchants, who exact fancy prices for articles which can be had much cheaper in the native bazar. In the present state of weights and measures in India, Europeans are denied the advantage of buying in the cheapest market and native shop-keepers the advantage of selling in the dearest market. This cannot but lead to congestion and ill-distribution of wealth, together with all its necessarily attendant and consequential evils. Those few only flourish, who can take advantage of the confounding differences of weights and measures, and that too, at the expense of both Europeans and natives. *Mutatis mutandis*, these remarks apply to agents and servants of Europeans and European houses. They all feed fat at the expense of their masters and poor native producers. For instance, people do not know exactly which weights are in use on Railways, and railway employes are heard to make good capital out of their ignorance. Agents and servants of European firms play a similar game with good success. And the mofussil people know it only too well, how native butlers take in shahebs and mem-sahebs. Now if



standard weights and measures such as can be readily and easily converted into corresponding English weights and measures, were introduced, all this pilfering and purloiment would cease. And Europeans and native shopkeepers would find it infinitely easier to deal with one another. The market of each class would be widened, and both brought closer together. Last but not the least, the vermin race of middle men would be reduced, to the mutual advantage of the producer and the consumer.

Is not the arm of law long enough to reach banias and others, that traffic in false weights and measures? The law, no doubt, undertakes to punish such folk, who, in their turn, invariably succeed including its grasp by reason of a faulty system of weights and measures. As shown already, the difference between weights and measures of any two adjoining localities is so slight that, it baffles even the most trained eye to detect whether weights and measures, current at the place of use, are employed. An European officer finds it well-nigh impossible to fix in his mind the several Indian weights and measures, he comes across during his several postings. An Indian officer too labours under similar difficulty. So far briefly about the plight of those entrusted with the execution administration of law. As for the rayat, he has besides other difficulties to count. An agriculturist or a labourer does not in the first place perceive the slight difference that exists between weights and measures current at the place of transaction, and those current in a neighbouring locality which, being more favourable to the bania, might be used by him. And secondly even if the difference were appreciated, the culprit cannot as a general rule be brought to book. Why?—because he is far better off and therefore able to buy off his injured but poor opponent's witnesses. The poor labourer or agriculturist sees it clearly that it is, in more than one way, a distinct loss to him to embark upon litigation against a court-bird of a bania. He further sees that besides expenses of litigation, he must spend much valuable time in

dancing attendance at executive and judicial offices. Above all, he cannot ignore the risk of proceeding against a man on whom he has to rely so largely even for his current wants. Are these losses and inconveniences, present and prospective, counterbalanced by the result, which may bring punishment to the culprit, and costs to the poor complainant? A successful suit is only less ruinous than an unsuccessful one, says a popular economist. But in nine cases out of ten, the poor labourer or agriculturist must fail and the bania succeed to the expected ruin of the former. This more than explains why prosecutions for using false weights and measures, though almost in universal use, are so far and between. Therefore, if standard weights and measures were introduced, the magistracy and the police would be better equipped to discharge their duties, and the rayat better armed to protect their interest.

The revenue and agricultural departments draw up a monthly price-register (Taluka form No. 38, Symond's Manual Bombay.) This register\* is prepared taluk-war, obviously on the assumption, that weights and measures vary from taluk to taluka. Therein are recorded, at each taluka office, (1) quantity of grain i. e. sers per rupee in local sers, (2) equivalent in tolas of one local ser i. e. of ser-ful of grain. Now as the ser-measure (capacity) varies from district to district or from taluka to taluka, information about the weight in tolas of a local ser serves no practically useful purpose. For instance, the Sholapur ser-measure being larger than the Poona ser-measure, the former contains more grain than the latter; and naturally enough, grain measured by the former would weigh more tolas than that measured by the latter. The difference, in the tola weight of a ser-ful of a certain grain in Sholapur and Poona price registers, does not at all represent any difference in the quality of that grain. It shows prominently only difference of capacity between measures of the same denomination current at the two

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\* Please see accompaniment A.

places. Thus the different weights, recorded under the second head, do by no means indicate improvement or deterioration in the grain produced in the various talukas or districts. In fact, information in this column throws no light on the quality of local produce, and is therefore useless. Moreover, as measures vary profusely, divisional and presidency offices are not likely to detect, at once and without effort, any mistake, made in filling up this column by a district or taluka office. But if standard weights and measures for all-India were introduced, difference in weight of a particular kind of grain in any two localities would mean difference in quality, in other words, improvement or deterioration. The department of Agriculture and Revenue can, in that event, not only notice, as it were, instinctively any mistake made in filling the last mentioned column, but can turn to the utmost possible advantage the information so labourously recorded, and start investigation into the causes leading to improvement or deterioration in quality of grains produced in different places. It can furnish the most reliable data to agricultural experts at the Pusa College and such other institutions and call upon them to deal scientifically with the subject. By watching and comparing conditions predisposing superiority or inferiority of grain in a tract, even district and taluka officers can offer practical advice to the rayat and contribute to general agricultural progress. Why, such of the rural population, as can read and write, will be able to follow and take advantage of the course of prices in big commercial centres, which are now entirely in the hands of middle men. In this manner, introduction of standard weights and measures will not only effectively prevent error in official and public records, but induce very useful scientific and economic enquiries and results.

By means of the Deccan Agriculturist Relief Act, Government have interposed themselves between the Sowkar and the agriculturist, on the well-warranted presumption that the latter is too weak, too needy, to resist the coercion or undue

influence of the latter. In the name of equity they authorise their law courts to reduce the rate of interest agreed upon, enforce discovery of accounts and interpret the contract fairly, if not favourably to the agriculturist. In short, Government undertake to protect the interest of the agriculturist even by substitution of a contract different from what the parties themselves entered into, and thus deny the parties their expressed free will and accord. But by letting diversity of weights and measures severly alone, they disable poor people—mostly agriculturists—from enforcing their solemn contract against the wily bania, who is invariably his Sowkar, receiving repayment of debts both in coin and kind. An agriculturist or a labourer agrees to have his ghee weighed or grain mesured by weights and measures current at his residence. The bania or the Sowkar swears to do the same, but generally in bold defiance of law and truth, uses weights and measures favourable to himself, no matter whether they be prescribed for that or some other place. How doubtful is the protection, afforded by law to poor people against the tricky bania has been already dwelt upon and need not be repeated. Suffice it to say, that so far as weights and measures are concerned, they cannot insist even upon bare performance of a contract, which the other and stronger party entered into, in broad day-light and market overt and before one thousand and one witnesses. This is scandalous to a degree even under a weak backward Government. It is a sad irony of fate that while Government have rightly legalised by means of the D. A. R. Act, interference with expressed and written contracts of agriculturists, they have practically done very little to enable poor agriculturists and labourers to enforce a contract to weight and measure with correct current weights and measures. It is easy to imagine that such contracts (*i.e.* those into which weighing and measuring enter) must be for more numerous and frequent than those hit at by the D. A. R. Act. It is therefore in the largest number of contracts that the poor ignorant people are left

unprotected, and completely at the mercy of the bania. It is by the use of false weights and measures that the Sowkar succeeds in snatching what Government try to deprive him of by means of the D. A. R. Act. Thus, the existing diversity of weights and measures renders practically nugatory the wholesome provisions of the D. A. R. Act. The introduction of standard weights and measures, coupled with the following safeguards will go a long way to end this shameful state of things.

To be short, Government should make it a penal offence to possess or use after a certain date any weights and measures except the standard ones. Because one of the notorious ways by which people are at present deceived by the bania, is to assure them that his weights and measures, though unstamped or bearing a stamp different from the one prescribed for the place for the time being, tally exactly with current weights and measures. Hence the necessity of penalising the possession or use of any other except standard weights and measures. Secondly, according to the individual requirements of a market town or village, a complete set of weights and measures or only of the required weights and measures should be supplied to village officers. People should be encouraged to tally the weight or measure of the things bought or sold by them by means of weights and measures lying with village officers. And village officers should be asked to give people free use of weights and measures for the above purpose. It should be made part of the duty of all inspecting officers, of police and revenue departments, to inspect weights and measures of banias and Sowkars as also those supplied to village officers. This will save people from fraud in weights and measures, which is now fearlessly practised by banias and Sowkars.

A wave of economic awakening appears to have overtaken simultaneously both Government and people. The constitution of the department of commerce, the reorganization of the department of agriculture added to subsidies to several indus-

trial and agricultural exhibitions—all point to the lively interest that Government take in pushing the material progress of the country. People too have not been less responsive to this awakening. And however useful may be the present and proposed activities of both, it is surprising to note why this basal subject has not attracted that degree of attention which is its due. What an alphabet is to a language, standard weights and measures are to the commerce of a country. Indeed, material prosperity cannot be founded on the sifting sands of diverse weights and measures. A stable internal currency and uniform weights and measures are prime necessities of economic advance; and unless these are secured, it is ridiculous to aspire to add substantially and permanently to the resources and prosperity of the masses.

Consider the question of standard weights and measures from any point of view, and its supreme practical importance cannot be doubted even for a moment. Their absence affects all people alike, whether they be Indian peasant, or educated Europeans and natives. Government have extended legislative aid to intelligent and vigilant European merchants against jute frauds. They have conferred an analogous boon on Deccan agriculture. They have prescribed a standard time to remove inconvenience of globe-trotters. To facilitate reference to proper names in works relating to India, they have been actively encouraging the Hunterian system of spelling. And, is it not in the fitness of things, that moving on the same lines, Government should lose no time in standardising weights, measures and coins for all India?

Let us, by way of recapitulation, repeat once more what must be done in this matter:—

(1) In consultation with all ruling powers in India, the British Government should fix standard weights, measures and coins. There should be free exchange of coins of all ruling powers all over India, and standard weights and measures should be universally adopted throughout the length and breadth of India.

(2) Weights and measures should be so recast as to be readily convertible into corresponding English weights and measures. And they should be as few in number and variety as possible, e. g., there is no reason why there should be one ser for gold and another for coal, the latter ser being heavier than the former.

(3) Possession or use of weights and measures other than the standard ones should be made a criminal offence throughout India, British or otherwise.

(4) A complete set of weights and measures, or weights and measures of more frequent use, should be supplied to village officers according to the requirements of each village. Village officers should be directed to give free use of these weights and measures to villagers. And all touring officers should be instructed to encourage people to satisfy themselves, by means of weights and measures in the custody of their village officers, that they are not deceived by the bania or Sowkar. Touring officers should be asked to make it a point to see, that none but the standard weights and measures are used, and that villagers do tally their sales and purchases by means of weights and measures lying with village officers.

A. (ACCOMPANIMENT TO MR. ATRE'S PAPER ON WEIGHTS, MEASURES AND COINS)

TALUKA FORM, NO. 38.

Price Register

Taluka

Zilla

month

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ARTICLES.	SERS PER RUPEE IN LOCAL SERS.			Equivalent in tolas by jantry of one local Ser.	Sers per rupee in Standard Sers (80 tolas) and chhataks (5 tolas).	REMARKS.
	1st.	16th.	Average			
1	2	3	4	5	6	7
	Sers. Qur. Sers.	Sers. Qur. Sers.	Sers. Qur. Sers.	Tolas	Sers chhataks.	
Jowari (Sholapur) ...	9 0	11 0	10 0	113	14 2	Difference in weight in Col. 5. does not prove that Sholapur jowari is heavier and therefore better than Poona jowari.
Jowari (Poona) ...	10 0	12 0	11 0	108	14 14	

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The Second Industrial Conference

## Second Day's Proceedings

[MONDAY, THE 31ST DECEMBER 1906.]

*The Conference re-assembled at 11 a. m. to-day.*

### I TECHNICAL AND COMMERCIAL EDUCATION

MR. V. KRISHNASWAMI IYER (MADRAS) :—

*Mr. President and gentlemen,*

The proposition which I am charged to propose is as follows :—

“That this Conference reaffirms the Resolutions passed at the Conference of last year on the subject of Technical and Commercial Education, and requests the Government to establish a sufficient number of Secondary Technical and Commercial Schools, a superior Technical College for each Province, and one fully equipped first-class College of Technology for the whole of India. And that a Committee consisting of Mr. A. C. Sen, Mr. P. N. Bose, Lala Lajpat Rai, Mr. G. V. Joshi, Mr. D. E. Wacha, Mr. G. Sabramania Iyer, the Hon'ble Mr. Vithaldas D. Thackersy, Mr. R. C. Dutt and the General Secretary be appointed to prepare a memorial on the above lines for submission to Government by the President and the General Secretary.”

Now, gentlemen, a proposition of this description requires no words from me to commend it to your acceptance. Technical Education is of the primest necessity in this country and when we talk of Technical Education our attention is mainly directed to Industrial Education in the departments of Law and Engineering. The Colleges that have been started and the education that has been given therein well fall within the description of Technical Education. But in the matter of real Technical Education, the Government of India has done very little indeed. I happened some time ago to look into the

figures with reference to the number of schools—Industrial schools—that are maintained by the Government of India and, although I have not got the figures up-to-date, I have figures up to March 1902—there were only 84 Industrial Schools maintained in India. In Japan, with a population which is not even one-sixth of the population of the British India, there are 864 schools maintained. In the remarkable address which was delivered by His Highness, the Gaekwar of Baroda, the other day you had an account given to you of the great interest taken by the civilised nations of Europe and America and the advance they have made in the matter of Technical Education. The lead that has been taken by Germany, France and England and the very important strides that have been made by the United States of America were explained at very considerable length. If it is a matter of comparison, there is no doubt whatever the efforts of the Government of India in this direction sink into nothingness. A few years ago, I think, in 1902, the Government of India appointed a commission for the purpose of making an enquiry as to the steps to be taken by Government for the purpose of encouraging Industries and for the purpose of undertaking technical education on a large scale than had been done. That commission made a report; but after the report was received by the Government of India, Lord Curzon came to the conclusion that it was impossible for the Government to undertake any very large measure in connection with technical education and simply relegated the report to the archives of the Government of India and forwarded it to the Local Governments for such action as they might be prepared to take from time to time. That was a most unsatisfactory result. Unfortunately, Industrial Education does not appear to have been one of the problems which Lord Curzon set his mind upon for the purpose of elucidation. It was not one of the twelve; and so it was that the Commission of inquiry undertaken with reference to the Industrial Education has practically resulted in nothing. Now, gentlemen, we ask

the Government of India, having regard to the great importance of Industrial Education, to take some very decisive action. I think it was in the budget of 1906 that the Government of India allotted some 2½ lakhs for technical education for the whole of India, a paltry sum compared with the enormous amounts that are being spent by other Governments. We feel that this is not the right way of dealing with the great problem of the industrial advancement of the country. In this matter, the Government of India professed great anxiety and expressed sympathy with the people. But we feel, the performance is not in accordance with profession. The Government of India have done very little for the purpose of advancing technical education. The problem is always stated to be a difficult one, for, they say, there are not very many industries in the country which can be promoted by technical education; technical education presupposes the existence of different industries in the various centers of the province, and in such industries, as they exist, technical education cannot be effectively given and if it is given, there is no opportunity for the people who receive instruction to utilise it. On the other hand, it is equally true that for the purpose of starting new industries which have not already taken root in this country, it is necessary there should be certain amount of skill in the direction of Electrical Engineering and ability to deal with Machines to put them together and to attend to their repairs and to see that they are manufactured in sufficient quantities for the purpose of being utilised in the various technical arts and industries. One thing depends upon the other; and, I think, it is quite a mistake to say that you cannot have technical education until you have large industries started in the country any more than you can have technical education alone given without industries requiring that technical education to be utilised in the work of those industries. At the same time, we must bear in mind that one part bears upon the other and

There are capitalists in the country who are prepared to put money in new commercial ventures and it is the duty of the Government of India to provide education to give the people a skill sufficient to help those industries. We want Government to start Secondary Technical and Commercial schools and a superior technical College in each province ; we want the Government of India to have a first class College of technology for all-India. This is a very modest request and the Government ought not to find any difficulty whatever in acceding to it. I am perfectly aware that this will mean a considerable expenditure, but when you consider the various ways in which money is expended in this country, upon all kinds of project, I do not think it can be regarded as an expenditure of money which is undesirable. If the Government of India embarks upon a policy of giving instruction in Technical Industries, and for the purpose spends a considerable amount of money, it cannot be said to be a fruitless policy. We want the committee to address a memorial on the subject. I am a believer in what is called the policy of mendicancy. I do not believe in a policy of diltante mendicancy but persistent mendicancy. It seems to me that we have not been mendicants enough. If you knock at the door of the Government of India by persistent agitation, if you go on sending memorials to Government, not once in a way but memorials signed numerously sent often from all parts of the country, then I am perfectly certain that the Government of India, and if not the Government of India, authorities higher than the Government of India will listen to our prayers. Our request is reasonable, it is on the lines on which other countries have advanced and it is in accordance with the ideas of modern progress. No Government, be it the most beauracatic one, can long withstand the persistent prayer of the people of a country. I, therefore, commend this proposition to your acceptance.

Mr. Deva Prasad Sarvadhicari (Bengal):—Sir, the resolution just moved asks you, among other things, to re-affirm the

resolution of the Benares Congress and it is therefore right that I should read to you that resolution in order that you may see what you are doing. The Benares resolution which was the first resolution of that conference says "that this Conference urges the Government of India and all Provincial Government and administrations and also the people of India, according to their opportunities, to found technical schools in each of the centres for the Industrial education, on an adequate scale of the Indian people, to encourage and help Indian manufactures and to foster and extend the use of such manufactures in India, in preference to foreign goods." This year's resolution has already been read out to you and I shall not take up your time by repeating its terms. In seconding this resolution, Sir, I desire for one brief moment to call your attention to the amplification of the scope of the last year's resolution, that the Conference has this year thought fit to make. The people of India were called upon in that resolution to take a every modest part in the technical education programme of the country, according to their opportunities; but this year the Conference begs to demand that it has become imperative that the Government, which has a larger duty in this matter, should perform their duty by establishing not only technical schools in each of the centres asked for by last year but by providing a sufficient number of secondary commercial schools and a superior technical college for each province and one fully equipped first-class college of technology for the whole of India. The idea of Technical Education, as it has gone on so long, has been what the late Ajodyalal used, in his facetious style to say, to make an absolute weaving order. We have had good mistries and apprentices but not superior workmen and supervisors, under the system which has hitherto obtained. We feel, therefore, that time has come when real superior technological institution should be established in the country, in order that full advantage may be taken of the great awakening which had taken place in the country, the history of which the future generations

will largely lay to heart. The proposer of this resolution has incidentally stated that the Government of India has done very little in regard to Technical Education. I would go a step further and say that the education policy of the Government of India has made it impossible for the people to do more than what they had already done. In order to understand it, you will have to go back for one brief moment to the educational struggle in the days of Macaulay who, when he came with his Penal Code in his one pocket and the educational code in the other, triumphed in the memorable struggle, quite homeric in its way, with the emotionless occidentals, that concealed the education system of the country for the time. In some of the old papers of my uncle Sarvadhicari, I came across some in which, dealing with the educational problems of the Forties, he complains, the literary man as he was, that our education was becoming far too literary exclusive and that the claims of scientific education were being neglected, let alone technical education, a term which had not been invented in those days. That went on until we had the famous despatch of Lord Macaulay which was the crowning piece of the work of the Government in that time. Even the Presidency College Library was of a most primitive description. That was the idea of the Government of India, in those days; and that policy was naturally inherited by the University, which is soon to perform its Jubilee. What could it do in 50 years when the impromptu national education of those days was the policy enunciated by Maccaulay, Scientific and Technical education found no place in the scheme of Education. He could not forget that private enterprise was very feeble and scanty and the missionaries took up the cause of education while the Government was waiting and watching. Government did not take up the work and the exigencies of time interfered with private enterprise and also with University methods. We all felt the need of a change and a change has come, but even the best University cannot have a thoroughly equipped College for Technical

Education. It is the Government that must do it. What a vast and stupendous field there is before us! The papers read before us show what a vast field there is which should be availed of and how inadequate private enterprise is. Gentlemen, unless we have a first class technological institute, as it is denominated, what will happen?—Mr. Dhadhabhai Nowroji and Mr. Mukerji have told us what could be done with jute and cotton? Mr. Jordan has said that we can make excellent white sugar without the admixture of any offensive material in it. These are the things to be brought home to the people. How could it be done, except it be through an authoritative central Institute that we asked for? I say that by the establishment of a National College of Education for Bengal and the Bengal Technical Institute, people have shown that they are prepared to do what little they could in the direction. But, there are difficulties and, so far, we have had to depend upon public spirited individual and generous donors in connection with this matter. As I am now talking of the Bengal Technical Institute and the National College, I may say that there is one difficulty which we all feel. We who have got to do the work in connection with it feel the absence of proper experts for drawing up the syllabuses for the education of our boys. There is a great difficulty experienced and it would be a good thing if the committee appointed were to draw up a comprehensive syllabus which the different provinces, according to their requirements and resources, might take up in compartments and work up. I have approached some of the members of the Committee and they have viewed my proposal sympathetically and if the Conference were to ask it to do so, by the time we meet next year in Nagpur, the Committee will be able to give us a syllabus that will do for all provinces to enable them to work in compartments. Gentlemen, as I was observing to you, the Government has not done its duty in the matter, and it has made it impossible for the people to do their duty in the matter of its educational policy, which has so far been purely literary.

We appreciate the need of educational facilities for the promotion of the Industrial movements. We have got to be content with being mistries, overseers, apprentices and supervisors. That is the real reason why the Conference feels that the Government must undertake a larger share of the work while the people will supplement, as far as they could, the endeavours of Government. The Institutions I have named have made it emphatically clear that they are intended as not to supplant but to supplement the Government efforts: otherwise they would not have the whole-hearted and the ungrudging services of leaders like Sir Gurudas Banerji, whose association with this work is one of the valuable assets of our movement. As far as lies in our power, this educational movement will be kept quite apart from any political movement, so that the Government can very well lend its help to the movement. Well gentlemen, we must not forget that the lessons of the latter day have been read amiss. The soul-stirring National song that has been adopted in all parts of the country has found detractors in some circles and the immortal author has been more sinned against than sinning. Necessarily, because the whole scope and object of his work has been lost sight of. Those of you who have read his great work *Anandamauth* in which the song appears must have felt how noble the idea contained in the song is Education in all its well balance systems, spiritual, physical and material, which includes technical and technological systems will be the real regeneration of the country. We have lagged behind so long and we shall have to lag behind for all time unless we recognise that fact. I trust that brighter days are in store for us and the real solution of the difficulties that face us for effecting the regeneration of the country must be found in our educational system. For this reason, this Conference calls upon the people of the country to do their duty in the matter, according to their opportunities, and, I can assure you, those opportunities will be lost unless they are availed of.



BABU AMBICACHARAN MITRA (PABNA):—*Mr. President and other Fellow Swadeshis*, More than a decade has elapsed since it was proposed to the Indian National Congress at Lahore, presided over by our Grand Old man, that the early formation of an all-India Commercial and Industrial Conference for the promotion of our National Interest and connections, both internal and external, for the healthy growth, progress and regeneration of a fallen and a down trodden conjuries of nations living peacefully, though in a state of abject general poverty, under a mighty potentate of the west, was a matter of paramount necessity.

Before I proceed further, I should like, with your kind permission, to quote a few lines embodying a suggestion together with the means thereof as reported in the Indian National Congress Report of 1893 :—( Page 103 & 104 ).

"The problem to be solved now is how to cope successfully with such a curse as the poverty of India. We must, like a good physician, feel well the national pulse and scrutinize the signs of the times and strike at the very root of the disease. The flow of the Indian money from the National exchequer to a foreign land should be stopped, as far as possible there must be retrenchment too, right round in India. The financial minister to the Government of India must make bold to scrape out all useless items of expenditures from the Indian Budget, as unmercifully as the British surgeon so cleverly deals with the sloughs in a carbuncle. These are the roots of the disease. But, so that we might induce the Indian Government to pay due attention to our just and legitimate prayers, we must let them know, that it is the voice of the people and not that of a microscopic minority that speaks through us. Improve the individual units in a nation and you will have a happy, contented and loyal set of people. My countrymen, we must urge on the several Governments, both local and supreme, to take a little more practical interest in the cause of mass and technical education as they are unhappily and unsuccessfully now trying to put down high

education. I make bold to say that no power in the land can now check the onward march of high education in India as Providence has ordained otherwise. High and mass education are twin sisters, and they must walk on together along the path of progress and we will then have no discordant tune ever marring the marvellous effects of the harmonious unity as we hope one day to have here.

"One point more and I have done. I should like to see the early foundation of a national industrial and commercial conference to hold its annual sittings at the Congress times and consist of delegates and others who might interest themselves in the question. I would wish such a conference if so advised for making arrangements, or such of its members as might so desire, to raise the necessary funds for the due developments of the immense natural resources in particular of the country all through India, by opening up banks, art and industrial schools and establishing factories and the like at suitable centers all through this vast country, so as to cope successfully with the unjust and almost exclusive invasion and monopoly of foreign industry, which is sucking, as if it were, the very life blood of all India and replacing indigenous industry, thereby making many a poor family in India homeless and famished. I should like to see more of industrial life in my fellow countrymen, than I see at present, so that we might settle, once for all, this great problem which is a stumbling block alike to the Government and to our Indian patriots."

But, alas! in those days there was no national response. The country was not then ripe for action. The times have changed and ideas all round have changed also, so that at the present moment, we and our rulers see before us a whirlwind of forces bursting forth in all possible directions, practically without some responsible persons to lead them to a common goal, except the One and the only One, without a second, who rules over the destinies of nations.

In the many sided agitation, one fails to see that coolness

of thought, that calmness of judgement, that moderation of action, that foresight in lead, which are necessary to guide and lead the conflicting forces towards the path of the steady progress, so that the wheels of experimental national steam engine, in its just attempts at taking galloping steps, may not dash against some hidden rock in its headlong march, upwards and downwards, and become completely smashed to the discredit of all parties concerned. May the God of all nations save us from such a catastrophe.

The question that naturally arises is how to work on with these many sided national impulses, by finding out natural and healthy courses for the gradual but steady growth along the path of progress, under the existing circumstances, an important factor in the solution of the 'all-India' national problem. If we want to succeed, we must not divide and wrangle. A house divided against itself cannot stand. But we must take hold of the many and various opportunities that are now ushering forth their blooming existence, in love and hope. We must not only help ourselves, as our honourable President and his co-adjutors are doing in Bombay, but also take help of the legislature in a loyal spirit, so nobly fought out by the Honourable Mr. Gokhale in the Supreme Council, when he succeeded in inducing the Supreme Government to undertake the co-operative Credit Society's Act, which, if properly organised and tenderly and skilfully worked out, will, in the near future, be an important factor in the solution of the poverty problem in India by cheaply financing all industrial and agricultural undertakings in our common motherland. Our feelings are now perturbed and so we are naturally viewing with suspicion things inaugurated by the Government, even under great pressure from the people's man. But times will change again and will soon clear up the clouds which have darkened, for a time, the political atmosphere of India and the sun of righteousness and the stars of love and peace will tend to bring about a harmony, so that the angels in heaven reign in torrents of flowers from on high, as of old, in our common

motherland. By uniting all India, through common morality and common financial and economic interest under a beneficent paramount rule, divested of its occasional and unavoidable pin-pricks, and our successors, if not we ourselves, will witness all-India, from the highest to the lowest, contributing his mite, according to his might, in promoting financial organisations, larger and larger, for the due development of the industrial and agricultural interests of India and thus contribute a mighty factor in the solution of the All-India National Problem to the great glory of the British Lion. The world has now long outlived the stone ages and have stepped into the iron; whereas, with all our intelligence and education and the benign influence of a mighty foreign rule, we are still here found as groping in the dark in industrial and commercial matter, not a whit better than we were at least a decade ago, though national development, as understood now in the civilised world of the West—the far West—as also to the East, lies in the improvement of the iron industry in all the different branches, from the lowest to the highest. Such industries, as we all wish to be successfully worked on in a gigantic scale, require considerable capital and sound practical skill that again require honest co-operation, specially in a poor country like ours, and this again depends on the solution of another important problem. Has the time come when such an attempt is feasible;—I should like to answer the question in the affirmative, though not without some hesitation. The times are now much changed. Sad experience has now made sage of many of us who are now electrified with swadeshi zeal. May the blessings of God be showered on the constructive Swadeshi, which I hope, minus its suicidal side, under proper guidance and enlivening influence, generate a real swadeshi spirit in us—not based upon rancour and hatred, but on the external bonds of love and good will towards our countrymen first, and then on common humanity, as well, irrespective of creed and colours, times and climes, to the glorification of God and the happy development of divinity in fallen humanity. Have

faith in a living God who alone can help us—we helping ourselves—remembering, at the same time,—“the more the chain is tightened, the greater is the possibility of its breaking”—and there is no power on earth under the sun that can withstand this law of nature. Work on and on remembering always “कर्मण्ये वाधि क्रस्ते मा फलेषु कदाचन” the old adage. You have only the right and privilege to work leaving the result in the hands of the great Dispenser of justice.

Then Mr. G. A. Natesan (Madras) also supported the resolution

*The Resolution was then put to the Conference and carried unanimously.*

## II. THE INDIAN STORES COMMITTEE.

THE HON'BLE SIR BALCHANDRĀKRISHNA:—*Mr. President, ladies and Gentlemen*—The resolution which has been entrusted to my care runs thus :

“That this Conference thanks the Government of India for appointing a Committee for making recommendations for the use by Government departments of indigenous articles in preference to foreign goods, and requests to that they be pleased to direct the early publication of the Report of the Committee, so that the public and the traders in India may have an opportunity of considering it before final orders are passed on the subject.”

Gentlemen, the struggle about the purchase of articles produced in this country, purchase by Government specially, has been going on for a number of years. From the early sixties, this struggle has been going on throughout the whole of India. On this question, that most sympathetic and righteous Viceroy Lord Ripon, (cheers) issued a resolution, but it is sad to think that that resolution has been a dead letter for a long number of years. Then a resolution of a somewhat restricted character was issued by the Government of Lord Elgin. That also did not take effect. Provincial Governments also issued some resolutions in regard to these matters, but they had not had much effect. Then, after a n

agitation, the Government of India last year appointed a Committee and the Honourable Hewett, who was in charge of the Commercial Bureau, wrote thus: "I may also point to the recent resolution issued on the appointment of the Stores Committee as evidence of our wish to give every encouragement to products of local manufacture." We have expressed our recognition of the fact that local industries must frequently lean, in the first instance, on the support of Government, and it is our intention to insist that whenever an article required by Government can be produced in this country of the same quality and at the same price as the imported article can be laid down in India, the preference shall be given to the locally produced article". Then the terms of the resolution appointing this Committee are "to ascertain definitely the procedure which in practice is adopted at present for the purchase of stores" for Government Departments in India. This Committee was appointed last year and we have reason to believe, from the reports which appeared in some of the papers, that that Committee has submitted its report to the Government of India. But the Government of India are silently sitting upon that report and had not taken the opportunity of publishing it to the world. In the meanwhile, manufactures of England have taken their opportunity and they have strongly protested against it. It is believed that this report is favourable to India, and therefore, the manufacturers in Europe, in England especially, have taken the opportunity of approaching the Secretary of State and the Government of India on this subject. They are strongly agitating against it. Perhaps it may be, I hope not, that honest John and Lord Minto may succumb to the agitation in England. We strongly hope that our able Secretary of State for India, Mr. John Morley, and our present Viceroy, Lord Minto, who is credited with great powers as regards the administration, who, although is not given to speaking much, is doing his best in the administration of the country, will not be influenced by these agitations and that they will publish this report which we pray for in order that

the public may have an opportunity of criticising it, and ultimately, we hope that they will bravely resist all the agitation and allow the Government of India to sanction the report as it has been submitted to them. With these few observations I submit this resolution to your acceptance.

MR. K. NATRAJAN (BOMBAY) :—*Mr. President and gentlemen*, I think it will be granted that in a country like India, State aid is essential to industrial development. Then the question next arises, how can this aid be given. Protection of infant industry is one form; but we never had any hope of getting such protection. Whatever hopes we had, we must give up now, since the British nation have pronounced by an overwhelming majority in favour of free trade as an Imperial policy, once for all. We have, therefore, to take for granted that the policy of free trade is the policy of the Empire; and we have now to consider in what other ways the State could lend its aid to industrial development. The promotion of technical and scientific education is one of them. On that subject you have heard several speeches. The purchase of stores by Government aggregates in a year to, I don't know at present, how many crores of rupees, and even if a fraction of that amount were spent on home industries, I should think it would go a great way towards the encouraging and the starting of new industries in this country. The last resolution of the Government went further than any previous pronouncement and I may say it went further than several native states have gone as yet, I should think. It makes it incumbent on officers to purchase Government Stores in India, wherever possible, instead of leaving it to their choice to do so. I told you, I did not know exactly what the value of the total Government stores, brought into this country, was but I think a very large proportion of it is railway material which we do not manufacture. You all know that we do not manufacture railway materials in this country just now; and even if Government were to buy all the rest of the materials in this country, the total value could not be appreciably large. I

therefore value the resolution not so much for what it does immediately but for what it holds out and for what it may do. You all know that we are in sight of a great iron industry in this country and I think that industry, for instance, will not be possible unless Government undertakes to guarantee certain proportion of its demand to the promoters. I do not know whether they have done so or not. The State must guarantee a fixed demand from Government, for a number of years, as a true incentive to the establishment of new industries (A voice "they have guaranteed"). I have no official information about it.

Coming to the report of the Committee, appointed by Government, to enquire into this subject, the only reason I have heard for its non-publication is that its recommendation to the Government are of so drastic a character that, if the English manufacturers came to know of it, they would raise a howl and prevent the Government from giving effect to any portion of them. But I do not agree with this opinion, because, as a matter of fact, English manufacturers are not going to wait, to know what the recommendations are until Government publishes the report. You know very well that there is no Official Secrets Act in England and as regards the Police Commissions Report, which was regarded as quite confidential, the whole of it was printed in the *London Times*. I think English manufacturers know very well and have a very good idea as to what the recommendations are because they have already begun to protest against effect being given to the report. Withholding the publication of the report would be to give advantage to English manufacturers. Before we know where we are, the Government of India will have been pushed to yield to British influence. I think, the Government is anxious to give support to our claim and if the report is published now, public opinion that will be created in this country will go a great way towards strengthening the hands of the Government. For these reasons we ought to ask the Government to publish this report at once.



MOULVI MOHAMED NIZAMUDEEN, Lucknow:—*Gentlemen*, The proposal of the publication of the report on the subject of purchasing native articles has been put before the meeting and seconded, and there is nothing for me to say except that I think that it is a most reasonable proposal and that the request should be met. But as regards the political discussion of the matter, I have nothing to say. All I can bring to your notice is, as a Government officer, that Government is most anxious to buy good articles of reasonable value in India and not to import any articles from foreign countries. As a District officer, I have always tried to do that. And I have never found any of my superior officers opposing the scheme. The only difficulty is, I am not sure that the report of the Committee has been ready for publication and whether it is delayed. All these facts are in the dark and you must give some little credit to Government. They must have a busy time of it for the reception of the Amir and they might not have time to publish the report. To blame Government for any thing, when facts are not known, is not prudent. So far as I have known my superior officers, the English officers have always backed up purchase of indigenous articles, wherever they were good. We have always tried to purchase Indian manufactured articles whenever they were good. I believe, if the Committee's report is reasonable, the Government of India will carry out its recommendations. I can tell you of one difficulty from my own personal experience: it is that the article is not really made in India,—the article which is offered as an Indian-made article. Some pieces of it are brought in from England and it is manufactured in India and it is thence claimed for it that it is an Indian product. Even Government objects to such a process as this. It is not as good as the English made article and is an expensive article. Government wants that it should be an article made in India, genuine and of reasonable value. Then they are ready to purchase and utilise it. With reference to the present resolution, I cannot support it when the facts are not known.

Shapurji Bikaji Patel then spoke on the resolution which was put to the Conference and *carried*.

### III. INDUSTRIAL SURVEY.

RAO BAHADUR R. N. MUDHOLKAR, AMRAOTI,—*Mr. President and gentlemen*, The proposition which I have to submit for your consideration runs thus :—

“ In view of the importance of having an Industrial Survey of India made by Government, and having regard to the recommendation made by the Committee on Industrial Education to that effect, this Conference request Government to institute such a survey, and empowers the President and the General Secretary to submit a memorial on the subject.”

This resolution comes very aptly after the last two. In the first resolution we have asked Government that they should promote technical education, that they should carry out the promises they have been holding out to us, since years past, in regard to the development of Industrial Education. We now ask them definitely to have, for the whole country, a large and properly equipped technical institute. We also asked them in the first resolution that they should have technical colleges for each Province. We also asked that there should be due and sufficient provision made for secondary education and technical education. Having asked that in the first proposition, we ask them in the second that, in regard to the things which are prepared in India and which are in no way inferior to the things imported from abroad, Government ought to give preference to Indian things. Having done these two things, we now proceed to the third thing, which is very necessary to give due and proper effect to the first two. When we ask for the establishment of schools for secondary and technical education, we have to consider what kind of technical education is required, from the circumstances of each district. Technical education ranges over a vast field. We must, therefore, see what kind of instruction is needed by the circumstances of each province.

There was, five years ago, a committee appointed by the Government of India to go into the question and submit a report thereon. That Committee was presided over by Colonel Clibborn, himself a specialist in the matter, and he was further assisted by expert colleagues. That Committee went very carefully into the matter. With all the proposals or the opinions of that Committee, I do not agree and I also know that many of our countrymen do not agree. But there was one most fundamental proposition laid down by them to which we all of us, so far as I know it, give our full adherence. And that is this: that the Committee said that, in the absence of an industrial survey, they felt themselves unable to recommend a complete scheme of technical education. Gentlemen, that is only natural. Unless you know what industries actually exist in a district—how that industry actually stands—what are the wages which persons, working in that district, earn—how far that industry is affected by foreign competition—how far, if properly developed, it is in a position to withstand foreign competition—unless all these things are known, you cannot know that you can give encouragement to it, that you can apply capital to it or that you should have schools for giving instruction in that industry. That information is, therefore, very necessary. This appears to me to be so very obvious and almost so very elementary that I was thunderstruck when, some few months ago, I read in the papers that when a question was put in the Bengal Legislative Council, by one of the non-official members, inquiring of Government whether the Government of Bengal was prepared to institute and make an industrial survey, the reply was given that there was no necessity for it. Well, gentlemen, I do not know that there are peculiar facilities in regard to it in Bengal. I do not pretend to have studied the whole literature in regard to the industries of Bengal; but, of the Bengal monographs, I have seen, with the exception of a few like those of our friend Mr. N. G. Mukerji, they do not serve the purposes of an industrial survey. They are very good reading in their way ;

some of them are written in artistic style; but, so far as practical information is wanted for developing industries or for determining what kind of technical schools should be established in the province, they do not give you that assistance which is required. Gentlemen, we have the highest authority in support of our view. Only in March last, when the budget was under discussion, Mr. J. P. Hewett, who was then the member for the Department of Industries and Commerce and who is now Lieutenant-Governor Designate of the United Provinces, said from his place in the Council: "The Government of India are, however, in full sympathy with those who are endeavouring to improve the state in which our indigenous industries are at present. Much information bearing on this subject has been collected in the Census Reports, and in monographs which have been prepared on the different industries; but the material is scattered, there is no co-ordination of results, the subject is in general treated from the artistic point of view, rather than from a business standpoint, and the information is in many cases neither sufficiently detailed, nor sufficiently exact to be of much practical use. The Madras Government have recently taken the lead in establishing what is practically a Government Agency, for the fostering and improving of Indian industries."

There is another thing which I ought to mention: that is the Madras Government have already appointed Mr. Chatterton as Superintendent of the Survey. Gentlemen, the Government have considered the necessity of having a revenue survey; in fact, we have revenue survey more often than we want. They have topographical, trigonometrical, Marine, Geological and various other surveys. But in regard to industries, on the progress of which the very existence of a nation depends, in regard to them, in the very capital of India, you find that a gentleman, occupying a high position in Government, doubts the necessity for that survey. To that gentleman, we can only, in reply, quote the observations of the Honourable Mr. Hewett. As I said just now, our demand for

industrial survey is so obviously of such a rudimentary and elementary character that I never thought for one moment that anybody occupying a high position in Government would at all question it. But, since it has been questioned, it became necessary for us to emphasise our position and point out how this kind of survey is required and to press our view on the attention of the Government. With these words I commend this resolution to your acceptance.

MR. B. PAL CHOWDHURI (CALCUTTA):—*Gentlemen*, I have been asked to second this resolution, but I think there is not much need for it, because I am sure that all of you fully understand the necessity of such a requisition from the Industrial Conference to the Government. Let me first tell you what this survey means. It means a sort of statistics to be prepared by the Government of India showing what are the industrial conditions of different parts of India, at present, and what their prospects are, what things can be developed and in what places. It is something like lighting a lamp in a dark room. Unless we have a light in the room, we cannot see what things are where. If we want to get at a thing, we must have a light. We can't do it in a dark room. This is what is wanted. We have got all the surveys, as the proposer said,—different surveys established by Government throwing light on what is necessary to be done in different fields. And so, unless we have an industrial survey, people cannot understand what has to be done and at what particular places. I have often been told by several friends of mine that this survey is a sort of double-edged weapon. If the survey is made, you bring to light the industrial possibilities of India. Unless we, Indians, take advantage by being in the field first, mind that there is the danger that you will be supplanted or replaced by other people. In asking for this survey, gentlemen, you must remember that you must be up and doing. For, after the survey is made, if you are not up and doing, I think you will be doing more harm to yourself than good. I am not a speaker. I am a practical man; I will only show

to you one or two figures which will, perhaps, impress you more than any speech from me. For instance, from this Calcutta port alone, we export something like six crores of rupees worth of raw hide. And not a single skin is tanned or partially tanned, or cured or partially cured. These hides go to other countries and come back as cured articles or sometimes as boots and shoes. When they come back as cured articles, their value is three times as much. If you could do the tanning and curing here, it would bring a profit of fourteen crores to our pockets. It will do a great deal to mitigate the famine. Unless we have a survey, how can we know how much of this hide is exported from this place. This is only one instance. Then, take our oil seeds. Some thing like sixteen crores worth of oil-seeds is exported every year. This will produce almost sixteen crores worth of oil. And, if we can export this oil and keep of the oil cakes here, it means much enriching our soil; but, if instead of doing that, we export the oil seeds, we impoverish our soil. I would not take up your time any more. With these few remarks, I beg to second this proposition.

MR. S. C. MUKERJI (CALCUTTA)—*Mr. President and gentlemen,* To put the matter from a layman's point of view, it stands thus. Mother India with her hundred arms, has her arm for industries paralysed. This industrial survey that you want the Government of India to take up is for the purpose of diagnosing as to what the matter is with the industrial arm and in what way it has been paralysed; what are the nerves that have become useless; what is the latent vitality in the muscles and nerves and in their tissues. It is only with the object of getting data before us that we want the Government to take up this matter. I am not one of those who say that we must leave Government alone. Government's money is people's money. Government has got powerful organization and it can, by means of its officers, get together more data in a shorter time than it is possible for us individuals by our voluntary exertion to perform. We must at the

same time make our utmost endeavour to make Government move for our benefit. We must induce Government to take up this national cause and help us in trying to get the data which will help us to push this matter of industrial regeneration of India forward. Gentlemen, would you believe what my friend Mr. Mudholkar just now told you that the Bengal Government declined to move in the matter? I must say, to the credit of the Indian Government, that, by its resolution and by its endeavours in this matter of the industrial survey, it has tried to help us to a certain extent. It is these Provincial Governments that are the greatest obstacles. Lord Curzon, it must be said to his credit, feeling that there was great famine in the land and that the industrial regeneration was an imperative necessity, established a department of Commerce. Mr. J. P. Hewett, when he took charge of the office, looked into the previous data that had been procured, for instance, from the Census Reports and monographs; he found those data very imperfect and came to conclusion that they were not sufficiently detailed and were scattered, and were treated from the artistic standpoint and that, in some cases, the monographs were written by people who knew nothing about the subjects they wrote about and treated of matters which did not exist in India at all. With these data, Mr. Hewett, though he was willing, could not do anything. When our President opened this Conference yesterday with his speech, he quoted from Mr. Hewett's remarks made from his place in the Council. Mr. Hewett urged the Provincial Governments to make a survey of the state of indigenous industries within the area of their jurisdiction with a view to ascertaining the exact state of the various industries and handicrafts, the amount of the earnings and the present condition of the artisans respectively employed in them, the precise manner in which the different industries have been affected by competition with imported articles, the practicability of creating new markets or of developing markets which already exist, and the possibility of giving a new lease of life to these

industries, either by means of special instruction or by the improvement of the appliances in use." These were recommendations made by a responsible minister. The Government of Bengal, for instance, as when the Honorable Mr. Sharfudān, who has been made a Judge, put a question asking the Government to take up this matter, they declined. Forsooth, why?—Because, they had a memorandum written by E. W. Collin in 1890 and therefore it was no longer necessary to take up the matter. That memorandum does not contain a word about agriculture, or about raw products which Bengal produces; nothing about jute or rhea. A great deal of the wealth of Bengal consists in rice, jute and rhea. This memorandum, on the basis of which the Government of Bengal declined to inquire, was the memorandum of Mr. E. W. Collin, written in 1890, long before the Swadeshi-movement or long before Lord Curzon took any step to open this new department for Commerce and Industry. Although, as my learned supporter told you, there is the danger, directly the data being furnished, of English competition being keener in the matter, nevertheless, it is a matter which we ought not to shrink from; now that we have a great deal of feeling in the way of swadeshi, we ought not to be afraid of what competition there may be. We must be prepared for it; we must know the exact condition of industries of our country; it is an open field,—we must be prepared to fight hand to hand in the industrial struggle. This is a foreign Government which will not give us protection by law; and, if there is no protection by law, we must protect ourselves by means of the swadeshi vow, which every one of us, true son of mother India, must take. Being true swadeshis, we shall bring protection to ourselves. And then, there can be no reasonable doubt that our country will be as prosperous as any in this world. With these words, I ask you to carry this resolution.

*The resolution was unanimously carried.*



## IV. SUGGESTIONS TO THE PUBLIC.

DEWAN BAHADUR AMBALAL S. DESAI OF AHMADABAD,—  
*Mr. President and brother delegates*, The resolution, or the proposition I will call it, which I am called upon to commend to you, is as follows:—

“That this Conference specially invites the attention of the public to the great importance of introducing the use of improved handlooms among the weavers of India, of promoting technical education by the establishment of schools and classes, and of starting laboratories for the purpose of determining the industrial value of Indian products.”

Gentlemen, you must have observed that this differs from the three previous ones. The three preceding propositions are resolutions. They are, in a way, mendicant propositions, as some call them; but this is a constructive proposition (*hear, hear*). The thing that is recommended here is for our own observance. It is a recommendation of self-reliance, I for one, as a matter of private opinion, am rather inclined to rely upon myself than upon Government or others (*hear, hear*). Gentlemen, there are two mottos which I may remind you of. Do not make a request even of a father. Why approach Government even in a small matter and ask them to do this and that? We tell them we are ignorant, give us this information. We are very poor. give us a small college. Who gives money to the Government?—It is we that give money to Government (*cheers*). Cannot we, then, all the best men of India, combine and do what the Government, either out of policy or out of indifference, cannot do or will not do. Gentlemen, that is also in consonance with our religion. Readers of the *Bhagavat Gita* will say—*Uddarat Atmanan Atmana*. That is the motto of our book,—of our immortal book. We go to Government, we ask for a big technical college. Are we to tell Government do it? Have we to tell the members of the Government and the Secretary of State and others find funds, if you have the inclination to assist us? Shall we wait till then or must we begin? The answer has already been given by

Bengal. Bengal has not waited. Bengal has got its National College of Education and National Technical College, also (*hear, hear*). As a matter of fact other Presidencies have, in their own way, already made a beginning. Bombay has got its Victoria Jubilee Technical College and it is supported, not by Government, but principally by the subscriptions of the people and the Bombay Municipality and, if I mistake not, the Mill-owners of Bombay (*a vaiaa, by all four*). Government pay only a quarter. This is no new thing among our people to support our own institution. I know of a gentleman who lived in great simplicity all his life and who at the end of his life gave his fortune for the cause of the people. Rs. 90,000 he gave. There is enough of charity amongst us, but the direction is wanting. Charity goes in wrong channels. A beginning has been made with dispensaries and rich people generally found dispensaries. But the founding of technical schools has not come into favour yet. I am sure, in a short time, that will come into favour also. Among the items here, there are three things proposed for our acceptance. Introducing improved handlooms. There is now a controversy raging whether handlooms will be able to resist the competition of power-looms. Our friend Raoji has given his opinion. Some maintain that the hand-loom is doomed; others maintain that it has survived and is destined to survive. Only actual experience will show which of these two will prove true. As my friend Raoji said, they will divide the field. Hand-looms will devote themselves to coarser goods and the power-looms will have all the medium cloths. This is a mere possibility. In the meantime, it is quite proper that we should do all in our power to encourage hand-loom industries. The second matter is in regard to technical education. On that matter, we are all agreed. But I wish the proposition was broader. It only says, establish schools and classes. Why not technical colleges? Why do you think that those who practice self-reliance will be contented with classes and schools, and not colleges? In Ahmadabad, the generosity •

one gentleman has been responsible for the gift of one lakh of rupees for the establishment of a technical college. There are signs there which make me believe that, in a few years, there will be a number of technical schools there. The third is starting laboratories, for the purpose of testing the industrial value of Indian products. There also I wish the proposition to go further. Why simply testing laboratories?—Why not practical laboratories for producing chemical things and products? If I had the liberty, I would have added that a number of students should be sent to Europe. Mr. Tata sends a number of students every year for being trained in foreign countries. Dr. Rao of Bombay was educated at the expense of Mr. Tata. Why should not private gentlemen undertake that task also? With these remarks I commend this proposition for your consideration.

MR. VISWANATH P. VAITHIA OF BOMBAY—*Gentlemen*, I come before you to second the proposition which has been so ably put before you by Mr. Ambalal. The proposition is so very important that each and every public-spirited gentleman here present should give his serious consideration to it. It speaks volumes for the propositions that have gone before it. After all the essays that we have heard and read here to-day, this proposition gives some practical idea of how those ideas are to be put into effect. Gentlemen, first of all to put all the ideas that have been suggested by the different papers into practice, requires that we should have substantial capital. Each and every gentleman, interested in the industrial progress of the country, should consider it his duty to give his quota towards that capital, which is necessary for fostering our industries. I am sorry to say that, in our country, and especially, in this part of the country, people have not understood the value of money, however little they may have in their pockets. Just now a financier told me that, in Bengal, our capital to the extent of 14 crores of rupees is locked up in Government Promissory notes, getting nothing more than 3 or 3½ per cent a year. You will be surprised to find that

most of our capitalists in Bombay, who have invested their fortunes in mills and factories, never imagine taking less than 10 per cent a year. In these circumstances, I feel that it is our duty, especially when we see the value of these factories,—it is duty to come forward with whatever capital we may have to start factories to foster our industries. I am sorry to find that in a large country like India with a population of nearly 30 crores, the available capital in the whole country for a fostering our industries, in different ranks is not more than 60 crores of rupees. Why, in a small country like Japan, where the population is not more than 5 crores, the available capital is 239 crores of rupees. Calculated on that basis, the capital we ought to have in India is something like 1,500 crores of rupees to foster our industries, so that we can supply whatever we want from our own products. However, I have no doubt that, after all the agitation we have had in Bengal, which has been taken by the different parts of the country, the surplus capital that have been invested in Banks, without any adequate interest, will be devoted to our industries which, we think, are more profitable. I also hope that we will invest them in other industries which will ultimately prove very useful to us. Two essays written here have shown us that the hand-loom, which have been improved and used till now, are not so very unprofitable as we imagined. Therefore, it is our duty, as public-men and as capitalists, to make a greater use of these hand-loom and revive the industries of Nagpore and Ahmedabad, and the silk industries of Bengal that have been dying out. The next thing that we have to do, and which may not, in the beginning, be very remunerative, is to start classes to give technical education to our young boys who may prove very useful to us in managing factories which may hereafter be started. Not only that, but we must start—and begin that very soon—laboratories in different parts of the country to understand the industrial value of the crude products of India. Imagine the raw materials grown in this country going to England and different

parts of Europe, worth lakhs of rupees and coming back here and drawing away the whole wealth that you have! We have been, in the last three resolutions, asking Government to do several things. My friend Dewan Bahadur Ambalal has rightly told you that it is now time that we should begin to think of applying the prayers to ourselves. We have been making these requests for nearly twenty years now. Whether it has had any effect or not, I am going to delate here. But I will give you an illustration. Supposing there is a profligate and drunkard of a father living in the house with a number of children and a kind mother. The father is not bringing anything to the house to maintain the children and the children are crying. Is the mother to sit quiet in the house and allow the children to die of starvation? The same is our position. We have been paying taxes to the extent of 33 per cent. of our annual income. The Government is not coming forward to improve our condition, to foster our industries and to make us wealthy. It is time that we should consider the situation. Are we, as the mothers of our industries, to starve them and thereby starve our own people and make the country every day poorer and poorer? If we consider these things, I do not think there will be anybody in this hall who will say that we should wait, for the time for beginning our work is long gone by. We have to begin at once. Let us say, we shall begin now and be sure that, if we ourselves begin with an earnestness of purpose, God will help us. With these few words, I second this resolution.

DR. NILRATAN SIRCAR of Calcutta:—*Gentlemen*, The resolution, as the proposer has already said, and very justly, appeals to our experience. In these days of fierce commercial and industrial competition, if we do not move ourselves and strain all our nerves, our lot is doomed. Look at the magnitude of the task that is before us, as laid down in this proposal. Of course, the Government has upto this time not done much for technical education; but that is no reason why we should be idle. We ought to strain all our nerves in this direction,

though the magnitude of the task seems to be appalling, at times. The whole system of primary and secondary education requires re-modelling; in co-operation with Government, I think it is not impossible. Manual training classes, which, as we find, have sprung up in America, may be attached to almost all our primary and secondary schools; manual training classes for teaching carpentry, blacksmithy, drawing &c. That will only be the foundation for future technical instruction. Then again, secondary education has to be remodelled as England has remodelled it during the last fifteen years. But appalling as the task is, is it impossible?—I do not think it is. We must introduce and first try in small units. Introduce new methods in small units. We have, at the present moment, the help of the public who have come forward with so much promise in this direction. It is quite possible that in these small units we may be successful. As one of such units, I may mention that here, in Calcutta, a small society has been established called the "Society for Technical Education in Bengal." They have started a technical institute, which, they hope, will be able to do some good in this connection. Of course, our programme is modest, and we are trying to impart education in such branches as seem to be most necessary, at the present moment. But, suppose there is a Company that starts a factory in Bengal. What are the difficulties it will have to contend against?—The difficulties are first to get good experts, second, to get good assistants and third, good workmen. One school or one college, for the matter of that, in the metropolis is like a drop in the ocean. We must have hundred such schools and classes in the country to cope with the necessity and even then it is likely to be insufficient. Now what do we find in the western world?—Germany, for instance, or France or England, is the growth of several decades. One may, in fact, trace the development of technical institutions since the days of Pestalozzi. In this country, we have to make a beginning, and therefore, we must require a good deal of patience; we cannot reap fruits all at once. It will require

years and years of patient work before any tangible result can be obtained. But then, what my appeal to the public is this that we should all come forward, not only with money, but also with men. The thing that is most wanting in this country is the proper men,—proper, energetic, painstaking, intelligent men. Money may be available; there is capital in the land, but capital becomes high when it does not get good men. I am not talking of experts,—for experts, at present, we may depend upon some foreign countries,—but we have also to employ lots of workmen and lots of assistants. As regards those skilled and trained men, we can depend upon technical schools; but, I think, every one of us present in this hall can do something in this direction of helping in the cause of organising technical educational movements in this country (*hear, hear*). That is what is wanting. We did not feel the necessity so long. We had been idle. Not only the Government had been idle, but we have been idle, as well. Perhaps the blame rests more with the Government than with us. But, the Government may have done something in the matter, but we have done nothing at all. Now that we find suddenly that we are so much behind other countries in the matter of industrial developments, unless we strain all our nerves, unless all of us try to improve our condition, our cause is hopeless. It is idle to talk of hand-looms competing with power-looms. That will never be. Industrial and economic laws are inexorable. We must be up to the mark; otherwise we are bound to go to the wall. This we must remember. We must come forward, not only with money but with men to further the national cause, otherwise we must rest content with our present position.

MR. DAMODARA DOS OF RAJPUTANA.—*Mr. President and gentlemen*.—It will be really difficult for a member of a backward community as that of mine, I regret to say, to come before an audience the members of which belong to enlightened and wise communities (*cries of "no no"*). But it is a relief to me that, after all, my community has been, up to now, keeping to their occupation. I myself am engaged in an industry of

the country (*hear, hear*). I should naturally be expected, as a representative of the cotton industry, to make some remarks on hand and power weaving; but, as the time before me is limited, I regret, I cannot, at this moment, speak on this subject at length and would confine my views only regarding the general principles. I do recognise the necessity of our asking for help from the Government, as much as I realise the wisdom of my wise countrymen in Bengal and other parts in sending students to other countries for their education (*hear, hear*). But, I would suggest quite another method, although it is not new, generally, to those of the audience who are interested in commerce and industries and specially to those members of my own community—the Marvari community. Although the steps taken by our countrymen are wise, nevertheless, they will in the long run retard our progress to a decade at least. The best way of rapidly increasing our industry is to, although on a small scale, begin those industries in our country and keep them, for the time being, under imported skilled-labour and put our students under these experts. In the course of five or six years, when they are acquainted with the general principles, it will be more beneficial to send them abroad (*hear, hear*), and there enable them to become more acquainted with up-to-date methods. I would specially draw the attention of those hearers in this audience who belong to my community and would commend to them the necessity of realising the situation and knowing how the wind blows. Although our community is not quite backward, yet much more should be expected of them. With these observations, I beg to support the resolution and to assure you, Sir, that, if our enlightened gentlemen are to try to educate the minds of our community in their language and mix my community with their views, it will only be possible by more reconciliatory methods, than by the methods of depreciation, which I find all over Bengal ruling to-day.

*The resolution was then put to the Conference and carried unanimously.*



## V. PROVINCIAL COMMITTEES.

HONOURABLE MR. L. A. GOVINDARAGHAVA AIYAR—  
*Gentlemen*, The resolution that I have been asked to propose is somewhat of a formal character, though doubtless of great importance. It runs as follows :—

“That the Provincial Committees, already established, be asked, besides taking steps to promote industries in their several provinces, to compile useful facts and suggestions for submission to the next Industrial Conference, and to raise suitable funds for carrying on their work.”

This resolution, gentlemen, is merely to re-affirm the resolution that has been adopted by the Conference last year, with the omission of the organisation of an industrial survey, for which a separate resolution has been considered necessary to be passed this year. Gentlemen, you are aware that in the present condition of our industries, a great deal is necessary to be done by private individual efforts; and this resolution simply calls attention to the work that the Provincial Committees, which have already been appointed, have before them to do and it also particularly draws attention to three kinds of work that the Committees might do. First, the Committees are expected to keep a vigilant watch over the condition of industries in the several Provinces, trying to stimulate and help the growth of the industries, goad the people to interest themselves in the development of those industries and the resolution says that the Committees are expected to do all that lies in their power by persuasion, by the extent of interest that they show in the matter and by example, if possible, that they would do all their power to help the development of the various industries in the Provinces. Another part of the resolution directs attention to the necessity that there is for the Committees helping the Conference, by bringing to their notice, facts which may be of importance by way of enabling the Conference to help the furthering of the indus-

tries in various parts of the country. The resolution wants that these committees should submit such suggestions as they think possible for the consideration of the next Conference and bring to their notice facts which appear to them to be important, and which they think will be useful to the Conference. The third part of the resolution is of an enabling character. It simply authorises the Committees to raise funds with which the Committees might be enabled to carry on their work. I do not feel, gentlemen, that any speech is necessary for the purpose of commending this resolution to your acceptance. It appears to me, now that the resolution has been once carried, very little is necessary to be said, although, as I began, the importance of the work it can do cannot be overstated. With these few words, I have great pleasure in proposing the resolution.

MR. AMBIKACHARAN UKIL OF CALCUTTA:—*Mr. President, brother delegates and gentlemen*, I stand before you to second the proposition which has just been submitted to you for your acceptance, that is in regard to the Conference Provincial Committees, the Committees which are to be organised all over India, at the Provincial head quarters, in order to bring the resolutions of the Industrial Conference into practice. That is a most important subject, at the same time a vast subject. I need only point to three distinct branches which are of essential importance. In the first place, in order to make the industrial problem familiar to the people, you need a propagandist organisation, that is to say, you have to establish committees who are to prepare men and equip men with facts and knowledge to go about the country to preach about the importance of the industrial problem and how the problem can be solved, because the problem is not an easy one. You are carrying on a competition, a very fierce competition, with foreign exploiters. Generally, when people address assemblies in regard to economic problems, they confuse two things. They think that the whole of the British people, including the

British Government, are against the development of the Indian industries. That, I should point out, is mostly a mistaken idea. The industrial struggle is not between British people and the Indian people or between the British Government and the Indian people, as between a small minority of British people, the capitalists who come to exploit the resources of India, and the masses of the people of India. Consequently, you have to make it clear to the people that the industrial salvation of India does not lie either in declaring boycott against Government or against the British people, but declaring, very emphatically, your firm resolution to bring the whole commerce of the country, the exports as well as the imports, much more the exports, that is the export of raw products of the country, on which ultimately the manufacture of the country must depend,—specially to bring the exports under your control. I will give you a familiar instance. Just very recently, Bengal was visited with a famine. Famines could not be, as far as I could understand the problem, result of wholesale failure of crops, because, the failure of crops occurred only in a few districts. The effects of the failure of crops in a few districts is felt all over the Province to such an extent that no future famine, affecting the largest part of India, could make the country feel so much as on the present occasion. This was, I think, due mostly to the capitalistic engineering; that is, foreign capitalists begin bying food-grains largely in the Indian market and exporting them to ports outside India, and when the markets were sufficiently high, re-import them to the Indian markets again, to take advantage of the very high prices, as well as gain by the freight earned both ways, both in exporting and again in re-importing.

It is very important, gentlemen, to organize Committees for propagandist purposes. Next to that, you must have Committees for assisting small industries. It is not very essential to the economic development of the country to have a few big Mill-owners, controlling the vast industries, eventually crushing whatever little independence may remain in

the country; because if, after all, big factories are to supply our necessities, we bring the entire economic circumstances of the country under the control of a few mill-owners, and the rest of the population will be reduced, more or less, to a condition of serfs and wage-earners. That is the great danger and the effect of this danger is being severely felt in America. The President of the United States of America has been forced to introduce legislation in the Congress to check the overgrown power of millionaires in the control of their national industries. It is a very important matter to see that small industries crop up all over the country. How can they do so, unless you put these small industries and Managers of these industries into communication with each other and bring their produce to the market? That they cannot do by themselves; they must necessarily depend upon some central organization to give them assistance to bring their produce to market. Last of all, I should draw your attention to the greatest of all industries, the agricultural industry. Gentlemen, when the industrial question is started, we are carried away by our imagination to the fancy of establishing large factories, turning out manufactured articles by the millions. That is not our ideal, because our industrial people live mostly by agriculture; nine-tenths of them live by agriculture. If we can control the agricultural industry, we must necessarily control the entire industries of our nation,—not only of our nation, but of other nations, as well, who live by exploiting our nation. If we can control our raw produce, we necessarily prevent those countries, which depend upon our raw produce for their manufactures, from flooding our own country with cheap goods that ruin our own industries, and if we do so, we must necessarily bring them under our control. The proposition that I lay before you relates to the organization of the greatest industry of our country, viz., the agricultural industry. Since the time is short, I have been asked by the President to stop. I do so with the hope that you will give some consideration to the remarks that I have laid before

you and carry this proposition with acclamation, insisting that this positive organization should be planted to bring about the economic salvation of the country which we all so earnestly wish for.

MR. A. RAMANNA OF MYSORE. *Mr. President and gentlemen,* I am not going to detain you with any elaborate statements in regard to the necessity for the development of Indian industries. Previous speakers have placed those facts before you. The most important matter is that of the provision of funds, because power of money is the greatest of all in the world. We want a lot of money for this work. How to raise the money? It is only with reference to this question that I am going to address the Conference. In Mysore, we have thought over it; we have started a national fund; the leaders of the community have joined in it. The suggestions I will place before you are these. First of all, it is a matter universally acknowledged that throughout the whole length and breadth of India, the awakening spirit has made all people open their eyes and see the necessity that there is for the promotion of industrial and technical education. When that is so and where there is a will, is it difficult to find out a way? It would not be; the ways are, firstly, you must raise a national fund in the sense that every man, however poor or however rich he may be, must think it his sacred duty to save one pie in the rupee of his earnings to be devoted, not for any charity not for building temples—we have already enough of temples—but for promoting technical education in this country. In the present circumstances of the country, there can be no better charity than the promotion of technical education. Secondly, Jaghirdars and Rajahs and other important men in their own circle, they must make it their sacred duty also to organize measures to collect money from the people within their own Jaghirs. They must protect their own Jaghirs and see that they do not require any help from outsiders. Thirdly, those persons who can spare their money for charity, instead of doing their old charities, let them found technical

schools and start industrial classes, because every such attempt in the promotion of industrial education would go a great way to solve the industrial problem of India. Again in every temple, let there be a Golaka kept and into which every man, who visits the temple to worship, ought to put something, however little, for the promotion of industrial education, for there is no *punyam*, better than the *punyam* to be got by assisting in the spread of education. There is another thing which we have thought of in Mysore. It is a matter to be considered by you. Ten gentlemen joined together, each of them contributing two hundred rupees, for sending a student to Japan. Organization will take a lot of time, collection of small sums will take a lot of time; we cannot afford to wait; we can find, however, ten friends each willing to subscribe two or three hundred rupees to send a man at once to Japan. When he returns, with the knowledge of some industry or other, let some capital be given to him. I believe there is a great future for India, because our people have learnt the very great lesson that they must utilize their capital not by giving it to Englishmen, Russians or Germans who are bent on making money and making their fortunes but invest it in developing our own industries and derive more profit out of our capital than the five per cent.—the miserable five per cent. given by foreign bankers.

*The resolution was then put to the Conference and carried unanimously.*

## VI. APPOINTMENT OF OFFICE BEARERS, &c.

MR. R. C. DUTT.—*Mr. President and Gentlemen*, Those of you who have the agenda paper in your hands will find that my friend the Hon'ble Mr. Madhan Mohan Malaviya and my friend Mr. Surendranath Bannerji were to have moved and spoken on this resolution. Unfortunately, Mr. Surendranath has been detained elsewhere by some other duties and the Hon'ble Malaviya reserves his strength

for some other purpose. I am afraid, gentlemen, that you will find me very poor substitute for these great orators of India (voices "no, no"). Before I proceed to read this Resolution, I have one or two pleasant functions to perform. At the request of our president, I have to acknowledge on behalf of the Conference the liberality of Mr. Chiman Lal, the weaving master of Ahmedabad mill. Last year, when I presided at the first Industrial Conference, this firm of Ahmedabad came forward and offered to take up students, gratis, in order to give them a sort of technical education in weaving. As a matter of fact, they state that there are already fifty students under such tuition, 28 of them being men from Bengal. They are taught weaving and engineering without any charge. That firm also has great pleasure to announce that it is willing to continue this benevolent and philanthropic work. The next thing I have to acknowledge, gentlemen, is the gift of the Central Agricultural Committee of Madras of this valuable publication. The Central Agricultural Committee is an influential body which has branches in all the districts of the Madras Presidency and the Governor of Madras is its patron. The Committee issues papers, from time to time, and takes practical steps for the improvement of agriculture. By a special Resolution of this Committee this record of their work has been presented to this Conference by a member of that body, Mr. V. Krishnasawmy Aiyer, who has been specially deputed for this purpose. On behalf of the President and the Conference, we acknowledge this, with our thanks. Now, I come to the Resolution, the words of which are these:—

"That this Conference re-appoints Rao Bahadur R. N. Mudholkar as General Secretary and Mr. C. Y. Chintamani as Assistant Secretary, and empowers the President and the General Secretary to appoint an additional Assistant Secretary and establishment on suitable pay, so that the Assistant Secretary may be free to visit the different provinces and help the Provincial Committees in all matters in which they may require assistance. And this Conference allots a sum of

Rs. 10,000 for meeting the expenses for the next twelve months, and also for issuing a quarterly bulletin of industrial information under suitable management."

Well, gentlemen, the applause with which you have received the first part of this Resolution informs me that I have not many words to say on that portion. The services which have already been rendered and which are being rendered both by Rao Bahadur R. N. Mudholkar and Mr. C. Y. Chintamani are well-known to you. As I said yesterday, they have organized our work, they have given themselves no rest and to the utmost extent of their capabilities, they have done their work honestly and well. Therefore, it is a pleasure to us to ask them to continue their services,—services which have been rendered by Rao Bahadur R. N. Mudholkar possibly at the cost of his own legitimate work, because, as you all know, he is one of the most successful practitioners at the bar in the Central Provinces and the Berars. He has done this work as our Honorary Secretary simply because he is devoted to it. Last year, beyond compiling information and promoting the very important objects we have in view, he has been, at some expense also striving to foster some local industries in his own province of Berars. Mr. Chintamani, as I told you yesterday, has been over all the provinces of India during the current year and done his utmost to help the Provincial Committees in the work which has been entrusted to them. It is now our object to employ another Assistant—whom we call additional Assistant Secretary in order to allow Mr. Chintamani to devote nearly the whole of his time to the work which he has already undertaken; and I believe it is the intention of our President and also of those gentlemen who advise him to employ a gentleman as additional Assistant Secretary who has some technical and scientific knowledge, so that he may be able, not only to do ordinary office work, not only to compile ordinary information, but also to tabulate them in such a way and place them before the public in such



a manner as only men with some scientific and technical qualification could do. According to the Resolution, we leave that entirely in the hands of the President and the General Secretary. I have no doubt that those gentlemen will use their discretion to our best interests. I now pass-over to the last clause here. I feel very much the absence of my talented and eloquent friend Mr. Surendranath Bannerji. I wish he were here to rouse you to some degree of enthusiasm, when it is to touch your pockets. I think we have been talking about these things for the last two days. We all know that there is a feeling all over the country, there is a resolution and determination all over the country to do what we can to revive our own industries, to do all we can to help ourselves, to do what we can to improve our own condition by our own efforts. There we are all agreed. We have spoken of that for the last two days and the eloquent gentlemen, who have stood before you, have impressed that lesson over and over again. No further words are necessary from me to enforce that lesson to you, when you are all willing cheerfully to come forward to help us in this great undertaking we have taken in hand.

I do not say that our Industrial Conference has any claim to having promoted that industrial activity which is now being seen all over the country. Our Conference is, in fact, itself only the result of that spirit which is in the air. There is a feeling, there is a determination, that we should help ourselves; and our Conference is only one of the effects of the same causes which have led to the activity which we are witnessing to-day. But still, if you think that our Conference is doing some useful work, if you think that it is necessary to co-ordinate all the efforts all over the country and to collect all the information to place them before you and every tradesmen and every merchant in the country, if you think the Central office and provincial offices are doing some work, I think you will come forward liberally to help us in our undertaking. Our aim is to raise ten thousand rupees. As

I told you yesterday, we raised five thousand rupees last year, but the scope of the undertaking has widened lately. It is our desire to raise ten thousand rupees this year, not only to do the work which we have done in the current year but also to collect informations to issue quarterly bulletin, if we can find funds for it. That will require the help of an editor with some scientific and technical knowledge. Therefore, it is our object and desire to raise rupees ten thousand. I am glad to announce that some of the gentlemen present here have kindly made a good beginning. I only hope that you will follow it up. I will read to you the name of the gentlemen who have already promised contributions and the amounts promised.

*Contribution in aid of the Indian Industrial Conference for the year 1907.*

	Rs.
The Hon'ble Mr. Vithaldas Damodher Thackersey, Bombay	500
Seth Damodardas Khivraj, Bewar	500
R. C. Dutt, Esq., C.I.E., Baroda	250
V. Krishnaswami Iyer, Esq., Madras	200
Rao Bahadur R. N. Madholker, Amraoti	150
Lalubhai, Samaldas, Esq., Bombay, [Paid]	50
Sir Bhalchandra Krishna, kt., Bombay	100
Dr. Harold H. Mann, Calcutta, [Paid]	100
Rai Jotindra Nath Chaudhuri, Calcutta	100
Ghulam H. Chagla, Esq., Ahmedabad	100
Dewan Bahadur Ambalal S. Desai, Ahmedabad	50
The Hon'ble Pandit Madan Mohan Malaviya, Allahabad	50
C. Vijiaraghavachary, Esq., Salem, [Paid]	50
N. Seebharao Pantula, Esq., Rajahmundry	50
Dewan Bahadur L. A. Govindaraghava Iyer, Madras	50
The Hon'ble Babu Jogendra Nath Mukerjee, Purnea	50
Bipro Das Pal Chowdhuri, Esq., Calcutta	50
The Hon'ble Mr. B. N. Sarma, Vizagapatam	50

	Rs.
Keshav Lal <sup>o</sup> Mansukhram, Esq., Ahmedabad	50
Chunilal Naranlal, Esq., Ahmedabad	59
Rao Bahadur Hiranand Khemchand Advani, Hyderabad (Sind)	50
G. A. Natesan, Esq., Madras	30
The Hon'ble Babu Bhupendra Nath Basu, Calcutta	25
Mr. Manilal Vakil, Surat	25
A. Rangaswami Iyengar, Esq., Mysore	59
T. D. Sanghyi, Esq., Bombay	10
"A Bengal Friend"	5
TOTAL, RS.	2,845

Gentlemen, I leave the whole thing in your hands. I hope that those of you who wish either to pay money immediately or to state your sums will come up and put down the figures, so that we may know how much we have been able to collect.

RAI BAHADUR P. ANANTHA CHARLU.—*Gentlemen*, after the very luminous and I may add voluminous speech of Mr. Dutt, it is hardly necessary for me to say anything. I think, if the gentleman for whom I happen to be, at the present moment, a stop-gap, were here, probably he could add a great deal to that speech. I refer to Mr. Surendranath Banerji. But under the circumstances, I am sure you would put up with the fraud of which I am the example. I am glad however that I am called upon to say these few words on this proposition because it gives me the opportunity, which I always readily avail myself of, to pay my tribute of admiration for my old friend Mr. Mudholkar and my young friend Mr. Chintamani. They have done yeoman's work and their work is almost concrete before you. I, therefore, ask you to join me in according a very enthusiastic vote of compliments to these two gentlemen (*hear, hear*). Of them, it may be said most truly that they have done their very best and the very best can do no more. Now, gentlemen, next I wish to call your

attention to the formation of an establishment and to pay them. I think this idea of paying an establishment is an excellent idea. I do not grant that by workers in this cause it may be said or that it should be said or ought to be said—“No pay, no results;” but this establishment will consist necessarily of persons of limited means. They cannot, therefore, be expected to be as heroic and as self-sacrificing as Mr. Mudholkar and Mr. Chintamani. It is, therefore, very desirable that not only in this case but in all cases of this description a paid establishment ought to be thought of first and I am glad that it is thought of here. I am glad that a large sum of money has been promised and I feel sure that when that sum is contributed, you will be surprised that my name is not in it. But it is for the simple reason that I am begging and a beggar's gift cannot be openly declared.

*The Resolution was then carried amidst loud cheers.*

BABU NORENDRANATH SEN.—*Gentlemen*, now that the labours of this Conference have come to an end, I have great pleasure in proposing a vote of hearty thanks to our distinguished President, the Hon'ble Mr. Vithaldas Damodher Thakersey. I am sure that I carry with me the sense of the Conference, when I say that no occupant of your Presidential chair has ever deserved it more. For who, that has heard his address, has not been impressed with the most invaluable service that he has rendered to the whole country by his very able practical and useful exposition of the present industrial and commercial situation in India? Mr. Thakersey, like His Highness the Gaekwar, who delivered the inaugural address at this Conference, hails from the Bombay Presidency, the centre and cradle of genuine Swadeshi in India and the centre of Indian industrial development and commercial enterprise. Gentlemen, it is our peculiar good fortune that we have had for our President a gentleman who occupies not only a most distinguished position in the Bombay society, but, what is more to our purpose to-day, also in the commercial and industrial circles of that Presidency. He has in his own

person set an admirable example of practical Swadeshi, for he is the founder and nourisher of not a few banking commercial and industrial concerns. He is, I am told, one of the largest mill-owners of Bombay, being the owner of no fewer than five cotton mills (*hear, hear*). He is the President of the Board of Directors of the newly-started Indian Species Bank, which has a capital of two crores of rupees; and he is also the Director of another indigenous Bank in Bombay. He is the President of the Bombay Mill-owners Association. He is also the owner of one of the largest cloth markets in Bombay. His name is indeed one to conjure with in the western Presidency. His life furnishes a most beautiful and inspiring object-lesson to us, Bengalis, who have just begun to acquire the true spirit of Swadeshi. Gentlemen, the Hon'ble Mr. Thackersey is a member of the Bhatia community, *i. e.*, he belongs to a class who have almost all taken to trade and commerce and who have even crossed the seas for extending business. I do not know how sufficiently to thank Mr. Thackersey for sparing time from his multifarious duties to come over to Calcutta and to preside at this Conference and give us the benefit of his commercial and industrial experience. Gentlemen, on behalf of the Bengal Provincial Committee of this Conference, and of all who are interested in the industrial movement, I beg again to move a vote of cordial thanks to the Hon'ble Mr. Thakersy, the President of the Second Industrial Conference (*cheers*).

THE HON'BLE MR. MADHAN-MOHAN MALAVIVA,—*Gentlemen*, I have great pleasure in recommending the proposition. I am sure, you will carry it with acclamation. We are deeply indebted to our President for the able manner in which he has presided over the deliberations of this Conference. His Presidential address is an exceedingly interesting and most valuable one, which will be read with great interest by thousands in this country, as it combines in itself, the sound judgment of a business-man with the fervour of a patriot. He has welcomed Government help and has asked for that help.

He has called upon the people to exert to their utmost to promote the industries of this country. These two features have been characteristic of his Presidential address and of the Proceedings of the Conference and we cannot but feel thankful to him for the manner in which he has conducted the proceedings and I am sure that we are all grateful to him.

*(Loud and prolonged cheers).*

*The vote of thanks was carried amidst acclamation and great enthusiasm.*

### THE PRESIDENT'S CONCLUDING SPEECH.

In acknowledging the vote of thanks, the President spoke as follows :—

GENTLEMEN,—I beg to return my heartfelt thanks for the kind words in which Babu Narendra Nath Sen has proposed, and you, gentlemen, have received the vote of thanks on this occasion. Gentlemen, I think we may congratulate ourselves on the success that has attended the second session of the Industrial Conference. The papers that have been read before us and the discussions that have taken place, have enabled us to have a clearer view of the issues that lie before us. This is a great advantage. It is of the utmost importance that, in the present upheaval of public feeling as regards industrial matters, the greatest care and caution should be exercised to prevent blunders. Before dissolving this Conference, I should like to bring prominently before you one or two important considerations which we ought to bear in mind. The first point is the necessity of combination. Union is strength; and, looking to the keen competition that we have to face, this saying was never more applicable to industries than at the present time. I will illustrate what I mean by reference to what has taken place in Japan. They are carrying out the principle of combination in every department of life and to the fullest extent. The manufacturers are combining, traders are combining, the shippers

are combining for their mutual advantage. The most recent instance of their combination is the raising of 20 million yen to amalgamate most of the shipping lines of Japan. Such combinations, while freeing them from internal competition, enable them to concentrate all their resources in successfully meeting the rivalry of strong foreign shipping companies. There is also the fact that large combination economise expenditure that enable the best and most expert skilled management to be employed. I, therefore, urge you not to fritter away individual resources in small concerns, but combine to form strong joint-stock companies. When I speak of combination, I do not mean that extreme and vicious kind to combination, popularly known as Trusts, the object of which is to make a few people millionaires at the sacrifice of millions of consumers. We want combination for purposes of defence, and because it leads to economy in production and to the permanent benefit of the consumers. While I urge you to combine and form joint-stock companies, I will give you a word of warning. And that is, beware of indiscriminate company-promoting. Here, the leaders of the industrial movement have a duty to perform. They should not associate themselves in the capacity of directors, or otherwise, with any joint-stock concern without first satisfying themselves about its good management and reasonable chances of success, because the investing public, subscribe for the shares, looking to the names of the Directors. During the last 12 months, I have had to refuse the Directorship of over a score of companies proposed to be formed for various purposes, because, although I sympathised with the object of the promoter and had absolute faith in their good intentions, I was not able to be convinced of the soundness of the concerns from a purely business point of view. These are the few thoughts which I wished to express to you at parting, and I am deeply grateful to you for the patient hearing you have given to me and the great courtesy and kindness which you have shown to me throughout these proceedings. It has been a pleasure to

me to preside over this Conference, for which I predict a career of ever-increasing usefulness.

MR. R. C. DUTT.—*Gentlemen*, before we disperse, I have only to announce that those who wish to send subscriptions—I have no doubt that many of you wish to do so—may forward them to Mr. Mudholkar. He is our General Secretary and is empowered to receive them.

The President,—*Gentlemen*, I declare this Conference dissolved.

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# REPORT OF INDUSTRIAL CONFERENCE WORK AND GENERAL INDUSTRIAL ACTI- VITY IN THE COUNTRY IN 1906.

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## PART I.

### INDUSTRIAL CONFERENCE WORK.

1. By Resolution VIII. of the First Indian Industrial Conference, held at Benares on the 30th December 1905, Rao Bahadur R. N. Mudholkar was appointed General Secretary of the Conference, and the President, Mr. R. C. Dutt, C.I.E., was empowered to appoint a permanent Assistant Secretary and establishment on suitable pay. Mr. C. Y. Chintamani has been appointed Assistant Secretary on a pay of Rs. 150 a month.

2. The Assistant Secretary, Mr. Chintamani, joined his duties on the 1st February. He worked at headquarters till the 11th of June, during which period he accompanied the General Secretary to Jabalpur, where the Second Central Provinces and Berar Provincial Industrial Conference was held on the 15th April, with Mr. Mudholkar as President; to Poona where an industrial Conversazione was held on the 15th and 16th May under the auspices of the Association for the Promotion of Industrial Education in India, with Mr. Mudholkar as Chairman; and to Bombay on the 2nd June to attend an informal meeting held to consider the future organization and working of the Conference movement. Mr. Chintamani left on a tour on

the 11th June, and returned to Amraoti on the 16th August, having visited Poona and Sholapur in the Bombay Presidency, Calcutta and Cuttack in Bengal, and nineteen centres in the Madras Presidency, including Madras city itself and Tinnevely, where the Madras Provincial Conference was held in the month of June. A Provincial Industrial Conference was held for the first time as an adjunct of the Provincial Conference, and our Assistant Secretary had some share in the inauguration of this Conference. Mr. Chintamani addressed public meetings at nearly all the centres visited by him and had also private discussions with the leading men of the localities, and tried to form industrial associations and committees wherever possible. He was accompanied by Mr. N. Subbarao Pantulu, one of the members of the Madras Committee, in a portion of his tour. After return to Amraoti he was chiefly engaged in the preparation of the "Directory of Indian Goods." He will arrange to visit a few of the important cities of the United Provinces before the end of the year. Mr. Chintamani has submitted a report on his tours which accompanies this Report.

3. The General Secretary submitted the Resolutions of the Benares Conference to the Government of India, the various Provincial Governments and some of the Governments of Indian States with suitable covering letters, and received prompt acknowledgments of the same.

In acknowledging receipt of the letter to the Government of Bengal the Honourable Mr. R. W. Carlyle, Chief Secretary to that Government, sent to the Conference Secretary a copy of an interesting "Memorandum regarding development of Agriculture, and Industrial, Commercial and Technical Education in Bengal." (*Vide Appendix I.*) The Secretary to the Government of Bombay in the Educational Department has sent a memorandum dealing

### III

with the provision for technical education that exists in the Bombay Presidency. (*Vide* Appendix II.)

Later in the year, the full report of the proceedings of the Conference, which includes all the papers laid before it, was submitted to the Supreme and the Provincial Governments.

4. The Government of India as well as the Provincial Governments have expressed their full sympathy with the objects of the Conference. And they have been supplying the office of the General Secretary with their respective official Gazettes and all their publications pertaining to Agriculture, Economics, Finance and Industry. The thanks of the Conference are due to them for this courtesy.

5. With a view to give effect to Resolution VI. of the Benares Conference, by which Provincial Committees were asked to make an industrial survey in their several provinces and to compile useful facts and suggestions for submission to the Second Industrial Conference a circular letter (*Vide* Appendix III.) was sent out early in the year by the General Secretary to the several Provincial Committees of the Conference. Very few replies having been received another circular (*Vide* Appendix IV.) was issued and over a thousand copies of it sent to different persons and bodies. In this the facts which had to be found out and the questions which had to be answered were set out in detail and it was hoped that at least one person from each District would be forthcoming to collect and give the information sought. The Conference office has received till to-day only 20 replies. A synopsis of these is appended (*Vide* Appendix V.) The thanks of the Conference are due to the gentlemen who have kindly supplied this information. Renewed efforts will have to be made to complete this enquiry. It is suggested that the Conference should address the Local and Imperial Governments on this subject and move them to get the facts collected by their officers.

6. A Directory of Indian Goods has been prepared in the office of the General Secretary, and it is in the press. It is expected to be ready about the 10th December. The owners and managers of factories, mills and other industrial establishments were invited to supply the requisite information which was done by some of them. It was incorporated in the Directory along with a good deal of other materials gathered from various sources.

7. The Bengal Provincial Committee met in the month of August and appointed Mr. S. R. Das as Secretary and Messrs. P. Roy Chaudhuri and S. C. Roy as Assistant Secretaries. Several notable names were added to the Committee at that meeting. The arrangements for the Indian Industrial Conference are in the hands of this Committee.

8. The Bombay Provincial Committee met in the month of March, and appointed Mr. Lalubhai Samaldas as Secretary. The Committee resolved that the Director of Public Instruction and the Chairman of the Joint Schools Committee, Bombay, should be addressed on the subject of adding industrial and commercial classes to the existing schools and colleges in that Presidency. It was also resolved that steps should be taken to make inquiries and collect information about the existing industries in the Presidency, and to ascertain the probable scope of their extension as well as the means requisite for the same. The Hon'ble Mr. Vithaldas Damodher Thackersey, one of the members of the Committee, offered to introduce different patterns of hand-loom in one of his mills, and to have their capabilities of turning out the different qualities of cloth tested by an expert weaving master, and to have the results published for general information. The offer was thankfully accepted by the Committee.

9. By a Resolution passed at the First Madras Provincial Industrial Conference, held at Tinnevely on the 22nd and 23rd of June 1906, the Committee of the National Fund and Industrial Association, Madras, a body established in the month of March last, was requested to act as the Madras Provincial Committee of the Indian Industrial Conference. And this Committee at a special meeting held on the 8th of July to confer with our Assistant Secretary on the occasion of his visit to Madras, passed a resolution consenting to do so. The three members of the Madras Committee appointed at the Benares Conference, Mr. N. Subbarao Pantulu, the Hon'ble Dewan Bahadur L. A. Govindaraghava Iyer and Mr. V. Krishnaswami Iyer are all prominent members of the Committee of the Association, Mr. Subbarao Pantulu being one of the Vice-Presidents and Mr. Krishnaswami Iyer one of the Trustees. Dewan Bahadur K. Krishnaswamirao, C. I. E., retired Dewan of Travancore is President, and Messrs. G. Subramania Iyer and D. V. Hanumanta Rao, are Secretaries of the Association.

The Hon'ble Dewan Bahadur Govindaraghava Iyer is interesting himself in the task of collecting information on the industries of the Madras Presidency.

10. The United Provinces Committee met at Allahabad in March and appointed Mr. Ramnath Bhargava, B. A., who has been added to it, its Secretary. The Committee resolved to concentrate its efforts and resources on the carrying out of an industrial survey of the Province, and an *Upadesak* of the Vaisya Conference—of which Rai Bahadur Lala Baij Nath, one of the members of the U. P. Industrial Conference Committee, is General Secretary, and which held its session at Muzaffarnagar in March—has been deputed to visit various centres of the province and collect the requisite information. This person works under the supervision of Rai Bahadur Baij Nath.

11. The Punjab Committee met on the 18th March and elected Lala Mulraj as its Secretary. The Committee is of opinion that the furtherance of technical education by sending students abroad is the one matter to which it should devote itself. And half a dozen students, were so sent, not by the Committee of the Conference directly, but by almost the same gentlemen who are members of the Committee, acting in other capacities.

12. In the Central Provinces and Berar a Provincial Industrial Conference was held at Jabalpur in April, and an Industrial Exhibition was held at Amraoti in the same month. The newly started Berar Association has the furtherance of industrial development for one of its objects ; while a scheme for the expansion of the Akola industrial Association so as to become an organisation to serve the whole province of Berar is under the consideration of the leading gentlemen of Berar. Rao Saheb Deorao Vinayak of Akola, who is honourably distinguished for the practical and zealous interest he has always evinced in the industrial movement, has sent the scheme to the General Secretary.

13. Two prizes of Rs. 300 and Rs. 200 each have been offered for being awarded to the best factory and cottage handlooms of improved pattern satisfying certain stated conditions, the working of which will be demonstrated at the forthcoming Exhibition at Calcutta ; and the General Secretary has published an advertisement inviting competition. (*Vide* Appendix VI.)

14. The Bengal Provincial Committee met in the middle of August, at the instance of our Assistant Secretary who went to Calcutta at the time and commenced arrangements for the next session of the Conference. These are being pushed forward in co-operation with the General Secretary.

15. As mentioned above an informal meeting was held at Bombay on June 2nd to consider the question of the future organisation and working of the Conference. There were present on the occasion Mr. Dutt, Mr. Mudholkar, Mr. Wacha, Mr. Lalubhai Samaldas, Mr. P. L. Nagpurkar and Mr. Chintamani. It was resolved to convene a meeting of the members of the Provincial Committees and a few others interested in the industrial movement, sometime in October, to consider and settle the business to be placed before the Calcutta session of the Conference, the definite proposals for action contained in the papers laid before the Benares Conference, and other cognate matters.

16. The Report of the Benares Conference was issued in the middle of October. The proceedings of the Conference roused such great and widespread public interest that early in the year the proprietors of the *Hindu* and the *Indian Review* of Madras republished the greater number of the papers in pamphlet form and there was a large demand for them. Everywhere the Conference has met with appreciation and encouragement, and the hope is expressed that it will be a potent factor in the ultimate success of the movement for the development of India's industries by Indian capital and by means of Indian agency.

17. The Government of India and the Provincial Governments as well as the Governments of several Native States have evinced sympathetic interest in the Industrial movement and a brief account of the measures adopted by them during the current year in furtherance of it is given in Part II. of this Report.

18. More remarkable, however, than the attitude of the Government is the activity of the people themselves. Not so very long ago the reproach was freely levelled against educated Indians, even by persons the genuineness of whose friendship for Indian aspirations was not ques-

tioned, that they bestowed comparatively little attention on so important a sphere of national activity as the development of the industries of the country. Whatever ground for such criticism there might have been, it must now be admitted that there is a real awakening to the claims of the industrial problem on the thought and activity of educated India. The erection of mills and factories, the formation of Joint Stock Companies, the establishment of banks, the spread of technical education, have all had considerable impetus given to them during the year, while Industrial and Agricultural Exhibitions seem to have become quite the order of the day. The most potent factor in bringing about the remarkable industrial activity which has during the last 12 months and more manifested itself in the different parts of the country is undoubtedly the stimulation of demand for country-made articles in preference to foreign goods and a large number of "Swadeshi Stores" on the co-operative basis has been opened to meet the great and growing demand that has arisen for them. To this new-born enthusiasm for the "Swadeshi Movement" we owe among other things, the revival of the hand-loom industry, the manufacture in the country of many small articles of daily use for which the people were till lately dependent entirely on foreign things, and added prosperity to the Indian Cotton Mills. The account of general industrial activity in the different provinces of British India and in the several Native States, given in Part II. (Section C.) of this Report, the list of new joint Stock Companies (Appendix VII.) the number of new patents taken out (Appendix VIII) and the review of the brightened prospect of the mill industry due to the "Swadeshi Movement" made by one who evidently writes from personal knowledge (*Vide* Appendix IX.) which are appended to this Report all testify to the success that the people of India seem eventually destined to achieve in their labours for the resuscitation of old and the creation of new industries in this country.



19. It is a matter of great pleasure to us to place on record our high appreciation of the valuable work of Mr. C. Y. Chintamani as Assistant Secretary of the Industrial Conference. His attainments, his culture, his energy, and, above all, his devotion to duty merit the fullest acknowledgment.

20. A Statement of Receipts and Disbursements of the office of the General Secretary of the Conference is published with this Report.

R. C. DUTT,  
President,  
First Indian Industrial Conference.

*Baroda, November 1906.*

R. N. MUDHOLKAR,  
General Secretary,  
Indian Industrial Conference.

*Amraoti, November 1906.*

## Summary of Accounts of the Indian Industrial

### Receipts.

	Rs.	a.	p.
Collections in Baroda through Mr. R. C. Dutt	1,500	0	0
The Honourable Munsbi Madho Lal, Benares	500	0	0
The Honourable Rai Bahadur Pandit Sunder Lal, Allahabad	250	0	0
Dayaram Gidumall, Esq., Surat †	250	0	0
Rai Bahadur Lala Baiji Nath, Allahabad †	150	0	0
R. C. Dutt, Esq., Baroda	100	0	0
Harkishen Lal, Esq., Lahore	100	0	0
Sir Bhalchandra Krishna, Bombay	100	0	0
Lajpat Rai, Esq., Lahore	100	0	0
The Hon'ble Mr. Justice P. C. Chatterjee, Lahore	100	0	0
R. P. Karandikar, Esq., Satara	100	0	0
Rai Bahadur Lala Ganga Ram, Patiala	100	0	0
N. Subbarao, Esq., Rajahmundry...	100	0	0
Ramanuj Dyal, Esq., Meerut †	100	0	0
T. Rangachari, Esq., Madras	100	0	0
Dewan Bahadur Ambalal S. Desai, Ahmedabad	50	0	0
The Hon'ble Rai Nihal Chand Bahadur, Muzaffarnagar †	50	0	0
Rai Sahab Lala Kedar Nath, Delhi	50	0	0
Rai Sahab Lala Girdhari Lal, "	50	0	0
Pandit Sunder Lal Pathak, Patiala	50	0	0
Thakurdas Fatehchand, Esq., Karachi	50	0	0
Mathuradas Ramchand, Esq., "	50	0	0
Dr. M. N. Ganguly, Cawnpore	30	0	0
The Himalaya Glass Works, Rajpur	25	0	0
Dr. H. D. Pant, Lucknow	25	0	0
G. A. Natesan, Esq., Madras	25	0	0
Pandit D. Gopalacharlu, Madras...	25	0	0
V. M. Mahajani, Esq., Akola	25	0	0
Rao Bahadur G. V. Joshi, Satara...	25	0	0
C. R. Tiruvenkatachari, Esq., Madras	25	0	0
Donations of sums below Rs. 25	109	8	0
On "Directory of Indian Goods" Account	21	8	0
Miscellaneous	11	14	0
<b>Total</b>	<b>Rs.</b>	<b>4,347</b>	<b>14 0</b>

† For Handloom Prizes.

‡ Rs. 50 for Handloom Prizes.

Conference for the ten months January—October 1906.

Disbursements.

		Ra.	a.	p.
Pay of Assistant Secretary and other Establishment Charges.		1,325	0	0
On "Directory of Indian Goods" Account ... ..		404	6	0
Travelling Charges of Assistant Secretary ... ..		167	4	9
Postage ... ..		67	7	3
Printing ... ..		44	10	0
Books and Papers ... ..		35	15	0
Stationery .. ..		28	9	0
Telegrams.. ..		20	6	0
Sundries ... ..		10	14	0
		<hr/>		
		2,104	8	0
Balance ..		2,243	6	0
Total..		<hr/>		
		4,347	14	0
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Balance on 31st October 1906.				
Ra.	a.	p.		
1,000	0	0	with Mr. R. C. Dutt.	
743	6	0	with the General Secretary.	
500	0	0	Handloom Prize Account (with General Secretary).	
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2,243	6	0	Total.	

N.B.—In addition to the above contributions, the cost of printing the Report of the Conference has been borne by the Honourable Munshi Madholal.

R. C. DUTT,

President, First Indian Industrial Conference.

Bombay 17th November 1906.

R. N. MUDHOLKAR,

General Secretary,

Indian Industrial Conference.

## REPORT BY THE ASSISTANT SECRETARY ON HIS TOURS.

My appointment as Assistant Secretary of the Indian Industrial Conference formally took effect on the 1st of February. But I took advantage of my visit to *Calcutta* early in January to see a number of the local leaders, who met informally at the rooms of the Bengal Landholders' Association, and we there talked over matters generally. The Resolutions passed at the Benares Conference were considered, and it was stated that several of the suggestions contained in them were already being carried out. For instance, weaving schools for teaching the use of improved handlooms were started at several important weaving centres in the province by individuals or committees, and at *Calcutta* by the Committee of the National Fund. The foundation of a College of Technology was under consideration. A fairly large number of young men were sent abroad for receiving technical education in the higher branches. And active steps were set on foot for stimulating and keeping up demand for country-made in preference to imported articles. Besides, the preparation of a Directory of Indian goods was taken in hand.\*

2. I happened to be at *Allahabad* about the end of February, and availed myself of the visit to see the two members of the United Provinces Committee of the Conference who were there at the time and arrange for an early meeting of the Committee to appoint a Secretary and settle their programme of work. A meeting of the Committee was held on the 13th March, at which Babu Ram Nath Bhargava, B.A., Proprietor of the Indian Trading Co., was appointed Secretary. It was resolved at that meeting that the Committee should limit its endeavours to the making of an industrial survey of the Provinces.

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\* This has not been completed and published, but it made considerable progress and the materials collected were utilised for the *Calcutta Congress Exhibition*. Meanwhile the Directory prepared in the office of the Conference at *Amraoti* is about to be published.

3. In the month of April I accompanied the General Secretary to *Jabalpur*, where the Second Central Provinces and Berar Provincial Industrial Conference was held on the 15th idem, with Mr. Mudholkar as President.

4. On the 15th May I similarly went with Mr. Mudholkar to *Poona* to attend the Industrial Conversazione, which was held there on that and the following days under the auspices of the Industrial Association of India.

5. On the 2nd June, again, I went with the General Secretary to *Bombay* for the informal meeting held there to discuss several matters relating to the organization and working of the Conference.

6. It was on the 11th June that I left on my long tour. I was at *Poona* on the 12th and 13th, and saw some local gentlemen with a view to obtain information on the industrial activity of the place. The information is embodied in Appendix V. in another portion of the report.

7. I left *Poona* on the 13th and arrived at *Sholapur* on the 14th. *Sholapur* is an active industrial centre, and with the help of Mr. P. L. Nagpurkar I was able to see a good deal that was interesting and instructive. There are here the Sri Sivaji Metal Works, a Cigar and Cigarette business, Leather works, several Spinning and Weaving Mills, a Swadesi Stores, &c. Very ingenious brass and steel locks are made here.

8. I left *Sholapur* on the 16th June, arrived at *Madras* on the 17th, and left the same evening for *Tinnevely*, where I arrived on the 18th. I spent a week at this place. And it was a busy week, an Industrial Exhibition and an Industrial Conference both being held then in that town. The Exhibition, which was an adjunct of the annual Session of the *Madras* Provincial Conference, was opened on the 20th Idem and continued till the 27th. The First *Madras* Provincial Industrial Conference was held on the 22nd and 23rd of June, with Mr. G. Subramania Iyer as President.

9. *Madura* was the next centre visited. I addressed a public meeting there on "Industrial India," on the 30th June,

The meeting was excellently attended, and Mr. V. Swaminadha Iyer, Subordinate Judge, presided at it. Madura is an active industrial centre. An Industrial Exhibition had been held there in the previous month. There is an Agricultural and Industrial Association, which has opened a sugar-cane crushing factory. A Weaving Factory for working with improved looms was under construction, while another was already at work; and the dyeing industry has of late been considerably developed.

10. I was at *Trichinopoly* on the 1st July. I addressed a public meeting there on "The Industrial Development of India" on the 2nd July. A Committee was appointed at the meeting to form a District Industrial Association. Mr. S. M. Rajaram Rao, Editor of the local *Wednesday Review*, was appointed Secretary of the Committee. There is at Trichinopoly a "National Emporium" with a nominal capital of Rs. 20,000, of which over Rs. 11,000 has been subscribed.

11. From Trichinopoly I went to *Kumbakonam* on the 3rd July. A meeting was held that evening in the Porter Tower Hall with the Venerable Dewan Bahadur R. Ragoonath Rao as Chairman, and I spoke on "The Industrial Situation in India." As at Trichinopoly, so here the Resolutions passed at the Industrial Conference at Tinnevely were adopted by the public meeting.

12. I next went to *Mayavaram*, also in the Tanjore district, and situated in the midst of a large weaving population. The same tale is heard here as elsewhere that the weavers were in a flourishing condition in the past, but that they are now in a decadent state. I addressed a public meeting at Mayavaram on "The Swadeshi Movement." The resolutions of the Tinnevely Conference were unanimously adopted, and a Committee was appointed with Mr. P. Natesa Iyer, Pleader, as Secretary, to take steps for the opening of a co-operative Swadeshi Stores in the locality.

13. I went from Mayavaram to *Conjeeveram*. This place is another active and public-spirited centre. An Industrial Exhibition was held in the beginning of June, at which there was a weaving competition as well. There are

at Conjeeveram a Town Bank and an Urban Co-operative Weavers' Union, both registered under the Co-operative Credit Societies Act. Improved handlooms are being introduced among the local weavers who form an important section of the population. The condition of the local silk weavers is rather sad.

14. I reached *Madras* on the 6th July. A special meeting of the Committee of the National Fund and Industrial Association, to which I was invited, was held on the 8th idem. Dewan Bahadur K. Krishnaswami Rao, C. I. E., President of the Association, presided over the meeting and several leading members were present. It was resolved by the Committee that steps should be taken for securing the addition of industrial and commercial classes to private high schools in the Presidency; to address the local Government as well as themselves to take steps for carrying out an industrial survey of the Presidency, and to depute an agent to stimulate industrial activity in the districts and in particular to secure the formation of District Industrial Associations. There are at Madras a Weaving Factory where about forty improved looms of different patterns are worked under the supervision of Mr. P. Theagoraya Chetty; a new technical institute—the P. T. Lee Chengalva Naicker's Technical Institute, in charge among others of Dewan Bahadur P. Rajaratnam Mudaliar, C. I. E.; the Chrome Tanning department of the School of Arts in charge of Mr. Alfred Chatterton, who has lately been appointed Director of Industries in the Presidency, by the Government of Madras; the Victoria Technical Institute; the Central Agricultural Committee; the South Indian Association with an economic and an Industrial Section, etc.

15. I went to *Salem*, on the 14th July, and addressed a public meeting held to take steps for the formation of a District Industrial Association. Mr. J. H. Robertson, I. C. S., Collector and District Magistrate, presided at the meeting, and among those who took part in the proceedings were officials as well as Europeans. Resolutions were passed adopting the Resolutions of the Tinnevely Industrial Conference and appointing a strong committee for taking steps to form a District Industrial Association. At Salem there is the Government Weaving Institute, in immediate

charge of Mr. N. Subramania Iyer, B.A. About fifty improved looms of different patterns are at work in the Institute. The unquestionable advantages to the weaver individually as well as to the industry itself, of the substitution of the new for the old looms—defective in several respects as the former still are—are clearly demonstrated by the work turned out at the Salem Weaving Institute. An urban Weavers' Union registered under the Co-operative Credit Societies Act has also been formed at Salem—Mr. C. Vijaya Raghava Chariar the well-known leader of this town is taking keen interest in all these movements.

16. Returning to Madras on the 15th July, I left it on the 17th in company with Mr. N. Subbarao Pantulu, well-known as a leading public man of Southern India, who is a member of the Madras Provincial Committee of the Indian Industrial Conference and a Vice-President of the Madras National Fund and Industrial Association. The first place in the Northern districts of the Madras Presidency which we visited was *Nellore*. A public meeting was held here on the evening of the 17th, at which I spoke and Mr. Subbarao Pantulu presided. Resolutions were passed at the meeting adopting the Resolutions of the Tinnevely Industrial Conference and appointing a Committee with a Secretary to take steps for the formation of a District Industrial Association. There is at Nellore a Swadeshi Stores on a small scale. The district is noted for its mica deposits, several of which are worked by Indians.

17. Mr. Subbarao Pantulu and I next visited *Guntur*. We arrived there on the 19th July and both of us spoke at a public meeting the same evening on "The Industrial Development of India." Besides adopting the Resolutions of the Tinnevely Industrial Conference, the meeting appointed a committee of three members to take steps to carry out an Industrial Survey of the Guntur district. The people of Guntur evince considerable enterprise. They have opened a good many rice mills, which are working profitably, and several ginning and pressing factories. A jute mill is in course of erection, and several other concerns are projected.

18. We next went to *Ellore* in the Kistna district. At the meeting held here on the 21st July, Mr. S. P. Rangachari,



Deputy Collector, presided, and a committee was appointed with Mr. S. B. Sankaram as Secretary to carry out an industrial survey of the district. Here as well as at the six other meetings held on subsequent days in the Godavari, Vizagapatam and Ganjam districts, the Resolutions of the Tinnevely Industrial Conference were adopted. A big jute mill was nearing completion at Ellore when we were there.

19. We had a large meeting at *Rajahmundry* on the 22nd July. Mr. Subbarao Pantulu presided. The Rajahmundry Industrial Institute, an association formed last year for furthering industrial activity in the district, has been charged with the duty of making an industrial survey of the district—a duty which has also been imposed on the Godavari District Association by the public meeting held at *Cocanada* on the 24th July. Mr. Subbarao Pantulu has offered to pay Rs. 150 if another Rs. 150 be raised by the Rajahmundry Industrial Institute for employing a person for a few months to go into the interior of the district and collect the requisite information. At *Cocanada* a Swadeshi Store was opened, and it was in contemplation to start a sugar refinery where Mr. Hadi's new process—which was demonstrated at the Benares Exhibition and is explained in his Bulletin on the subject—was to be adopted. It was also proposed to start a Chrome tanning business.

20. At *Anakapalle*, the next place visited, a Pencil Factory will be opened shortly. The buildings are complete and machinery has arrived. I went to *Chodavaram* from *Anakapalle* and addressed a meeting on the Industrial question. I was at *Vizagapatam* on the 27th July and at *Vizianagram* on the 30th. Public meetings were held at the former place on the 28th July, and at the latter place on the 31st July, my subjects being "The Trade of India" and "Indian Industries" respectively. Mr. V. Krishnaswami Iyer, who happened to be at *Vizagapatam* on professional business, presided at the first meeting; Mr. T. C. D. Durell, Private Secretary to the Rajah of *Vizianagram*, presided at the latter. A committee with Mr. V. Purnaiya, Pleader, District Court, as Secretary, was appointed at the *Vizagapatam* meeting to form a District Industrial Association; and a Committee, with Messrs. M. Venkanna Pantulu, Teacher, Maharajah's College, and O. Ramamurti, Pleader, as Secretaries, was appointed at

the Vizianagram meeting to co-operate with the District Industrial Association in making an industrial survey of the district. Besides the Pencil Factory at Anakapalle, there is another Pencil Factory at Bimlipatam, and there is also a Weaving Company at Rajam, in the same district. A Co-operative Swadeshi Stores was also to be opened at Vizagapatam.

21. *Chicacole* on the 8th August and *Berhampore* on the 9th were the two centres visited in the Ganjam district. At both these places public meetings were held, the Resolutions of the Tinnevely Industrial Conference were adopted, and committees appointed—at Berhampore for bringing into existence a District Industrial Association, whose chief and immediate duty would be the making of an industrial survey of the district; and at Chicacole for co-operating with the District Industrial Association in the carrying out of the survey. Mr. V. V. Jogiah Pantulu, Pleader, is the Secretary of the Berhampore Committee, and Mr. S. Baupirazu, Pleader, of the Chicacole Committee. At Berhampore there are two or three Swadeshi Stores; a small handloom factory started by Mr. Thuthuki Basavaraju; and a small technical school maintained by the American Baptist Mission, where practical instruction is given in weaving, carpentry, &c. The gentleman in charge of the school is the Rev. Mr. Jarreis, who takes a keen interest in the success of the Swadeshi movement. He presided over the meeting at Berhampore, and preached the Gospel of Swadeshism with the fervour of an Indian patriot and the energy of conviction of a sturdy Britisher.

22. At this point, where I conclude the narration of the chief incidents of my tour in the Madras Presidency, I will perhaps be allowed to express my obligations to the many gentlemen who gladly helped me at the many places I visited and to whose willing co-operation I am indebted for what little I was able to achieve in the tour. And if it is permissible to mention any individuals in particular, I will take leave to say how grateful I feel to Mr. N. Subbarao Pantulu, who went to several places with me and laboured for the success of our undertaking in spite of his poor health; to Mr. V. Krishnaswami Iyer, who took an ardent interest in the mission

which took me to the Madras Presidency and helped to facilitate my work in the Southern districts; and to Mr. M. R. Rama Krishna Iyer, of Tinnevely, but for whose enthusiasm for the industrial movement and determination to work, the First Madras Provincial Industrial Conference would not have been held at Tinnevely.

23. To resume the account of my tour where I left it above, I went from Berhampore to Cuttack on the 10th August. Mr. M. S. Das, C. I. E., a leading gentleman of the city, has for years been doing a deal of practical industrial work, and his Orissa Art Works is an important establishment which turns out many interesting and useful articles. Mr. Das has lately opened a Tannery at Cuttack, and it may be expected that the same success will attend this new concern as is the case with the Art Works. I addressed a meeting at Cuttack on the 11th August, at which Mr. Das presided.

24. I reached Calcutta from Cuttack on the 12th August. A meeting of the Bengal Provincial Committee of the Indian Industrial Committee was held on the 13th August, at which the strength of the Committee was considerably added to and Mr. S. R. Das, M. A. (Cantab), Barrister-at-Law, was appointed Secretary, with Messrs. P. Roy Chowdhuri and S. P. Roy as Assistant Secretaries. The Committee resolved at this meeting to set on foot the arrangements for the Second Indian Industrial Conference which would be held in Christmas week at Calcutta.

25. I left Calcutta on the 15th August and arrived at Amraoti the next day. Since then I have been engaged in the office on important work which did not leave me time to go to Northern India as I had earnestly intended to do so. But I am arranging, and hope to be able, to spend a portion of what remains of the year in visiting a few of the more important cities of the United Provinces.

C. Y. CHINTAMANI,

Assistant Secretary,

Indian Industrial Conference.

*Amraoti, 12th November 1906.*

## PART II.

### BRIEF ACCOUNT OF INDUSTRIAL ACTIVITY IN INDIA IN 1906 JANUARY TO OCTOBER.

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#### GENERAL.

##### SECTION (A).

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#### GOVERNMENT AND INDUSTRIAL DEVELOPMENT.

In this section will be given in brief an indication of the Government's attitude towards the Industrial movement and an account of the measures adopted by it in furtherance thereof.

2. His Excellency the Viceroy referred to the subject in his speech in the Supreme Legislative Council on the 28th March, and said "The Government of India earnestly desire to encourage local enterprise and that they mean to insist that in the case of articles required by Government which can be produced in this country at the same price and of the same quality as imported articles, the preference shall be given to local productions." Lord Minto expressed his recognition of the importance of technical education in the following words: "Technical instruction in other countries is growing apace . . . . . Competition has forced it upon us. We must not lag behind. The success of modern industries and the preservation of indigenous industries is becoming every day more and more dependent upon scientific and technical knowledge, and if the resources of India are to be developed by the people of India, such development must depend largely upon local enterprise, upon the investment of Indian money and upon a recognition of the absolute necessity of expert training. There is no lack of opportunity for such native

enterprise, which will well merit the assistance and encouragement the Hon'ble Rai Sri Ram Bahadur has so justly claimed for it." Speaking of the Swadeshi movement, his Excellency said that "if 'Swadeshi' means an earnest endeavour to develop home industries in an open market for the employment and for the supply of the people of India, no one will be more heartily with them (the supporters of Swadeshi) than myself."

3. The Hon'ble Mr. Hewett, Member for Commerce and Industry, made an important speech at the same meeting of the Viceregal Council, and the following passages of it may be cited as notable :—

"The trade of India consists at present mainly of the exchange of natural products for artificial products of European manufacture. The manufactured goods which India obtains are necessarily, in the main, paid for by unmanufactured raw materials; and the goods imported have often been worked up from the materials which she had exported in the raw state. These features represent a primitive stage in the system of international exchange which makes up the trade of the world. It is an assured fact that there is available in India the raw material requisite for almost every form of industry, and the idea that the country ought to be able to produce most of the manufactured articles which it requires is not one which its natural resources render Utopian. People argue—and argue rightly—that these resources should be utilised for the benefit of India itself and not for that of other countries. . . . .

"The Government of India are, however, in full sympathy with those who are endeavouring to improve the state in which our indigenous industries are at present. Much information bearing on this subject has been collected in the Census Reports, and in monographs which have been prepared on the different industries; but the material is scattered, there is no co-ordination of results, the subject is in general treated from the artistic point of view, rather than from a business standpoint, and the information is in many cases neither sufficiently detailed nor sufficiently exact to be of much practical use. The Madras Government have recently

taken the lead in establishing what is practically a Government agency for the fostering and improving of Indian industries. The success which has been attained in developing the aluminium industry and the chrome leather industry by Mr. Chatterton is a good augury for further development in the improvement of industries in the South of India. We hope that other Local Governments will now make a survey of the state of indigenous industries within the areas of their jurisdiction, with a view to ascertaining the exact state of the various industries and handicrafts, the amount of the earnings and the present condition of the artisans respectively employed in them, the precise manner in which the different industries have been affected by competition with imported articles, the practicability of creating new markets, or of developing markets which already exist, and the possibility of giving a new lease of life to these industries either by means of special instruction, or by the improvement of the appliances in use. It is not too much to hope that something tangible may be done to improve their efficiency and increase their scope by reorganising them on modern lines.

The Government of India welcome the awakening of interest in this very important question which was evident in the discussions at the recent Industrial Conference at Benares.

"With reference to what I have previously said upon the desirability of encouraging local industries on European methods, I may mention that the most important matter which the Commerce and Industry Department has recently had to consider is that of the establishment of an iron and steel industry on a scientific basis. The scheme owes its inception to the far-sighted views of the late Mr. J. N. Tata who was undoubtedly the pioneer among Indians in the scientific organization of Industries, and whose name will be associated for all time with the establishment of the Tata Institute for Research. The Government of India have taken the liveliest interest in the late Mr. Tata's project, and they have determined to encourage it, by making certain concessions which were asked for by Messrs. Tata and Sons. The establishment of an iron and steel industry on a large scale will not only enable the Government and the public to purchase many steel articles of local manufacture which are

now imported, but will also help to develop subsidiary industries, particularly those for the production of coal-tar and sulphate of ammonia, for both of which a ready market can be found in India. I think I may claim that the Government have, in the assistance they have promised to give to this very important project, given a practical proof of their desire to encourage local enterprise; and I may also point to the recent Resolution issued on the appointment of the Stores Committee as evidence of our wish to give every encouragement to products of local manufacture. We have expressed our recognition of the fact that local industries must frequently lean, in the first instance, on the support of Government, and it is our intention to insist that whenever an article required by Government can be produced in this country of the same quality and at the same price as the imported article can be laid down in India, the preference shall be given to the locally produced article."

4. The Government of India have provided what the Finance Member called "a small sum of Rs. 5 lakhs a year" for education, of which approximately one-half is applied to technical education. The grant for technical education is allotted as follows:—

	Rs.
Bombay ... ..	1,67,000
Bengal .. ...	35,000
United Provinces ... ..	30,000
Central Provinces ... ..	22,000

"The grant to be given to Bombay (says the Financial Statement) is intended primarily to develop and increase the efficiency of the three central institutions, *viz.*, the College of Science, the Victoria Jubilee Technical Institute and the Sir Jamsetji Jijibhai School of Arts, Bombay; to provide adequate inspection for ordinary technical schools and schools of weaving and the textile industry, and for the elementary drawing in all kinds of institutions; for the creation and maintenance of three new special technical schools and for the development and improvement of a certain number of approved technical schools by increased grants; and for scholarships in all classes of approved technical institutions.

"In the case of Bengal the grant will provide for the establishment and maintenance of a central weaving school at Serampore, at which instruction in the best and latest methods of hand weaving will be imparted.

"The grant for the United Provinces is intended to assist in the proposed expansion of the mechanical apprentice class at the Roorkee College, with the object of giving a sound practical training in the principles of mechanics, steam, and electricity.

"The grant to be assigned to the Central Provinces is for the establishment at Nagpur of an elementary school for handicrafts. It includes an initial grant of Rs. 10,000 for buildings."

5. Early in the year the Government of India appointed a Committee "to ascertain definitely the procedure which in practice is adopted at present for the purchase of stores" for Government departments. The Committee was asked to report, among other things, on the question "of affording greater encouragement to local industries;" on "the advisability of prescribing strict rules requiring Government officers to purchase locally manufactured articles in all cases where such articles are available and of calling upon them for explanations in cases where these rules are transgressed;" and on "the possibility of devising a system under which all departments of Government will be informed of the adoption of a local, in place of an imported, product in any part of India." The Committee is understood to have submitted its Report to the Government of India, but it is not yet made available to the public, pending the consideration of its recommendations by the Government of India and the Secretary of State.

6. The Government of India have also had under consideration the question of competition between jail industries and private enterprise; and Provincial Governments have been asked to make this matter the subject of detailed reports.

7. The question of the reorganisation of the Geological Survey Department was before the Government of India



recently, and the sanction of the Secretary of State has been obtained for "a considerable addition to the strength of the existing establishment. The rapid expansion of the economic side of the work is a new feature," say the Government of India,<sup>o</sup> "and it is regarded as vitally important that all possible facilities should be given to assist the development upon a sound basis of mining industries in India." It was felt, the Government proceed, "that the Geological Survey Department could not, with its existing strength, undertake the scientific work for the performance of which it was primarily constituted, and at the same time devote that amount of attention which the interests of India now demand to purely economic enquiries." Accordingly, (1) two short term appointments of Mining specialists have been abolished, and two new appointments have been added to the graded list in their place; (2) three new appointments have been added to the cadre to increase the strength of the department and to provide a reserve for leave vacancies, and (3) a new post to be held by a trained Chemist has been created.

This addition to the strength of the Geological Survey Department is to be welcomed. The department is doing very useful work, as the paper read by Mr. Holland, the present able and esteemed head of the department, at last year's Industrial Conference amply testifies. Mr. Holland pointed out there that "the assurance that we possess the natural elements essential for the restoration of our decayed metallurgical and chemical industries" led him to divert the energies of his colleagues, and to commence "the expenditure of public money for the investigation of our resources in minerals which are essential to industries now maintained entirely by imports, for which we have not only to pay heavy bills to other countries, but to exist always in a state of absolute dependence for articles that are no longer mere luxuries." And he further stated "that the Geological Survey Department will willingly determine minerals free of charge for any amateur who is willing to give the precise locality from

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<sup>o</sup> Resolution in the Department of Commerce and Industry, 7th September 1906.

which each specimen is obtained." But as Rao Bahadur G. V. Joshi remarked in his paper at the same place, the arrangement obtaining till now was altogether unsatisfactory, as it was the scientific part of the work that received the special attention of the department while investigation was relegated to temporarily engaged outsiders. Mr. Joshi urged "that the temporary employment of such men should cease, and that there should be a special staff of experts under the Director of the Survey, charged with the duty of economic inquiry." The reorganization of the department renders this possible.

8. Correspondence between the Government of Bombay and the Director of Public Instruction, together with the detailed proposals of the authorities of the Victoria Jubilee Technical Institute and the Sir Jamsetji Jijibhai School of Art in regard to the extension of technical education in the Bombay Presidency, was published in the *Bombay Government Gazette* of the 26th September last. We learn from this how the annual grant of Rs. 1,67,000 made by the Government of India for five years is to be utilised in this period. The College of Science, Poona, gets Rs. 49,000 for non-recurring expenditure, and Rs. 36,000 for recurring expenditure; the improvements to be introduced being the provision of new boilers and engine, of new building and plant for the Normal Class and the appointment of a Special Instructor for it, of residential quarters for workshop students, of electric fittings, and of six scholarships of Rs. 50 per mensem each and six of Rs. 25 per mensem each. The Victoria Jubilee Technical Institute, Bombay, gets Rs. 85,000 for non-recurring and Rs. 55,000 for recurring expenditure; the objects on which these sums are to be expended being Mechanical Engineering Workshops, Textile Manufacture, Electrical Engineering, Technical Chemistry, and quarters for students. The Sir Jamsetji Jijibhai School of Art gets Rs. 1,20,000 on non-recurring and Rs. 99,000 on recurring expenditure; the improvements to which these sums are to be devoted being the addition of a Laboratory and Pottery building, Textile School, Metal Workers' Class, Wood-working class, kilns, and students' quarters, and the appointment of a Superintendent of Pottery, an Instructor of

Textiles, and Instructors in Metal-working and Wood-work. The Ahmednagar Weaving School gets Rs. 22,000 for Buildings and Hostel. The Parekh School of Industry, Surat, Rs. 22,000 for Buildings and Equipment. The Ranchhodlal Chhotalal Textile Institute, Ahmedabad, Rs. 38,000 for non-recurring and Rs. 8,000 for recurring expenditure, the former for buildings. Rupees 2,13,000 are allotted for Scholarships and Grants-in-aid, Rs. 11,000 for Inspection, and Rs. 44,000 for Miscellaneous Grants.

9. It is understood that the Government of Bengal are contemplating the establishment of a College of Technology in Bengal in collaboration with the Association for the Advancement of Scientific and Industrial Education of Indians.

Mining classes have been added to the Sibpur College of Engineering during the year, and several students have joined those classes.

10. The Hon'ble Mr. Shurfuddin has, by means of an interpellation in the Provincial Legislative Council, drawn the attention of the Government of Bengal to the necessity of making an industrial survey of the province. But it is to be regretted that, notwithstanding the Hon'ble Mr. Hewett's pronouncement in favour of such a survey,\* the Government of Bengal has declined to move in the matter. It is to be hoped that the matter will not be allowed to rest here and that the leaders of Bengal will draw the attention of the Local Government to the important declaration of the Hon'ble the Member for Commerce and Industries.

11. The Government of Madras, alone among Provincial Governments, have acted on the recommendation of the Clibborn Committee on Industrial Education, and appointed Mr. Alfred Chatterton as Director of Industries in that Presidency. Mr. Chatterton's enthusiasm for his work is well-known. He worked hard for the introduction of the Aluminium industry till he proved it to be commercially profitable, and the Government have transferred the Aluminium work

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\* See above para 3.

to a private concern. He next took up the Chrome Tanning industry, and has been trying his best to make it commercially profitable. Tanning was an important industry in the Southern Presidency till a few years ago, when the invention of Chrome Tanning in the United States and the difficulties placed in the way of exports of finished articles by the United States Government led to an increasingly large export of untanned hides and skins. Mr. Chatterton introduced Chrome Tanning into the Government School of Art and has achieved a fair measure of success in the industry. It has, however, not yet become commercially profitable.

12. The Weaving industry, too, did not escape the attention of Mr. Chatterton. He had made special inquiries into the subject, and submitted a Note to the Government of Madras stating the results of those inquiries. This has borne fruit in the shape of the Government Weaving Institute at Salem. This was started in the month of March. The primary object of the Institute is stated to be to test the commercial value of the fly-shuttle apparatus and the other improvements recently effected in the handloom. And "Just as the Aluminium and Chrome Tanning industries were undertaken for the purpose of preliminary investigation and experiment with a view to their final transfer on a basis of ascertained and established commercial value to private agencies, it is intended to transfer the Institute with all the improved methods and machinery adopted therein to a properly constituted company of capitalists, if, as is expected, it is found possible to work the Institute as a factory constituted on business principles."

13. In a Notification, dated 23rd January 1906, the Government of Madras invited attention to the scheme of technical scholarships instituted by the Government of India. Information was furnished regarding the object of the scholarships and the conditions under which they would be offered, and it was stated that the first scholarships would be assigned in connection with the study of industrial chemistry in one or more of its branches and in connection with the tanning industry. Applications were accordingly invited from candidates desirous of prosecuting the scientific study of

these subjects. It would seem, however, from a supplementary Notification of that Government, dated 26th September, that no candidates possessing qualifications considered suitable by their advisers were forthcoming; and in the result, the Scholarships have not yet been actually awarded.

14. In answer to an interpellation in the Provincial Legislative Council, the Government of Madras stated that proposals had been submitted to the Government of India regarding the system of technical and industrial education to be introduced into that Presidency, but that the Supreme Government have not accorded their sanction to the character of the scheme under consideration, and further expressed their inability to take any action in regard to the spread of technical education in any branch until the orders of the Government of India on their proposals were received. It would appear that the Madras Government proposed that Technical Education should be separated from General Education, but that, though this was in conformity with the recommendation of the Clibborn Committee on Industrial Education, the Supreme Government disapproved of it. The appointment of a special Director of Technical and Industrial Enquiries for a period of five years has, however, been sanctioned.

15. A Resolution of the United Provinces Government notifies an important expansion of the scope of the Thomason Engineering College at Roorkee. It is stated that the growth of small factories, the development of electric light and power installations, and the extended use of motor-cars, have created a demand for men who have not only received a practical training in a mechanical workshop, but who have sufficient general education to qualify them for positions of responsibility, such as supervisors, foremen or managers of factories where machinery is employed. Funds being now available, it was intended to open a "Technical Class" at the Roorkee College in the month of October. This

course of instruction will extend over three years, and while there will be no cut and dried curriculum an endeavour will be made to give to each student that instruction which will best fit him for the employment he proposes to seek on leaving College. For the present the class will be limited to thirty students, who will be nominated by District Boards. Students must have passed the Entrance or School Final examination; they will be supplied with books, instruments, instruction, and quarters free of charge, but must have sufficient means to support themselves, the District Boards being permitted to grant maintenance scholarships when it is considered necessary. The scheme is to be carried out thoroughly, the estimated cost of new laboratories, enlarged workshops, power tools, electric installation and model machines being well over two lakhs of rupees.

16. In the Central Provinces, besides the contribution of Rs. 30,000 towards the initial expenditure and of Rs. 11,500 to the recurring expenditure of the Victoria Technical Institute at Amraoti and of Rs. 1,78,000\* and Rs. 30,800 respectively to the Victoria Memorial Institute at Nagpur, the Government proposed to make contributory grants, initial and recurring, towards the establishment of an Industrial School at Nagpur, to which the people are also asked to contribute.

17. During the year under review the status of the Forest School at Dehra Dun—has been raised to that of Imperial Forest Research Institute and College. Among the new officers appointed are an Imperial Silviculturist, who will make Silviculture his special study; an Imperial Forest Zoologist, whose chief duty will be to investigate the damage

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\* The office of the Commissioner of Settlement and Agriculture and the classes of the Government Agricultural School are also to be located in the building.

caused by insects and other pests, and to suggest remedial measures ; an Imperial Forest Botanist, who will study the botany of forest plants, the diseases of trees, and the distribution of species ; an Imperial Forest Chemist, who will investigate the chemical properties of the soils and of the produce of forests ; and an Imperial Forest Economist, who will make a special study of the best methods of rendering forest produce of all kinds available at the smallest cost to consumers, and who will keep in touch with the commerce of India with the view of fostering and meeting the demand for forest products.

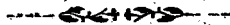
18. The Gass Forest Museum at Coimbatore in the Madras Presidency, has been removed to a new building specially provided for it. In this museum could be seen, among other things, specimens of rubber in its various stages of refinement ; specimens of different kinds of wood ; economic products, such as fruits, seeds, gums and resins, oils, etc., entomological, geological and botanical specimens ; several articles and models of articles made of bamboos, and tanning barks, edible roots and some of the leaf types. There is besides a small library of technical books.

19. The Governments of the several provinces have generally rendered valuable aid to Industrial Exhibitions ; the most prominent instance of it being in connection with the next Congress Exhibition in Calcutta, which will be opened on the 15th December by His Excellency the Viceroy.

20. Government's activity in the department of agriculture has, as might be expected, been much more than in the case of manufacturing industries. The reorganization of the Agricultural Departments in the several provinces has been steadily proceeded with ; work on the Pusa Agricultural Research Institute and College is progressing apace ; steps are being taken for the establishment of Provincial Agricultural

Colleges; the growing of improved varieties of cotton has been given attention to; Co-operative Credit Societies, Agricultural Associations, Agricultural Exhibitions and Cattle Shows are being encouraged, promoted and supported. The Board of Agriculture held its second sitting at Pusa in the earlier part of the year; and an important and interesting Agricultural Conference, in which representatives of the public were invited to take part, was held at Bombay under the presidency of the Hon'ble Mr. J. W. P. Muir-Mackenzie, I. C. S., Member of Council in Bombay.

21. The Government of India have in the course of the year started two periodical publications—the *Indian Trade Journal*, issued once a week by the Director-General of Commercial Intelligence; and the *Journal of Agriculture*, a quarterly publication issued on behalf of the Pusa Board of Agriculture by the Inspector-General of Agriculture.





## PART II.

### SECTION (B).

#### THE GOVERNMENTS OF NATIVE STATES AND INDUSTRIAL DEVELOPMENTS.

#### HYDERABAD.

1. An exhibition of Arts and Industries, as well as of the natural products, Mineral and Agricultural, of the Hyderabad State, was held at Hyderabad towards the end of January to commemorate His Highness the Nizam's fortieth birthday. Special efforts were directed to the encouragement of the ancient indigenous arts of His Highness the Nizam's Dominions. There was among other sections, a "Mills Gallery," which comprised "specimens of cotton in various stages of preparation and models of some of the machinery employed and specimens of goods manufactured." And there was an "Artizan's Gallery." We are told that special efforts were made to bring together a representative gathering of craftsmen from all parts of the Nizam's Dominions : "the Kinkhab weavers, the Carpet manufacturers, the Potala Silk dyers, Bandonia dyers, the Calico printers, the Gold and Silver embroiderers, makers of Silk Brocades and Bidri wares, the lace-manufacturers, the Wax Cloth decorators, the Wood and Ivory carvers, the Gold and Silversmiths, the Copper and Brass workers, the Potters, the Lapidary workers ; practically every craft in His Highness the Nizam's Dominions."

#### BARODA.

2. Improvement in cotton cultivation, channel irrigation, and well-sinking in the department of Agriculture, and the improvement and expansion of the weaving industry, the spread of technical education, sericulture, the manufacture of cigarettes and matches, have received attention in the State of Baroda. Mr. R. C. Dutt, Revenue Minister in Baroda, contributed to the *Indian World* of Calcutta an account of the

weaving industry of Baroda and the steps that are taken by His Highness Sir Sayaji Rao's Government to improve its condition. Rao Bahadur Raoji Bhai Patel, the Director of Industries and Agriculture in the State, has taken a patent for the improvements effected by him in the country hand-loom, and the "Sayaji Cottage Loom," as the improved loom is called, is in considerable demand in all parts of the country. And students from many places go to Baroda to obtain instruction in several branches of technical knowledge.

3. Mr. N. G. Mukerjee, Assistant Director of Agriculture in Bengal, was engaged by the Baroda Government a short time ago to investigate the possibilities of the introduction of a silk industry into that State. This step was taken in consequence of the success which attended certain small experiments in sericulture carried on in the Gaekwar's dominions, and Mr. Mukerjee's report encourages the hopes built upon those results. Mr. Mukerjee considers that the climatic conditions of some parts in the south of the State are eminently suitable for the growth of mulberry and for the rearing of silkworms. He has drawn up a scheme which includes the establishment of two schools at Vyara and Songadh—where students will be taught the methods of both silkworm rearing and silk reeling—the starting of mulberry plantations, the publication in Gujarati of a manual of practical instruction, and ultimately the foundation of a reeling factory on a large scale.

4. A set of questions relating to the possible development of industries in India was sent out from the office of the Revenue Minister of Baroda on the 1st May. °

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\*DEVELOPMENT OF INDUSTRIES.

SIR,

I am directed by Mr. R. C. Dutt, C.I.E., Revenue Minister of Baroda, to send you a set of questions relating to the possible development of industries in India. The Government of Baroda will deem it a favour if you will kindly give them your careful consideration, and send replies at your early convenience.

Yours faithfully,

Baroda, May 1, 1906.

Superintendent,  
Revenue Minister's Office.

## MYSORE.

5. An Arts and Industrial Exhibition was held in Mysore early in the year in honour of the visit of Their Royal Highnesses the Prince and Princess of Wales, and on all hands the Exhibition was pronounced a great success.

6. With a view to encourage and promote scientific research and technical education among the people of Mysore H. H. the Maharajah has sanctioned two scholarships, which will be paid from four-fifths of the annual proceeds of the Damodar Das Charities Funds. The scholarships, which will be assigned annually for two years, will be tenable only by natives of Mysore who have graduated from a College in the Mysore State.

## QUESTIONS.

## A.

*Existing Industries.*

1. Name the existing Indian industries which can be developed to the best advantage.
2. State clearly the difficulties in the way of the development of such industries.
3. Suggest the measures you would adopt to remove the difficulties.

## B.

*New Industries.*

1. Name the new industries that can be profitably introduced into this country, grouping them as under:—
  - (a) Those in which the raw materials required are the natural products of this country.
  - (b) Those in which some of the raw materials are to be imported.
  - (c) Those in which all the raw materials are to be imported.
2. Take each of the above industries separately, and state with regard to each:—
  - (a) The place in India best suited for locating factories.
  - (b) The raw materials.
  - (c) The places from which the raw materials can be most profitably obtained.
  - (d) The places from which the necessary machinery, tools, and appliances can be obtained to the best advantage.
  - (e) The power that can be most economically employed to work the factory, if other than manual labour is necessary for its successful working, (i. e., whether Steam Engine, Gas Engine, Oil Engine, Turbine, &c.)
  - (f) The smallest capital that would be required to be employed in order to make the factory a successful concern.
  - (g) The difficulties in the way of organising and starting the factory.
  - (h) The steps to be taken to remove the difficulties.

The Industrial School at Mysore has had its scope enlarged and better financial provision has been made for its efficient up-keep. It is also housed in new buildings. It is now named after His Highness the late Maharajah Sir Chama Rajendra Wodeyar Bahadur. The munificent help the Mysore Government has offered to the Tata Institute of Science, which is to be located at Bangalore, and will, it is hoped, be an accomplished fact without much further delay, need not be dwelt upon here at any length.

7. Handloom weaving seems to be making satisfactory progress in Mysore with the enlightened support of the State. Schools have been established in several industrial centres, and they are doing good work. "Fly-shuttle looms are used in weaving, and the Superintendent (of the Hole-Narsipur School) is able to report from experience that with less expenditure of physical labour and less fatigue, three times more cloth can be woven by means of the fly-shuttle than by means of the throw-shuttle in a given time, though

## C.

*Scientific, Technical and Industrial Education.*

1. Which of the industries mentioned by you under A and B, will require the opening and maintaining of technical and industrial schools, with a view to supplying skilled labour able engineers, superintendents and managers?

2. It is necessary to send young men abroad to receive scientific, technical and industrial education with a view to enable them, on their return to this country,—

(a) to take up scientific research work;

(b) to organise and conduct Technical and Industrial Schools;

(c) to organise and conduct factories either as Directors and Managers or as Supervisors and Superintendents.

3. If so, please name the subjects of studies you will advise these young men to take up, and the places abroad best suited for such studies.

4. Take separately each subjects or group of subjects to be studied abroad, and state, with regard to each, the previous qualification required in the student, and the information he should obtain in this country prior to his departure to a foreign country with a view that he may be fitted for the kind of work he is expected to do here on his return.

5. What arrangements should be made to give these young men the best education when abroad?

6. What arrangements should be made to help the students on their return to this country to make the best use of the training received by them abroad?

## D.

*General.*

1. Is it necessary to hold Industrial Exhibitions with a view to promote the growth of trade and manufactures.

2. State the difficulties in the way of the extension of trade and manufactures, and state how these difficulties may be removed.

greater care, intelligence and skill are demanded for working with the fly-shuttle." "The influence of the Institute on the local weaving industry has begun to be felt . . . Finer cloths, which used to be imported before, have been woven at Hole-Narsipur in large quantities in recent years, since the Institute showed the way." We are told that a small society of twelve weaver boys, who have learnt weaving in the above school, has been formed to work regularly on fly-shuttle looms during stated hours, to weave the finer cloths that used to be imported, to avoid running into the debt of *sowcars*, and to share the profits equally. The Superintendent has continued to make mechanical improvements in labour-saving machines suitable for small factories. His sizing machine has been still further improved, though it is said that the results of its working have yet to be fully ascertained. A new winding machine has also been prepared, "which enables a boy of ten years to wind four times more thread and with fewer breakages than by the hand in a given time." Further, he has formed a laboratory, constructed a dyeing house, and made experiments in dyeing, according to the methods he learnt during his stay in Bombay. The Hole-Narsipur School receives from Government an annual grant of Rs. 720. This year special grants of Rs. 150 for looms and of 200 rupees for dyeing experiments have also been sanctioned. The boys in the carpentry class attached to the Doddaballapur Weaving School make among other things fly-shuttle handlooms.

In the weaving school at Molkalmuru, silk-bordered cloths, *saris*, lace-bordered turbans, and lace-bordered *dhosis* are woven with fly-shuttle looms, which are made locally with the help of the carpentry maistry.

Mr. M. A. Sampath Iyengar, Superintendent of the Weaving School, has given his attention to loom construction, sizing, winding, warping, weaving, bleaching, dyeing and co-operative labour. A fly-shuttle stay is made for handlooms at from Rs. 5 to Rs. 10 and sold on deferred payment, and the moistening of the air about a handloom is now the subject of experiments. Already fine goods that were previously imported are now made in the weaving schools of Mysore, and as the pupils pass out of the schools, they carry the industry to

their own homes. "This system of instruction," remarks the *Indian Textile Journal*, "is based on a careful study of the needs of the people; it is carried on with the smallest outlay, in buildings of the very cheapest kind, and its success is already demonstrated."

### KASHMIR.

8. A few students have been sent abroad from Kashmir for receiving technical education. And the Kashmir Electric scheme which when completed is calculated considerably to help in the development of Kashmir industries, is making progress. The silk industry, for which Kashmir enjoys exceptional facilities, has had the earnest attention of the State bestowed on it during recent years.

### TRAVANCORE.

9. An Industrial Exhibition has been organized in Travancore through the exertions of Mr. N. Subramania Iyer, Dewan Peishcar, and with the support of the Government of the State. A Technical Institute was also opened, and technical scholarships have been awarded to students. A scheme of technical education, sanctioned in 1901, is in force in the State, and provision exists for technical schools, branches of instruction in which shall be Civil Engineering, Mechanical Engineering, Agriculture, Drawing, Geology (including Mineralogy), Glass and Pottery, Textile Fabrics, Leather-work, Wood-work and Metal-work, and Printing, Book-binding and Type-founding.

### KOLHAPORE.

10. A new cotton mill has been started in Kolhapore under the name and title of "Shri Shahu Chhatrapati Spinning, Weaving and Manufacturing Co., Ltd.," with a total capital of Rs. 15,00,000, divided into 15,000 shares of Rs. 100 each, of which 10,000 shares aggregating Rs. 10,00,000 were issued first. The mill starts with 20,000 spindles, to be increased later on to 25,000. The mill is primarily the result of private enterprise, but the Durbar has given it substantial help. The concessions given are:—"A

free grant of nearly 50 acres of land for the mill premises in a most eligible situation; a large water tank for the use of the mill; a three-inch pipe from the State water-works for the use of the mill in times of scarcity; the exclusive monopoly for 30 years of running the mill in the State of Kolhapore; the option of acquiring land under the Land Acquisition Act for a railway siding up to the mill premises; exemption from State tax on all articles imported or exported in connection with the mill." The ceremony of laying the foundation stone of the mill was performed by His Highness the Maharajah on the 27th September last.

## SIROHI.

11. His Highness Sri Sir Kesari Singhji Bahadur, Maharajah of Sirohi, has extended his patronage to the Kesar Native Sugar Manufacturing Co., Ahmedabad, to which reference will be made in the next section when we come to deal with the new industrial enterprises of the Bombay Presidency. The factory of the Company will be at Abu Road (Station). His Highness has made several concessions to the Company, chief among which is fuel at a special cheap rate from his jungles. In recognition of the help received from His Highness, the Company is named after him.

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## PART II.

### SECTION (C).

#### GENERAL INDUSTRIAL ACTIVITY OF THE PEOPLE DURING THE YEAR.

##### (A) GENERAL.

1. Among the criticisms, favourable and otherwise, which the Swadeshi movement has called forth, special notice may be taken of one. Mr. Prevost Battersby, a talented British publicist who came out to India with His Royal Highness the Prince of Wales as special correspondent of the *Morning Post*, the organ of Tory aristocracy, has distinguished himself by the acuteness of his observation and the power of discrimination and sympathetic imagination he has shown himself possess to. Writing of the Swadeshi movement in one of his now famous letters, he delivered himself as follows :— " Consider how far British benevolence would support a ministrations to the unemployed which involved the paying extra for almost every necessary of existence and the getting thereby an inferior article, and then laugh, if you can, at a movement which is not only doing that, but is trying to enmesh all India in a network of organisation which shall discover the needs, supply the deficiencies and promote the training of those village workers who still remain, a labour which, in the truest and most essential interests of the country, should have been undertaken years ago by the Government of India, as doubtless it would have been but for the deterrent fear of our British manufacturer. This chance of proving our disinterested concern for our Indian subjects has, however, been lost, and it is left to the chance product of an agitation to take our place with a determination which is, in its small, vexatious way, little short of heroic."



2. The Mining and Geological Institute of India was formed in January, with His Honour the Lieutenant-Governor of Bengal as Patron and the Director of the Geological Survey of India as President. As its name implies, the institute will attempt to blend the science of Geology with the art of Mining: and its objects "shall be the promotion of the study of all branches of mining methods and of mineral occurrences in India, with a view to disseminating the information obtained for facilitating the economic development of the mineral industries in the country." "The institute will consist of ordinary members, who will be elected in accordance with their professional qualifications, and will be senior to Associate members who are also to be professional men. The Associates, however, will be purely gentlemen interested in the Institute, and who wish to keep in touch with the proceedings and to be able to attend the meetings, without necessarily being professional men." The Honorary Secretary is Mr. W. H. Pickering, Chief Inspector of Mines, Calcutta.

3. There are at present about fifty Indian students in Japan, out of whom Bengal contributes 31, Bombay seven, Madras five, the Punjab two, and the United Provinces one. The branches of study they have taken up extend over a pretty wide range. Ceramics, Applied Chemistry, Weaving, Mining, Engineering, the manufacture of Soaps, the making of Pencils, handles and metal pieces of various sorts, Spinning, Knitting of kinds, Lacquerware, the manufacture of Sulphuric acid, Wire-drawing, Pin and Needle Manufacture, Electrical Engineering, Paper-making and Glass-production—these at present make up the list of subjects that our students are devoting themselves to. As regards the institutions the most resorted to seem to be the Imperial University of Tokio, the Pharmaceutical Institute and the Agricultural College in the same city, as well as the Higher Technological School located there. There is a single student in the Imperial Institute of Fine Arts.

### (B) BENGAL.

4. A working mill—the Luxmi Tulsī Cotton Mills at Serampore—was taken over by a Bengali Syndicate and re-started under the title of "The Bengal Luxmi Cotton Mills,

Limited." The concern, when purchased, had 23,000 spindles and 200 looms; but this number has been added to by the new company. The capital of the company is Rs. 12,00,000.

Messrs. Andrew, Yule & Co., and Messrs. Kettlewell, Bullen & Co., have started two new weaving companies. The Desi Cloth Mill Co., the one promoted and managed by the former, has a capital of Rs. 6,00,000 in ten rupee shares. In the allotment of shares preference was given to Indian applicants for shares, and it is understood that most of the shares have been taken up by Indians. A fourth mill is the Indian Spinning and Weaving Co., Ltd., with a capital of Rs. 12,00,000, divided into 12,000 shares of Rs. 100 each. This company has acquired the Cotton Mills equipped with plant, machinery and accessories, situate at Chandernagore and owned and worked by Babu Butto Kristo Ghose. The company is to close its share list on the 30th November.

5. The Association for the advancement of Scientific and Industrial Education of Indians, was established on the 22nd March, 1904, and has done very good work during the short period of its existence. Seventeen students were sent by the Association early in 1905 to Glasgow, Edinburgh, Leeds, and Paisley in Great Britain, and to the United States and Japan to receive instruction in such branches of technical knowledge as Electric Engineering, Industrial Chemistry, Mechanical Engineering, Dyeing, Tanning, Scientific Agriculture, Ceramics, Manufacture of Matches, Pencils and Soap, and Sericulture. Satisfactory accounts have been received of the progress of their studies. In the current year so many as 44 students were sent by the Association to learn hardware, sugar refining, the making of essences and pomades, hosiery buttons and horn combs, weaving and spinning, glass-making, enamelling, candle-making, the making of clocks and watches, tin works and lacquer works, and homœopathic pharmacy, in addition to the subjects named above. They are receiving their training—some in Great Britain, some in America, others in Japan, France and Germany. Both last year and this year the Lieutenant-Governor of Bengal was present at the send-off given to them. The Association has started a school for teaching languages. At present French, German and Japanese are being taught under the best professors available in the city of Calcutta.

The Association has been making strenuous efforts to start a Bank in Calcutta on a large scale.

A member of Association is making experiments at Serampore with the best kind of hand-loom, and the Association has been advised by its committee of experts to await the results of such experiments before taking any steps in the direction of hand-loom.

The committee of experts of the Association have recommended the starting of the following industries:— (1) Safety and friction matches ; (2) small hardware including pins, needles, spades, Karas, umbrella sticks, knives and scissors ; (3) soaps ; (4) buttons and horn combs ; (5) churies ; (6) glassware ; (7) enamel ; (8) porcelain ; (9) pencil ; (10) leather ; (11) paints (12) acids. To carry on some or all of these industries, a limited liability company to be called the Small Industries Development Company, is proposed to be started with a capital of two lakhs. Not more than three industries would be taken up first, more being taken up only if these turn out to be profitable.

As has been mentioned elsewhere, a scheme for establishing a College of Technology in Bengal jointly by the Government of Bengal and the Association is under consideration.

A most interesting enterprise of the Association is the Agricultural Settlement in Behanga near Deoghur with 45,000 bighas of land on the co-operative system. The property is in charge of trustees, the value of each share being 500 rupees. It is proposed, as soon as enough settlers have built their houses, to start boys' and girls' schools, and, if necessary, colleges with boarding arrangements. Those of the students sent abroad under the auspices of the Association who qualify themselves in Agriculture, Farming, Forestry, and the like, or even Mining, would find in the settlement a ready-made field for reducing their knowledge to practice. A model farm, a fruit plantation and a dairy have already been started and await the arrival of experts.

6. Very important steps in the direction of advancement of education have been taken this year in Bengal by the

foundation of the National Council of Education and the Bengal Technical Institute. There is a technical side of the former in the Primary and Secondary grades. The Primary grade is designed for the training of the senses by instruction in drawing and the like, and the Secondary grade for preparing the student for his intended career in life. Among the subjects taught are paper-cutting, clay-moulding, simple mechanics, shorthand and typewriting, commercial arithmetic and commercial geography for those who intend to prepare early for a commercial career; elementary botany including vegetable physiology and chemistry for those who intend to prepare early for an agricultural career; practical mechanics, etc., for those who intend to prepare early for a manufacturing career.

The Bengal Technical Institute was opened in July—thanks principally to the liberality of Mr. T. Palit. The cost of maintenance of the Institute in a properly equipped condition will be about rupees four thousand per month in addition to an initial expenditure of over a lakh of rupees. Donations of about Rs. 50,000 and monthly subscriptions of over Rs. 2,000 have been promised. The Institute has three Departments—Primary, Intermediate and Secondary. In the Primary Department, which is intended for training skilled labourers and artisans, each candidate has to select one of the following courses:—(1) Hardware, (2) Smithery, (3) Carpentry, (4) Electro-plating and Gilding, (5) Bamboo and Cane-work, (6) Sheet-metal and Foundry-work, (7) Turning and fitting, (8) Cutlery, (9) Lock and Key-work, (10) Shell and bone-work, (11) Tanning, (12) Earthenware and Pottery work, (13) Dyeing and Bleaching, (14) Plumbing, (15) Electric Fitting, (16) Tailoring, (17) Leather work, (18) Glass-blowing, (19) Lace-making (20) Knitting, (21) Confectionery and Baking, (22) Carpet and Rug-making, (23) Dairy work, (24) Weaving and Spinning (Jute, Cotton, Silk and Wool). Intermediate Department is intended for training skilled operatives and assistants to foremen, engine-drivers, fitters and mechanical draughtsmen. Every student in this department will be trained in Smithery, Carpentry and Practical Mechanics and shall select one of the following special courses:—(1) Electric Fitting and Installation, (2) Sheet-metal and Foundry-work, (3) Cutlery, (4) Lock and Key-work, (5) Turning and Fitting, (6) Smithery

(7) Carpentry, (8) Earthenware and Pottery work, (9) Electroplating and Gilding, (10) Soap-making, (11) Tanning, (12) Pharmacy work, (13) Enamelling, (14) Dyeing and Bleaching, (15) Spinning and Weaving, (Jute, Cotton, Silk and Wool), (16) Photography, (17) Dairy Work. In the Secondary department, which is intended to turn out trained foremen who will be able to take charge of small industrial factories, the following courses of instruction are in contemplation:—(1) Mechanical Engineering, (2) Electrical Engineering, (3) Sheet-metal working and Foundry-work, (4) Textile Manufacture, (5) Technological Chemistry with one of the following special subjects:—(a) Pharmacy, (b) Ceramics, (c) Tanning, (d) Paint, Polish and Varnish making, (e) Dyeing and Bleaching, (f) Soap, Candle, Oil and Perfume-making, (g) Preparation of Matches, (6) Commercial Course, (7) Economic, Geology and Mineralogy.

8. The Bengal National Fund, which was started on October 16, 1905, is "devoted to the promotion and development of industries and industrial education with a view to the provision of skilled labour in sufficient quantity so as to pave the way for the general employment of improved hand-tools and machine-tools in the workshops." A sum of about Rs. 80,000 has been realised for the Fund and Rs. 25,000 more promised. Funds have been allotted out of this for the following purposes:—

*I.—Particular purposes to which funds have  
already been allotted.*

(1). A sum of Rupees ten thousand has been allotted to the establishment of a Weaving School which was founded on the 15th December 1905 with 60 Students on its roll at 209, Cornwallis Street (Indian Sangit Samaj Premises). There are about 500 applicants for admission and immediate steps are being taken to provide suitable accommodation for about 250 students. The School is at present equipped with 21 Fly-Shuttle looms and a number of other looms including those of Khurja, Japanese and Hattersly makes. It has also been resolved to obtain a loom of the French pattern and also some of the improved looms which were exhibited at the last Benares Exhibition and elsewhere. They are also trying to

secure the services of experts trained in weaving at the Baroda Technical School and the Victoria Technical School, Bombay. The services of an experienced Madras weaver as also that of a young man who had a training in mechanical engineering in the Shibpur College and who has had besides sufficient practical experience in weaving have been secured. (2). A sum of Rupees five thousand has been allotted for making advances of small sums on proper securities to poor weavers specially in the Mofussil. (3). A sum of Rupees one thousand has been advanced as a loan on proper security to a body of student volunteers for hawking Swadeshi goods from house to house. (4). A sum of Rupees eight hundred has been sanctioned for the establishment of a Weaving School at Kishoregunj in the District of Mymensingh. (5) A course of lectures on Aniline Dyeing was organized and delivered at the School premises by Mr. W. Menke, the German Expert. It has been decided to send one or two M. A.'s in Chemistry to Bombay to learn the art of dyeing in aniline colours and a sum of not exceeding Rs. 300 has been sanctioned for the expenses of the intending student, who will have to give an undertaking that they will, after their return, become teachers of the proposed Dyeing School for at least one year on the remuneration to be fixed by the Committee.

Further purposes for which funds are proposed to be appropriated are as follows:—(1) Starting Weaving Schools in different districts and sub-divisions; (2) to introduce the weaving of woollen and silk fabrics as also to introduce knitting machines in the Weaving Schools already existing and to be started; (3) to encourage the invention and manufacture of improved looms; (4) to introduce such industries as could be started with a small capital and to teach such industries, *e.g.* the manufacture of knives and scissors, locks, keys and padlocks, steel-trunks, despatch boxes, nibs, buttons, etc., to proper persons, (5) to found occasional scholarships for training up energetic youngmen in useful arts and manufactures to become teachers of the School on proper remuneration.

9. A newly issued programme of the Indian Industrial Association, Calcutta, setting out the details of the work for the current year, shows that it has entered upon a sphere of extended usefulness.

The programme is issued in the name of Mr. T. N. Mukharji, who is well known for his interest in and knowledge of industrial questions, and a brief summary of it is given below :—

(a) Delivery of lectures on Products and Manufactures, the course of lectures under this head comprising Mineral Products, Food Substances, Fodder or Cattle Food, Spices and Condiments including Tea and Coffee, Oils and Oil-seeds, Fibrous substances, Dyeing and Tanning substances, and Animal Products; (b) Investigation into Primary Manufactures, such as what are called "oilmans stores" including rice, starch, corn meal, condensed milk, vinegar, pickles, which are now imported in large quantities from Europe, though the raw materials for their manufacture abound in this country; (c) Investigation into the manufacture of a single important article, such as led, through the efforts of the Madras School of Art, to the successful starting of the manufacture of aluminium ware and the preparation of chrome-leather, (d) Organization of the Swadeshi movement by establishing communication with the different local bodies scattered all over the country and disseminating information through them; (e) Experiment with fodder crops; (f) Exhibition of Products and Manufactures; (g) Preparation of a Handbook on Indian Products and Manufactures.

10. The National Spinning and Weaving Company, Limited, has been started this year with a capital of Rs. 20,000; the Calcutta Weaving Co., with a capital of Rs. 30,000; the Goabagan Spinning and Weaving Co., Ltd., with a capital of Rs. 50,000; the Oriental Match Factory, Ltd., with a capital of Rs. 1,00,000 and the Oriental Soap Factory with a capital of Rs. 30,000. Messrs Janaki Nath Ray and Brothers have started the "Eastern Bengal Steamer Service" with a capital of Rs. 4,00,000, and the Bengal Steam Navigation Co., Ltd., have added two new steamers to their line. Besides these have been started the National Soap Factory, the Lotus Soap Factory, the Bool-bool Soap Factory, the Globe Cigarette Co., the Bengal Pencil Factory, and the Tarpur Sugar Works; while new works costing Rs. 2,00,000 have been added to the Bengal Chemical and Pharmaceutical Works.

11. The handloom industry has received a considerable impetus. According to a special report of the Bengal Landholders' Association, weaving schools have been started in several zemindaries, and systematic instruction is being imparted. "Thousands of weavers have returned to work, and country dhoties are readily available. Some youths undergoing instruction in weaving are graduates."

The Tagore Weaving Institution at Kushtea is the first of its kind to come out with its results. The institution was started towards the end of last year, and the students having shown a proficiency in the art, an examination was held and eight students came out successful. The successful students belong to different districts, and they have gone each to his own district to teach to others the art of weaving cloths of finer counts with the fly-shuttle handloom. The celebrated Robindra Nath Tagore is the founder of this institution, and its rapid success is to no small extent due to his untiring efforts.

12. The Calcutta Pottery Works has already achieved a name for its manufactures of Chinaware, tea cups and saucers, toys of different sorts, etc., etc. The proprietors were encouraged by the success that attended their efforts to start a regular porcelain factory in Calcutta. Mr. Satya Sundar Deb, who received his training in Japan and returned to India towards the end of last year, has been placed in charge of the works since December last. The experiments conducted by him in making porcelain with purely indigenous raw materials, have proved a success, and there is every prospect of the enlarged works turning out profitable. The capital of the works is Rs. 2,00,000.

13. Innumerable shops—"Swadeshi Stores" as they are generally called having been opened during the year all over Bengal, and there seems to be room even for more; so extensive is the demand for articles of indigenous manufacture. It was the Indian Stores, Limited,—the direct and immediate outcome of the first of the Annual Congress Exhibitions, held at Calcutta in December 1901—which led the way for other concerns of the kind. And it is satisfactory to know that, thanks chiefly to the exertions of the founder, the Honorable Mr. J. Chaudhuri, the Stores are in a sound financial position. About half of the nominal capital which is five lakhs of rupees, has been offered to and subscribed by the public, and it is proposed to issue the remainder to the full extent. An idea of the growth of demand for "Swadeshi" articles may be formed from the fact that the sales effected by the Indian Stores last year were three lakhs more in value than in the preceding year.

The United Bengal Stores, the United Bengal Co., and the Laxmir Bhandar are other important Swadeshi Stores in Calcutta. The Managing Agents of this last are the well-known Messrs. K. B. Sen and Co., and the capital is one lakh of rupees.



14. An Industrial and Agricultural Exhibition was held at Midnapur in February. The notable point about this show was that several articles made by students, such as nibs and shoe-blackening, were exhibited.

15. Mr. Radha Nath Das, Personal Assistant to General Pudma Jung Rana Bahadur of Nepal, has published a "brief statement of facts" regarding his investigation into the mineral resources of the Chota Nagpur Division and the South Behar districts. He refers to the reports of experts on the existence of iron ores of superior quality and limestone of fair-strength and percentage in close proximity to the coal fields of the Palaman and Daltongunj districts of Chota Nagpur, and says that the existence of coal, iron ore and limestone being a rare combination of things to a manufacturer of iron, this mineral wealth is eminently worth developing. His "statement of facts," which can be had from the writer at 185, Salalabag Road, Allahabad, contains interesting information.

16. One other fact remains to be noticed before we leave Bengal. Messrs. S. K. Dhar and Brothers, Chutiabazar, Hughli, have constructed Astronomical Telescopes, entirely by indigenous labour. "The instruments are of the reflecting form, and, as such, are free from colour defect. The mirrors and lenses have all been carefully ground, polished and figured" by Messrs. Dhar, and they "give very satisfactory views of sunspots, lunar features, Jupiter's belts and satellites, Saturn's ring, phases of Venus and Mercury, nebulae in Orion, and other nebulae, star-clusters, double stars, etc."

### (C) BOMBAY.

17. The Swadeshi movement, old as it is, had a second birth, as it were last year in Bengal, and consequently Bengal has loomed largest in the public eye as the home of Swadeshi agitation. But for the biggest enterprises tending to the ultimate success of the Swadeshi movement, one has to look to Bombay, which for years if not for generations has been the pioneer of industrial development. Here we move in a spacious atmosphere. It comes as a surprise to no one, therefore, that during the year under review it is in Bombay that the most important steps in advance have been taken, as will be clear from the account of them given below.

18. The Tata Iron and Steel Co., although the field of work lies in another part of the country, is nothing if not a Bombay enterprise, the late Mr. Tata and his sons after him having laid out near four

lakhs on the preliminary investigations alone. The capital of the Company is one crore and fifty lakhs. It is a pity that this could not all be raised in India and that Messrs. Tata have been obliged to seek the assistance of English financiers with the inevitable consequence that the Directorate will be in England. The works will be located at Sini. The Government of India have been pleased to make some substantial concessions to the Company, and all knowing people predict unqualified success for this large enterprise.

19. Another big scheme to whose initiation, too, the country is indebted to the genius of the late Mr. Tata, is the Bombay Hydro-Electric Scheme. The intention is to utilise the immense water-fall in the Ghats for generating power to be brought down to and utilised in Bombay. Power will be supplied to the many mills in Bombay, thus diminishing the cost of production. The scheme has been matured completely, and application for license has been made. This is now under consideration. If, as is hoped, Messrs. Tata will obtain the license, the benefits that the Hydro-Electric Scheme will confer on the industries planted in Bombay city will undoubtedly be immense.

20. It is news to no one that the organisation of capital is in a very defective State in India, relatively and absolutely. But industry is limited by capital, and no assured success awaits large industrial enterprises in India so long as the operations of banking are so very limited in scope, and compared to the need for their expansion so minute, as they are at present. This truth has for some time been increasingly recognised, and it is no wonder that a few large developments have taken place in Bombay, during the year. The Bank of India, Ltd., has been successfully floated with a capital of no less than one crore of rupees, and the Bank of Western India with a capital of 25 lakhs. It never rains but pours, and not content with these two, a third bank—the Indian Specie Bank—has been started with a capital of two crores of rupees. And those who know the organizing capacity and resources of the Honourable Mr. Vithaldas Damodher Thackersey, who is responsible for the last, will have no difficulty in concluding that the scheme of the Indian Specie Bank is destined to be as successfully carried out as the Bank of India and the Bank of Western India.

21. Insurance is allied to banking, and Bombay has been equally to the fore in this department of activity. A Fire Insurance Co. for all India—"All India United Insurance Company, Limited",—with the splendid capital of fifty lakhs has been floated in Bombay, and it is a pleasure to note that Bombay's premier citizen, the Honourable

Sir P. M. Mehta, who has laboured hard for the success of the Victoria Jubilee Technical Institute of Bombay, is the Chairman of the Board of Directors of this company. Sir Pherozezshah was before this, Chairman of the Empire of India Life Insurance Co., and piloted it successfully in its first few years. And it is no vain hope that under his sagacious guidance the new Fire Insurance Co. has a fortunate future before it.

22. We have recorded six large schemes which have been successfully started on their career, or are likely to become accomplished facts in a short time. Bombay claims credit for more. The business of the Bombay Steam Navigation Co., which has existed for more than forty years, has been acquired by a limited liability company, started with a capital of 60 lakhs of rupees. The Steamers and other boats taken over by the Company consist of nine steamers for both passengers and cargo, and nine steamers for passengers only. The new Company continues the services performed by the steamers under the old management, which are as follows :—A service twice a week to and from Bhownugger ; a service twice a week to and from Karachi calling at all Kathiawar Ports ; a service twice a week to and from Mangalore calling at Marmugoa and other ports ; a weekly service to and from the Gulf of Cutch, and a fast weekly service between Bombay and Cutch Mandvi touching at Porebunder and Dwarka, *en route*. In addition to the above, the Passenger Steamers are used for Ferry Services, which have four regular daily sailing s from Mody Bay.

23. It does not need to be told that many times more than the usual number of additions have been made to the Spinning and Weaving Mills in Bombay City and Presidency, during this year of industrial activity. The review of the prospects of the Indian Mills, to which reference has been made, as well as the list of new joint stock companies, tell a pleasing tale of the effect of the popular industrial awakening on the growth of the mill industry. It will not be out of place to make mention here of a few of the new Mills. The Broach Industrial Cotton Spinning and Weaving Co., Ltd., started with a capital of seven lakhs, has been formed for the purpose of Spinning Cotton and Weaving cloth, silk, linen, fibres, etc. A feature of this concern is that students will be admitted for receiving practical instruction, and arrangements are to be made for the students, lodging, education, etc. The Agents, whose commission and remuneration have been fixed much below the usual rates in Bombay and who, besides, forego to the extent of one-third of their commission if the shareholders paid to realise a profit of 6 per cent. have resolved to

pay a further two annas in the rupee from their commission on profits payable them by the principal Company, towards the maintenance of the Industrial School attached to the mill.

The new Spinning, Weaving and Manufacturing Company of Sholapur, Limited, starts with a capital of ten lakhs. The prospectus refers in the following terms to the increased demand for country-made cloth:—"The demand for country-made cloth has considerably increased of late and will go on increasing still in this country. The home demand is so great that little or no attention is being paid to foreign markets where the field is large and capable of great development. With these prospects in view Spinning Mills in Sholapur afford a valuable and secure investment for investors. With the increase in the consumption of Indian cloth in this country and China, and with the consequent increase in the demand, India can compete favourably with imported goods to a very large extent."

The Pratap Spinning and Weaving Mill and Manufacturing Co. has been started by some enterprising merchants of Chopda and Amalner, with a capital of ten lakhs. The mill is the first of its kind in Khandesh, which is a district rich in cotton. "The organisers of the mill are ambitious of weaving finer stuff than is usually turned out by most Mills, and will thus have in requisition most of the cotton of the better quality that is produced not only in Khandesh but in the country around."

Then we have the Barsi Spinning and Weaving Mills, Ltd, with a capital of ten lakhs, "with power to increase." The mill starts with 15,000 spindles and 300 looms which will be increased in course of time to 25,000 spindles and 500 looms.

The Poona Swadeshi Weaving Co., Ltd., has a capital of Rs. 2,50,000 "with power to increase." The Company has for its object the weaving of finer yarn into cloth. It starts with 200 power-looms.

Messrs. Finlay Muir Co. have started a new mill with a capital of twenty lakhs; and the Bhaskar Techno cotton Mills, Cambay, have a capital of ten lakhs. The Krishna Dyeing, Trading and Weaving Co., Wai, in the Satara district is started with a capital of Rs. 50,000,

24. The Kesar Sugar Manufacturing Co. is started at Ahmedabad with a capital of Rs. 5,00,000, divided into 2,000 shares of Rs. 250 each. The prospectus of the Company gives the following information :—

“ There are, at present, seventeen factories working by steam power in Bengal, Upper and Southern India. Six or seven more are being added to the number this year. On enquiring it is fairly estimated that the majority of them earn profits aviable for dividend to Shareholders of more than 20 per cent. on the capital. The statement is strongly supported by the balance-sheets of the Cawnpore sugar works Ld. for 3 years (1902-03-04), which is situated near the place proposed for the factory of this company and which show large profits. The said company, with the capital of Rs. 600,000 had in balance nett profits of Rs. 1,21,393-6-0, and was able to reserve the considerable sums in the years 1903-1904, after paying a clear dividend of 12% to Shareholders. These profits vary from 30 to 45 per cent.”

25. “ The Alembic Chemical Works ” is the latest fruit of the scientific knowledge combined with business enterprise of Professor T. K. Gajjar. Mr. Gajjar first distinguished himself as principal of the Kala Bhuvan of Baroda, and then by his work in the Techno-Chemical Laboratory at Bombay. The Alembic Chemical Works have been started “ with the object not only of supplying the public with drugs, chemicals, essential oils, etc., but also of manufacturing from indigenous raw products as many of these as can practically be manufactured here.” “ The chemical work of the factory is carried on under the guidance of Professor Gajjar, and amongst the chemical staff of the Works are analytical and manufacturing chemists like Mr. Kotibhaskar who are specialists in their own branches, and have devoted considerable time and spent many years in laboratory work and whose chief aim is to properly utilise indigenous raw products.” The “ Alembic Chemical Works ” is almost the first effort of the kind in Western India, in that “ whereas most of the chemical firms in our country manufacture their tinctures and extracts from foreign alcohol, in our factory we prepare our own alcohol for this and other manufacturing purposes. For this purpose a special factory called

the Baroda Distilling Works has been opened at Baroda. Secondly most of the chemical firms are only dealers in drugs, chemicals, etc., and the few that are manufacturers manufacture chiefly tinctures, extracts and certain proprietary medicines. In our factory, however, we manufacture even chemicals and drugs and to extend this kind of manufacture is the special aim of the Proprietors."

26. The "Sholapur Industrial Financing Fund," with a capital of two lakhs, has been started with the object of financing the Cigar and Cigarette, and the Lock-making business now in the hands of a private individual, who has shown considerable ingenuity in the manufacture of the above articles, but who has not the wherewithal to develop the business on a commercial scale. It may be expected now that the financial difficulty which so far stood in his way promises to disappear, that the business will be adequately expanded.

27. The Gujarath Islam Match Manufacturing Company of Ahmedabad was started about eight years ago and worked profitably for four years when it felt the need of enlarging the scope of its operations. The original capital of a lakh of rupees proved insufficient for the purpose, and the Company accordingly went in for a loan. But the loan could not be obtained except at a high rate of interest with the result that the annual amount of interest has eaten up all the profits and more than the profits. The Company has, therefore, issued this year debentures of a lakh and a quarter at six per cent., and when these are taken up the factory will be permanently established on a sound financial basis. A large portion of these debentures has already been subscribed for.

27. (a) The Holy Soap Manufacturing Co., of Bombay, which in view of "the tremendous run" on its Soaps in the Bombay Market found it necessary of late to convert itself into a Joint Stock Company with a capital of Rs. 1,50,000 divided into 6,000 shares of Rs. 25 each, has further extended the area of its operations and opened a branch factory at Calcutta.

28. The Western Manufacturing Co., Bombay, makes buttons. The button manufacturing plant is now in full working order and the workmen are now fully trained: "The average daily production

is not only regular but of good quality." The Directors of the Company suggest that the machinery of the button factory may safely be doubled, with an almost proportionate increase in the profits. The Directors appeal to the public to support the Company, so that the concern may be placed on a stable financial bases and "implant in India a perfectly new and modern industry of great utility to every one.

29. A notable step in advance has been taken in the direction of supplying the growing demand for indigenous articles by the starting of the Bombay Swadeshi Co-operative Stores Co., Ltd., with a capital of Rs. 2,50,000. It is rightly said in support of the foundation of the Stores, that "if all kinds of Swadeshi goods are collected together by the help of experienced merchants in a large Swadeshi Co-operative Stores in a city like Bombay, mofussil customers and dealers will have no difficulty in finding out where and how to get the reliable Swadeshi articles or where they can be purchased." "Another advantage to be derived from such Co-operative Stores of Swadeshi goods is that persons desirous of establishing Swadeshi shops in the mofussil, if they are willing to invest a part of their capital in the shares of this Company, can easily obtain the required goods from (it) at special concession rates. "It is the object of the Company that smaller shops on the co-operative principle should be started in the mofussil in connection with it." This Stores will fill in Bombay the place of the Indian Stores of Calcutta.

30. Other new concerns which may be mentioned are the following:—The Indian Goods Depot, Ahmedabad, capital one lakh; Patankar & Co., Bombay, capital one lakh; Match Manufacturing Co., Bombay, capital one lakh; Oil and Flour Mills, Sholapur, capital Rs. 50,000; the Indian Co-operative Society, Bombay, capital one lakh; the Sayaji Sugar Works, Ganadevi, capital Rs. 2,50,000; Swadeshi Bank Limited, Bombay, capital one lakh; Handloom Weaving Company, Sholapur, capital Rs. 15,000, Loom and Industrial Machine Works, Belgaum; Dattatraya Oil Mills, Shirpur, Khandesh; Deccan Brass Works, Satara; Bharat Bhushan Cigarette Factory, Malegaon; N. B. & Co., Swadeshi Nib Manufacturers, Sion, Bombay; the Deccan Banking and Trading Syndicate, Ltd., Kolhapur and Bombay.

31. At the Surat Mahajan Home for Destitute Children, instruction is given in Gardening and Farming, Coir work of all sorts, Durry and tape work, Carpet-making in cotton, Wool and Silk, Elementary Photography and Drawing. The girls are taught needlework and embroidery. The industrial work of the boys and girls in embroidery, needlework, carpets, etc., secured medals and certificates at the Ahmedabad, Bombay and Benares Exhibitions.

32. The Trustees of the Hindu Foreign Education Fund, Bombay, have resolved to send during the year one student for the study of Scientific Agriculture in America and one to Germany for the study of Industrial Chemistry. The Trustees opened in October, 1905 as an experiment, evening classes to teach the French and Japanese languages on moderate terms. "It is hoped that these classes will materially help Indians desirous of proceeding to Europe and Japan for educational purposes. If the experiment succeeds, the Trustees propose to make arrangements to teach German and other foreign languages."

33. Exhibitions were held during the year at Broach and at Pandharpur.

The articles exhibited at the former have found a place in the Directory prepared in the office of the Conference. The latter was held about the end of October. The Chief of Miraj presided at its opening ceremony, which was a grand function attended as it was by many leaders of public opinion of Western India.

A "Swadeshi Bazar" was held for the first time this year in connection with the Shivaji festival at Poona. We learn that about 60 shops were represented at it. The Bazar was open for three days, and we read "that it amply fulfilled the purpose of its organisers, *viz.*, to bring the traders in Swadeshi articles and their customers together; and while helping to push on the Swadeshi trade to enable the people to see for themselves, and realise that it was not altogether a vain boast that the Swadeshi movement did prove fruitful in the production of many an article of every day use for which we had so long to depend upon foreign manufacturers."



84. The first annual general meeting of the Bombay Society for the Encouragement of Indian Arts and Industries was held at Bombay on the 17th September 1906. The Society was founded on the 16th August 1905 with the object of promoting the Swadeshi movement. Among other measures taken by the Society to propagate the gospel of "Swadeshism" are stated to be the following:—"It has spread far and wide lists for people to sign a vow thereon to use only "Swadeshi" goods. It gave three prizes to writers of three best essays on "Why should the 'Swadeshi' goods be used." It gave a prize through the "Ganesh Mandal" to the best "Mela," in point of its "Swadeshi" made attire during the last Ganapati festival. It brought about lectures of well-known speakers at different places during the last Ganapati festival. It sent its representatives to encourage the agitation of "Swadeshism" in such places as Pen, Agashi, Bhaindar, Vellas, Pandharpur, Mangalvede, Sangli, &c. It held a number of public meetings in Bombay in 1905 and 1906, accompanied by fairs and exhibitions."

During the year Industrial Associations have been started at Ahmedabad, Satara and Broach, and have done fairly good work.

85. An "Industrial Conversazione" was held at Poona on the 15th and 16th May under the auspices of the Association for the Promotion of Industrial Education in India. Representatives from Poona, Nasik, Ahmednagar, Satara and Sholapur were present at the meeting. A Resolution was passed that a Provincial Industrial Conference should be held along with the Bombay Provincial Conference. This last, it is now settled, should meet in March 1907 at Surat. Another Resolution was passed at the Conversazione by which the Conference was recommended to consider the advisability of sending abroad a commission of experts to study what small industries could profitably be introduced in India.

86. An account of industrial activity in the Bombay Presidency would not be complete without mention of what has been called "an industrial oasis" near Bombay. It is a small manufactory at Juvem, of toys and other articles, finding employment for some twenty-five persons and offering "an admirable example of a technical school which seems to be closely adapted to the needs and character of its pupils." It includes—as the *Times of India*

points out—"Several workshops and a small museum, all so lightly and cheaply built that one wonders how they have withstood the monsoon storms. They stand, a model of good construction and a credit to their proprietor, Mr. K. R. Rane, Naturalist, Artist and Medallist, as his business card informs us . . . In the show room are examples of the products of the factory, gracefully turned vases, platters, and models of fruit in wood, the latter painted in close imitation of nature, fans of Chinese pattern, the silk being perfectly stretched, and painted in floral designs of excellent taste, ornamental wall 'chicks' with well-drawn Indian designs, paper weights cast in lead composition from the bodies of crabs, frogs, lizards and other models, crucifixes and figures of Saints cast in the same material and painted. The manufacture of fire-works is carried on in a separate shed, and in the museum, the various processes of this art are illustrated."

### (D) MADRAS.

37. The "National Fund and Industrial Association" was established at Madras in the month of March to serve as the Industrial Association for the entire Madras Presidency, and as stated earlier in this Report, several influential leaders of South Indian public opinion are actively connected with it. The following are the objects of the Association :—

(1) The fostering and improving of indigenous industries ; (2) Promotion of Technical and Scientific Education and diffusion of knowledge on industrial matters among the people by means of demonstrations, lectures, leaflets and the like ; (3) The provision of Scholarships for the study of industries in India or in any foreign country ; (4) The helping of students trained as above in the starting of industries ; (5) The establishment of a bureau of information relating to the industries, trade and commerce of India, and (6) The adoption of such other steps as may be calculated to advance the industrial condition of the country. The Association proposes to carry out the above objects in co-operation, as far as practicable, with similar Associations in the Mofussil. There are to be two Committees of the Managing Board, called (a) the Bureau of Information and (b) the Committee of the National Fund. The

duties of the former are (a) to collect information on all matters pertaining to Indian industries, trade and commerce; (b) to collect and maintain a library of literature bearing upon the industries, trade and commerce of the country; (c) to send for journals relating to the same including publications by Government; (d) to hold correspondence with experts in India and other parts of the world; (e) to answer inquiries on Industrial and Commercial matters; (f) to publish periodical information relating to the same; (g) to organise lectures. The duty of the Committee of the National Fund is to collect money for the Fund. About Rs. 12,000 was collected last year and this year, but as ill-luck would have it, Rs. 8,000 of this was lost in the Arbuthnot crash.

38. The First Madras Provincial Industrial Conference was held at Tinnevely on the 22nd and 23rd June. Five or six papers of interest were read at the Conference on subjects of importance by persons competent to handle them, and Resolutions were passed urging the need of establishing District Industrial Associations, of making an Industrial Survey of the Presidency, of promoting technical education in all its grades, and of carrying out the recommendations of the Committee on Industrial Education. The Committee of the Madras Industrial Association has been empowered to act as the Madras Provincial Committee of the Indian Industrial Conference. It has also been authorized to arrange for future annual Sessions of the Madras Provincial Industrial Conference.

39. Industrial Exhibitions were held in the course of the year at Tinnevely and Tanjore, Madura and Conjeeveram, and they were all more or less successful. Special attention was given to practical demonstrations of the working of improved handlooms at the Tinnevely and Conjeeveram Exhibitions, prizes being awarded to the best looms. Another important feature of the Exhibitions was the delivery of lectures on industrial subjects by competent persons who were specially invited for the purpose.

40. There are some new industrial enterprises to bring on record. It is true that they cannot compare in importance or magnitude with some of the magnificent concerns brought into existence in opulent Bombay, and go-a-head as Madras is comparative-

ly a poorer province, and the people down South are more or less new to such matters unlike their countrymen of Bombay where the Members of several communities breathe an industrial and commercial atmosphere as it were. But such as it is the progress is noteworthy and is evidence of the enthusiasm for industrial development created by the Swadeshi movement. The dye-works at Madura are in process of continual development, and so is the weaving industry. A new handloom factory is about to raise its head there. One word may be said of the last. The people of Madura had expected the location of the Government Weaving Institute in their city, and were disappointed at finding Salem favoured instead. Presently they raised money from among themselves and the new Weaving Factory is the substantial outcome of their self-reliant patriotism. The example was catching and the town-people of Coimbatore—a considerable weaving centre—have followed suit with a Weaving Factory in their locality. Yet another weaving factory was started by a public-spirited private citizen at Tellicherry in the Malabar district and another at Arni in the North Arcot district; while Mr. P. Theagaraya Chetty's factory at Tondiarpet, Madras, is an altogether larger affair, which can almost be compared to the Government weaving institute at Salem. Weaving factories on a smaller scale are to be found at several other centres. The chief object of all these is to test the comparative value and introduce the use of improved handlooms of different patterns. There are also weaving companies such as the one at Rajam in Vizagapatam district, formed with the object of supplying yarn and advancing money to local weavers and buying up the cloth turned out by them for retail sale in the neighbouring places. This method of increasing the supply of country-made cloth and diverting large bodies of weavers from the occupation of agricultural labourers to their ancient craft, bids fair to bear good fruit in the not distant future.

41. But weaving is not the only business on which attention has been bestowed. Two Jute Mills are nearing completion at Ellore and Guntur; pencil factories have either been actually started or are on the point of commencing work at Bimli-patam and Anakapalle; rice factories have been started in large numbers at Guntur, Rajahmundry and other places; cotton gins and presses

are being rapidly multiplied in number ; a Candle and Soap Manufacturing Co. has been floated in the Godavari district ; chrome tanning has been taken up by a private company at Madras, at the same time that work in it is continued in the Government School of Art ; insurance companies have been started at Madras and at Vizagapatam ; and the Co-operative Credit Societies Act has been taken advantage of to start a few urban industrial banks.

42. The Swadeshi Steam Navigation Co., Ltd., which works between Tuticoria and Colombo, deserves separate mention. Grave and long continued indeed were the difficulties the promoter of this enterprise had to face, but given the determination, difficulties arise only to be confronted successfully ; and it must be said to the credit of those responsible for the idea of starting a Swadeshi Steamer Service that they were not daunted by the obstacles in their way. The line was registered on October 16, under the Indian Companies' Act with a capital of ten lakhs of rupees divided into 40,000 shares of Rs. 25 each "to be held exclusively by Asiatics." Sriman Pandit Thoraisami Theyar, Zemindar of Palavantham, is the Chairman of the Board of Directors, which consists, besides him of a millionaire, and thirteen respectable bankers and merchants. Fifteen thousand shares had been purchased before October 16, and "applications for shares have been pouring in" since then. Purchases of two steamers and two launches have been negotiated, and a chartered steamer is plying now.

43. The application of the co-operative principle to matters other than agriculture is an encouraging sign of the times. We have already referred to the urban industrial banks that are started here and there under the Co-operative Credit Societies Act. Thanks to liberal interpretation of the scope of the Act on the part of Mr. P. Rajagopalachari, Registrar of Co-operative Credit Societies in the Madras Presidency, the Swadeshi Co-operative Stores of Triplicane, Madras, have been registered under the Act. A still more interesting and useful application of the Act is in the case of the Co-operative Weavers' Unions at Conjeeveram and Salem. The object of the former is to finance the weaving industry in Big Conjeeveram. "For the purpose of attaining the above object, it shall be competent to the Union to borrow money on the joint and several responsibility of all its members, to purchase wholesale the

raw material required for the weaving industry and retail the same either for cash or for credit to its members, to make ready money advances to the members, to purchase and hold in common improved appliances connected with the handloom industry and to sell or let on hire such appliances to the members, to purchase from the members the finished products of their industry and to sell the same to the best advantage and to do such other acts as may be conducive to the attainment of the general object of the Union." To start with the maximum number of members of the Union is fixed at fifty and the maximum number of looms to be financed 100. "Every weaver member of the Union shall, on admission, pay an entrance fee of 8 annas per loom held by him. Members who are not professional weavers, shall pay an entrance fee of Rs. 2 each." "The Panchayat shall purchase such raw material as they may find necessary and on such terms as may appear to them reasonable." "The Panchayat shall be competent to make ready money advances for weaving purposes to members; provided however, that such advances shall not ordinarily exceed Rs. 5 per loom and provided also that arrangements shall be made for the adjustment of these advances when the finished products are delivered." "It shall be competent to the Panchayat to lend money to the weaver members to pay off their prior debts; provide, however, firstly, that the total amount so lent shall not at any time exceed Rs. 500; secondly, that the total amount lent to a single member for this purpose shall not exceed Rs. 50; and thirdly, that arrangements shall be made for the repayment, within a period not exceeding two years, by monthly instalments, of the money advanced to a member to enable him to pay off his prior debt." "Every member shall sell his finished products to the Union at such rates as may be prescribed, from time to time by the Panchayat." "It shall be the duty of all the members to deliver their finished products from day to day to the Panchayat, accounts being adjusted at the end of every month. A member who sells his finished product otherwise than to the Panchayat shall be liable to a fine not exceeding Rs. 5 for each offence; and if he persists in a breach of this rule, it shall be competent to the Panchayat to expel him summarily."

44. The provision that exists in the Madras Presidency for the technical education is very inadequate; much more so than in

Bombay, perhaps than in Bengal, too. This year the Trustees of Pachaiyappa's Charities have organised, in connection with P. T. Lee Chengalvaraya Naicker's Charities, a Technical and Industrial Institute "Somewhat on the model of the Madras School of Arts." There was already an Orphanage maintained out of this estate, and the object of the Institute is to train the Orphan boys and also Day students who might seek admission, in Mechanical Engineering (including turner's, fitter's, etc., work), smithy and metal work, carpet and other handloom weaving, carpentry and other handicrafts. A workshop has been constructed at a cost of Rs. 8,000 and is fitted up with an oil and steam engine, a lathe, drilling machine, and other accessories. Carpet and other looms have been purchased at a cost of Rs. 10,000.

A "National Technical Institute" was started at Palghat some months back. Classes have been opened in the Union Workshops, Tanjore, for instruction in technical subjects such as cabinet-making, smithy, upholstery, and pupils belonging to the artizan classes are admitted free of cost. Weaving and other technical classes are attached to the Kalyanasundaram High School, Tanjore.

The Committee of the Madras Industrial Association have lately addressed the authorities of private schools in the Presidency suggesting the addition of commercial and industrial classes as was recommended by the Benares and Tennevelly Industrial Conferences.

45. Stores for the sale exclusively of country-made articles are now in existence at many centres, but they may all be said to be on a comparatively small scale. As one goes about the country and sees how many articles of daily use are produced by Indian workmen, one is led to wonder why they are not consumed in larger quantities in preference to similar articles imported from abroad; though it may be said with confidence that there is hardly any India who is not anxious to support the products of home industry in the first instance. One has to seek for the reasons, firstly in the fact that the articles themselves are produced on a small scale and the manufacturers do not know to find a market outside their narrow local limits; and secondly in this that the great majority

of those who open Swadeshi Stores take no steps to find out what articles are made and are available in what places outside their own provinces. The latter observation certainly applies to almost all, if not all, the Swadeshi Stores in the Madras Presidency, not excepting the Indian Industrial Company, Limited, which was started in December 1905 by some leading public men of Madras. It may, however, be hoped that the expansion of these concerns is only a matter of time. Not very long ago there was almost no shop in that part of the country for storing and selling indigenous articles, while we have many to-day dotted over the Presidency and these will doubtless be increased in number as well as enlarged in scope in the near future.

46. The South Indian Association and the Rauade Library of Madras ought to be mentioned in this place. The Association is divided into sections, among which are the Industrial and Economic Sections. "The Industrial Section will take in the study of all the conditions, natural and artificial, that affect the development of our industries and manufactures, and concern itself not only with the scientific basis of the various processes involved, but with the means of finding markets and conquering them. Perhaps the most important section is the economic. In general terms it is to regulate the adaptation to the special needs and conditions of India of the general principles of economics in so far as they may be said to have been ascertained." The latest of the valuable papers read before the Association was on Sugar Industry by Mr. H. Vencoba Rao.

47. Mr. G. Subramania Iyer, who needs no introduction to the Indian public, made an extensive and prolonged tour in the Southern districts of the presidency on behalf of the Madras Industrial Association and National Fund, visiting many small towns and villages. And Mr. N. Subbarao Pantulu did the same to a smaller extent, in the Northern Districts. He was accompanied by the Assistant Secretary of the Indian Industrial Conference in his tour, except to one place, Masulipatam, where he went alone and succeeded in getting a Committee established for making an Industrial Survey of the District,



**(E) THE UNITED PROVINCES.**

48. Maharajah Deb Shamshere, Rana Bahadur, brother of the Prime Minister of Nepal, has decided to establish a glass factory at Rajpur, Dehra Dun, which is already noted for the Himalaya Glass works which made such a successful display of their wares at the Benares Exhibition. The Maharajah is reputed to be a special student of the Physical Sciences, and to keep himself always abreast of the times in acquainting himself with the latest inventions and discoveries of science. His intention is to found a large and well-equipped manufactory for turning out all kinds of articles made of glass. He has got out all the necessary plant and is arranging for the supply of electric power to work the machinery.

49. Steps have been taken during the year at several important places in the province to discourage the use of imported sugar and to increase the supply of the indigenous article. And factories have been started at Rampur, Unao, Cawnpur and Shahajampur to produce refined sugar.

50. At Allahabad, Lucknow, Benares and many other places arrangements have been made for storing and selling countrymade articles.

51. The Benares Silk Weavers Co-operative Association, working with a capital of Rs. 45,000, promises to be a successful effort at rehabilitating the famous silk weaving industry of Benares. The lines on which it conducts its business are more or less the same as in the case of the Conjeeveram Weavers Union, particulars of which have been given in a foregoing paragraph.

52. An Industrial School was opened at Benares early in the year. Attention is primarily given to instruction in the use of improved handlooms.

The authorities of the Christian College, Allahabad, have opened an Electrical Engineering Department in connection with their College. Practical training in Mechanical Engineering and workshop practice form part of the course of the new Department. The services of a competent specialist, Mr. H. T. Avey, B. M. E., of the Towa

State, U. S. A., have been retained, and he has been placed in charge of the Electrical Engineering Department of the College. The course of study in this Department comprises a three years' course in which Science, Mathematics and English will be taught in addition to the special subjects, viz., Drawing, Surveying, Machine Design, Dynamo-Electric Machinery, Pattern-making, Metal-working, Power plant and Electrical Installations and other connected and subsidiary subjects.

53. An Exhibition of the Products, Industries and Arts of the United Provinces was held towards the last quarter of the year and its opening ceremony was performed by Rai Bahadur Lala Baij Nath.

### (F) THE PUNJAB.

54. The Ambala Glass factory—the "Upper India Glass Work"—is a concern working with Indian capital and under Indian management, and turns out an excellent variety of articles. From the 1st November the proprietor has made arrangements for training two apprentices in the works. They will be admitted to a 'two years' course, during the first eighteen months of which they will be taught the technics of the industry, such as preparation of clay for and making of crucibles, mixing of raw materials and preparation recipes; melting, blowing, pressing, annealing etc., of glass, finishing and polishing of manufactured glass-articles, etc.; and during the remaining six months they will be given commercial education to fit them for business.

Mr. Muhammad Shafi announced in June last his intention to open a technical school at Lyallpore for teaching Porcelain-making, Pencil-making, Match-making, Enamelling, Weaving, Dyeing and Calico-printing.

One student has been sent to learn Tanning in America, another to learn Mining, two have been sent to Manchester to receive instruction in Spinning, one for Banking, and so on.

55. The scheme of an Industrial Bureau outlined by the Hon'ble Mr. Daji Abaji Khare in a paper laid before the Benares

Conference suggested to some persons in Lahore the formation of a society called "The Fraternity" of which we have the following particulars from the Secretary.

Its objects chiefly are :—

- (1) To collect information of Swadeshi articles ;
- (2) To beat down the sellers of Swadeshi articles taking undue advantage of the movement ;
- (3) To have a show room to exhibit Swadeshi goods ;
- (4) To give information (to those who require) as to where a Swadeshi thing can be had and of whom it can be had. Gentlemen desirous of promoting *the Swadeshi* cannot do better than taking advantage of its (Fraternity's) service.

Manufacturers and merchants should send samples of their goods with wholesale and retail prices. Those samples will be put up in a show room and prices told to those who enquire.

All correspondence should be addressed to the Secretary, the Fraternity, Lahore.

The Manufacturers are requested to give the names of the maker or seller of the goods.

The goods mean Swadeshi goods and no others.

56. A Spinning and Weaving Mill has been started at Lahore with a capital of Rs. 2,00,000 ; the Pioneer Handloom Weaving Co. has been started at Jullundur with a capital of Rs. 50,000 ; the Indian National Trust Association at Lahore with a capital of Rs. 5,00,000 ; the Industrial Bank at Ludhiana with a capital of Rs. 5,00,000 ; a Swadeshi Store Company has been formed at Wazirabad ; the Panjab and Kashmir Trading Co., Lahore, has opened special warehouses at Lahore and Srinagar for storing and selling a variety of country-made articles ; the Oriental Co-operative Stores, Ltd., has been opened at Rawalpindi with a capital

of Rs. 1,00,000, and a joint stock company has been started at Amritsar with a capital of Rs. 50,000 to manufacture woollen cloth by means of Japanese handlooms.

### (G) CENTRAL PROVINCES AND BERAR.

57. The Second Central Provinces and Berar Provincial Industrial Conference was held at Jubbulpore on the 15th April 1906. Resolutions were passed at it in regard to Technical Education, the establishment of Joint Stock Companies for carrying on industries on legitimate commercial and sound basis, the establishment of a Bank, and the Mining industry. Committees have been appointed to take the requisite action in respect of these several matters.

58. An Agricultural and Industrial Exhibition was held at Amraoti in the month of April, and those who witnessed it were unanimous in pronouncing it a success. While there were exhibits from other provinces, the Exhibition was specially noteworthy as revealing the industrial possibilities of Berar. Thanks to the courtesy of Mr. R. R. Abhayanker, I. C. E., the energetic Secretary of the Exhibition, we have been able to include the articles shown at the Amraoti Exhibition in the Directory of Indian goods prepared in the Conference office.

59. The Akola and Central India Spinning and Weaving Mill, Akola, has been started with a capital of Rs. 7,50,000. The Akola Native Cotton Ginning, Pressing, Spinning and Weaving Co. is extending its Spinning establishment and adding looms. The Akola Cotton and Oil Manufacturing Company is putting up a number of looms also. A number of Ginning and Pressing factories have been opened during the year both in the Central Provinces and Berar. The number of oil mills at Akola has been added to this year by Rao Bahadur D. V. Bhagawat's Oil Mills. A match factory driven by steam power has been started at Ellichpur with a capital of one lakh of rupees. It is working satisfactorily. Another match factory worked by manual labour is projected at Telhara.

60. Technical education is slowly making progress, thanks to joint action on the part of the Government and the people. The Nagpur and Amraoti Technical Institutes are the result of the initiative taken by the leaders of public opinion in Berar and the Central Provinces, who were anxious that the memorial to the late Queen-Empress should take the form of such objects of public utility, and of the liberal support Government was pleased to render to them. Technical classes have been added to the school started at Amraoti by the Berar Education Society.

### (H) THE NATIVE STATES.

61. An Industrial Education Society was formed at Hyderabad (Deccan), with the aim of collecting funds to send students to Japan or elsewhere to learn some industry which could be started with a small capital.

62. An Industrial and Agricultural Association for the State of Mysore was started at Bangalore. Its functions seem to be mainly of an educative character. A Reading Room for technical periodicals and publications has been opened in connection with the Association, and a series of lectures are organised.

63. The Swadeshi movement is said to have given a great impetus to the trade in Kashmir woollen goods. The demand for them has greatly increased, and prices have risen in consequence. The trade is now in private hands, but suggestions have been made for organising a joint stock company to stimulate production in view to meet the growing demand.

64. Kathiawar has not been left unaffected by the Swadeshi enthusiasm. There, too, the rush for indigenous articles has been very great. And "in all the principal cities of the province shares are being subscribed for opening Swadeshi Stores;" over a lakh of rupees having been so subscribed.

65. It is recognised that there must be large gaps in the above record; but it has not been possible to obtain information from all places and about all things. Such as it is, however, it leaves no room for doubt in one's mind that a year's substantial work has been done, and, if the achievements are still very meagre compared with the needs of the situation, our future is in our own hands if we but continue with a steadfast determination of purpose, which no difficulty can daunt and no obstacle thwart the good work which has been so well begun.

R. C. DUTT,

President,

First Indian Industrial Conference.

*Baroda,*

*November 1906.*

R. N. MUDHOLKAR,

General Secretary,

Indian Industrial Conference.

*Amraoti,*

*November 1906.*

## APPENDIX I.

### Memorandum regarding development of Agriculture, and Industrial, Commercial and Technical Education in Bengal.

#### A.—AGRICULTURE DEPARTMENT.

##### ESTABLISHMENT OF SEPARATE DEPARTMENT.

THE Government of Bengal has established a separate Department of Agriculture, with a Director and a complete staff of peripatetic experts.

##### AGRICULTURAL COLLEGE.

2. A Provincial Agricultural College with a staff of European and Indian Professors will be established to provide agricultural education for the sons of a limited number of landholders, as well as to train men to supply the staff required for other agricultural institutions in the Province and for a graded Agricultural Service.

##### EXPERIMENT AND SEED FARMS.

3. Large farms will be established in five or six typical localities that will serve both as experiment stations and seed farms. Land is already being acquired for two of these farms.

##### DEMONSTRATION FARMS.

4. In these areas numerous demonstration farms will subsequently be opened to acquaint the cultivating classes with established results.

##### SEED, IMPLEMENT AND MANURE STORE.

5. A central seed and implement store has been opened in Calcutta to assist the public in obtaining improved varieties of seed and implements as well as approved kinds of artificial manures.

##### DISTRIBUTION OF AGRICULTURAL LITERATURE.

6. Special measures are being taken towards the systematic publication and distribution of agricultural information both in English and in the vernaculars.

##### AGRICULTURAL AND INDUSTRIAL SHOWS.

7. Agricultural and Industrial shows are being liberally assisted both by financial aid and by the loan of machinery and implements and the deputation of experts to advise, demonstrate and lecture. Government has largely increased the provision for the encouragement of these shows.

## DEPUTATION OF OFFICERS.

8. Provision has been made for the deputation of experienced officers for special enquiries. Mr. N. G. Mukherji has recently published an interesting account of enquiry and experiment in the *tasar* silk producing districts of the Central Provinces and Chota Nagpur.

## TASAR SILK FARMS.

9. Orders have issued for the establishment of a model *tasar*-rearing nursery at an initial cost of Rs. 10,000 each, and an annual charge of Rs. 4,000.

## SILK-REELING.

10. Mr. Mukerji was deputed to Kashmir and Mysore to enquire into an alleged improved method of reeling; and his report on this enquiry is now in the press.

## WELL-IRRIGATION.

11. Mr. N. N. Banerji, another experienced officer of the Agricultural Department, has lately been deputed to make special enquires regarding the methods of well-irrigation in the United Provinces and Bihar.

## PUBLICATION OF MONOGRAPHS.

12. The following monographs on important industries of the Province have been published by the Department:—

- (1) Monograph on Dyes and Dyeing, by Mr. N. N. Banerji, 1896.
- (2) Monograph on Cotton Fabrics, by Mr. N. N. Banerji, 1898.
- (3) Monograph on Woollen Fabrics, by Mr. N. N. Banerji, 1899.
- (4) Monograph on Ivory Carving, Bengal, by Mr. G. C. Dutt, 1901.
- (5) Monograph on Silk Fabrics of Bengal, by Mr. N. G. Mukerji, 1903.
- (6) Tanning and Working in Leather, Bengal, by Mr. Rowland, N. L. Chandra, 1904.
- (7) Monograph on Gold and Silver Works by Mr. D. N. Mukerji, 1905.

## DEPUTATION OF STUDENTS FOR TRAINING IN AMERICA.

13. In accordance with the scheme drawn up by this Government, four Indian students who have passed the agricultural course at the Sibpur College have been deputed during the current year to America to undergo a higher training in agriculture at the Cornell University. The annual charge on account of such deputation is estimated at Rs. 12,000.

## JUTE.

14. Last season special experiments were carried out in Faridpur, Jalpaiguri, Rangpur and Mymensingh in the cultiva-



tion of jute with a view to the collection of selected seed for distribution. This seed has been widely distributed. During the current season farms are being opened at Berhampore, Purnea, Krishnagar and Chinsura, as the districts named above have been transferred to the new province. Important experiments are also being conducted at Burdwan. A jute expert was also employed by Government with a view to special enquiry into the cultivation of jute and its alleged deterioration.

#### COTTON.

15. A special grant of Rs. 5,000 has been provided for the selection and distribution of the best varieties of cotton. Experiments have also been made with Egyptian and American varieties.

#### SUGARCANE.

16. Selected varieties of sugarcane have been indented for from the Mauritius, the West Indies and from other parts of India, and it is proposed to encourage improvement in cultivation by the offer of prizes in the shape of approved cane presses.

#### INDIGO.

17. Scientific investigation is being made into the cultivation of indigo. A research station has been established at Sirsa in the Muzaffarpur district, and an annual grant of Rs. 50,000 has been provided to the Bihar Indigo Planters' Association in this connection. An account of the important research work carried out at the expense of this Government on behalf of this industry was issued in 1905.

#### TEA.

18. Since 1899 this Government has been giving financial aid towards research work in connection with the cultivation and manufacture of tea. The grant was increased from Rs. 5,000 to Rs. 7,000 in 1903.

#### SILK.

19. For some years this Government has been making a grant of Rs. 6,000 to the Bengal Silk Committee to stimulate the industry by promoting the rearing of healthy worms and extending mulberry plantation. The grant has been increased to Rs. 15,000 with effect from the ensuing financial year. Financial aid has also been given to the Rampur Boalia Sericultural School.

#### AGRICULTURAL ASSOCIATION.

20. A Central Provincial Agricultural Association was established in August 1904, and an annual grant of Rs. 6,000 is being made to meet the expenditure of the association. A special officer of the overseer class, has been employed for

work in connection with jute and a large reference library is being collected.

21. Divisional Agricultural Associations have been established in the Burdwan, Presidency, Orissa, Chota Nagpur and Patna Divisions, and District Agricultural Associations in nearly all the districts. Financial aid is being given to the Divisional Associations, and it is proposed to supply each with a small stock of standard books on Agriculture. Trained agricultural Inspectors are being deputed as they become available to assist the Divisional Associations.

#### LEAFLETS.

22. Leaflets are issued by the Department for the guidance of the agricultural classes in the cultivation of the principal crops.

## B.—INDUSTRIAL, TECHNICAL AND COMMERCIAL EDUCATION.

### INDUSTRIAL AND TECHNICAL EDUCATION.

The principal technical institutions under Government management in Bengal are the Civil Engineering College, Sibpur, the Government School of Art, Calcutta, and the Bihar School of Engineering at Bankipore; the Cuttack Survey School and the Ranchi Industrial School are Government Institutions of minor importance. Special technical classes have also been opened in connection with selected high schools under Government management. Up till the year 1900 the course of instruction in such schools was a purely literary one leading up to the Entrance Examination of the Calcutta University. In that year sanction was given to the introduction of a scheme for the bifurcation of studies and for the development of education on modern lines. It was decided that, in addition to the arrangements already made for teaching general subjects, provision should be made for the instruction of students of the first two classes in such subjects as would enable them to follow engineering, industries or commerce as their future career. In accordance with the new scheme, B or technical and C or Commercial Classes were opened in selected Government Schools, in 1901. A final examination on leaving school was instituted to test boys who had passed the modern side of a zilla or high school, and it was decided that certificates should be granted to those who passed the examination. Government has for the present retained the control of the examination. The higher instruction of those students who pass the B course examination is provided for at the Civil Engineering College, Sibpur.

## COMMERCIAL EDUCATION.

2. In 1903 special Commercial Classes were opened at the Presidency College for the advanced instruction of students who might pass the "C" or Commercial Course examination. The scheme did not, however, prove successful, and the subject was accordingly referred to the consideration of a Committee of practical men, consisting of representatives of the Bengal Chamber of Commerce, the Bengal National Chamber of Commerce, the Calcutta Trades Association and the Education Department, besides other gentlemen interested in Commercial Education. The recommendations made by the Committee were generally approved, and new classes were opened in the Presidency College in 1905. Arrangements have been made for the instruction and examination of students in two different courses of studies, one being a complete day course and the other consisting of evening courses of lectures on a number of optional subjects. The day course will extend over a period of two years. Students passing the examinations will receive from the Education Department certificates which will require endorsement by the Secretary to the Bengal Chamber of Commerce, and lists of successful candidates will be published by that Chamber and the Bengal National Chamber of Commerce. It has been decided that grants will be made to other Colleges and high schools to introduce schemes of education on the lines laid down in the case of the Presidency College. It is also in contemplation to open Commercial Classes at the Victoria Boys' School for European and Eurasian boys at Kurseong.

## INSTRUCTION OF WEAVERS.

3. In 1890 Mr. E. W. Collin, I.C.S., submitted a report on the existing Arts and Industries in Bengal, in which he referred to a flourishing colony of hand-loom weavers at Serampore who used an improved native loom. Mr. Havell, the Principal of the Government School of Art, Calcutta, was deputed to investigate the methods of these weavers with a view to their improvement and extension. He suggested that some of the Serampore weavers might be usefully employed as teachers in other weaving centres throughout the province. As the weavers, however, were unwilling to leave their homes, Government arranged for the opening of a teaching establishment at Serampore for the instruction of weavers and carpenters in the use and construction of the fly-shuttle loom. District Boards in Bengal were also asked to take measures with a view to making known in the districts the advantages to be derived by the weaving industry from the Serampore fly-shuttle loom and to instruct the local weavers in its use; efforts were made in that direction by 25 Boards during the year 1903-04. In most cases two weavers and a carpenter were sent to be trained at Serampore, where they were provided with free

quarters by Government, and were taught how to use the fly-shuttle and to construct the looms adapted to it. These men, after receiving a course of instruction, returned to their districts, where they were employed on training the local weavers and carpenters. In Chittagong, the experiment proved a success, and the improved loom was appreciated by the people. It was reported from the district of Darbhanga that the difficulty as to the high price of the improved fly-shuttle loom was overcome by adapting the fly-shuttle to the ordinary country loom, and that the outturn of those modified looms was almost equal to that of the framed fly-shuttle loom, *i.e.*, nearly three times that of the ordinary looms in vogue in the district. The cost of altering a country loom in this way was reported to be less than Rs. 7 a piece. Copies of the report on the subject received from Darbhanga will be circulated to other District Boards with a view to the experiment being tried in other districts. Some weavers in various parts of the district of Midnapore are reported to have adopted the fly-shuttle loom, but only for coarser kinds of cloth.

#### TECHNICAL EDUCATION. WEAVING SCHOOLS.

4. In connection with the recommendations made by the Educational Conference which met at Simla in 1901 on the subject of industrial education, a Committee was appointed in 1904, with the Hon'ble Mr. Hare as President, to consider a scheme for the development of industrial education in Bengal. As a result of their recommendations, proposals were submitted to the Government of India to open a school for the teaching of improved methods of hand-weaving in silk, cotton and wool at Serampore, with a higher class for the instruction of men of the type of the apprentices at the Civil Engineering College, Sibpur, who would become teachers, assistants to manufacturers, or manufacturers, and a lower class for the instruction for weavers of the neighbourhood and their sons. It was proposed that an expert Inspector should have charge of the school at Serampore, and that he should be assisted by a Head-master and a master of drawing and designing. It was also proposed that a course of instruction less ambitious than that to be given to the lower class at Serampore should be imparted to weavers and sons of weavers at five selected centres, which should be under the general superintendence of the Inspector, aided by a teacher of each centre; that the general education of the junior students both at Serampore and the outlying centres should receive careful attention, but that such education should not go beyond the Primary standard; that special attention should be paid to the teaching of drawing and designing at all the schools; that subject to well-defined exceptions, admission to the schools should be limited to pupils whose caste occu-

pation is weaving; that scholarships should for the present be given to all students at the school; and that when students leave the schools, they should be provided with advances for the purpose of purchasing appliances, such as would enable them to put their acquired knowledge to account. The Government of India have approved of these proposals generally, and this Government is now considering the question of funds.

In Manbhum a weaving school has been started at Raghunathpur, where the use of the fly-shuttle loom is taught. A grant of Rs. 1,000 has been made by Government to provide for a building and for the purchase of looms and accessories for the opening of a weaving class at Pakhuria. Experiments will be made with the adapted country loom, the ordinary fly-shuttle loom and the Japanese fly-shuttle loom.

#### EXHIBITIONS.

5. It was proposed to hold an exhibition and practical demonstration of improved warping apparatus at Calcutta, Pabna and Cuttack during January, February and March of this year (1906) at which the old Indian loom and weaving apparatus, the Serampore fly-shuttle loom and warping apparatus and the Japanese foot-loom and warping apparatus were to be shown, and weavers were to be instructed in the use of looms. It has, however, been decided to postpone the proposed exhibition till next cold weather. Possibly, owing to the efforts to introduce improvements in the Serampore loom, a new model can be introduced to supersede the present type. A new and improved model of the Japanese loom is also expected.

6. Grants are given for efficient industrial instruction in schools under private management.

#### MINING SCHOLARSHIPS.

7. The Government of India have instituted State Technical Scholarships to enable natives of India to pursue a course of study in Great Britain or other Western Countries. In the year 1904 four scholars were sent from Bengal to the Birmingham University to undergo a course of training in the management of Mines. In 1905 two scholars were sent to the same University for a similar course of training. Each scholar is provided with a second class passage to London by sea and gets a scholarship of the value of £150 a year exclusive of the fees paid at the University. Each scholarship is tenable for two years subject to an extension for a third year in the case of scholars who produce evidence of satisfactory progress during the course of their training.

#### MINING.

8. Arrangements have been made to open mining classes at the Sibpur Engineering College. The necessary teaching staff has been secured from England.

## APPENDIX II.

## TECHNICAL EDUCATION IN BOMBAY.

No. 1475 of 1906.

EDUCATIONAL DEPARTMENT,

BOMBAY CASTLE, 13th August, 1906.

FROM THE SECRETARY TO GOVERNMENT,

TO THE GENERAL SECRETARY,

INDIAN INDUSTRIAL CONFERENCE,

Amraoti.

SIR,—With reference to paragraph 2 of the letter addressed to you from the General Department No. 4472, dated the 28th ultimo, I am directed to inform you that there are three principal institutions in this Presidency in which Technical and Industrial education is imparted: viz. (1) The College of Science, Poona, (2) The Sir J. J. School of Art, Bombay, and (3) The Victoria Jubilee Technical Institute, Bombay.

2. The College of Science affords instruction in Civil Engineering, Science and Agriculture, and has also classes for Sub-overseers, Mechanical Engineers and Electrical Engineers attached to it; it is a Government institution affiliated to the University of Bombay, and prepares students for degrees in Engineering, Science and Agriculture, for which examinations are held annually by the University of Bombay.

3. The Sir J. J. School of Art, Bombay, is also a Government institution which besides teaching drawing, painting, design, architectural drawing and modelling, trains drawing masters for schools and colleges throughout the Presidency. The School has also workshops attached to it where instruction is given in carpet weaving, ornamental copper and brass work, enamelling, house decoration and painting, gold and silver work, pottery, wood carving and joinery, stone carving and wrought-iron work.

4. The Victoria Jubilee Technical Institute is an aided institution where instruction is imparted in Technical Chemistry, Mechanical Engineering, Textile Manufacture, Electrical Engineering, Sheet Metal Working, Enamelling and Practical Locomotive Work. In addition to these, the Institute has

Science classes in connection with which students attend courses of machine drawing, lectures in theoretical and applied mechanics, and steam, sound, light, heat and magnetism, with physical laboratory practice. The Engineering students attend also lectures on tools, while the students in cotton manufacture receive instruction in the theory of spinning and weaving.

5. In connection with the subject of commercial education, I am to state that the annual examination for the London

**SENIOR CERTIFICATE EXAMINATION.**

Book-keeping.  
Methods and Machinery of Business.  
Commercial and Industrial Law.  
Banking and Currency.  
Commercial History and Geography.  
Political Economy.  
Freehand Drawing, Group I.  
Mathematics (optional).  
Typewriting.  
Short-hand.  
Chemistry.

**JUNIOR CERTIFICATE EXAMINATION.**  
Commercial Arithmetic. Typewriting.  
Book-keeping. Short-hand.

Chamber of Commerce Certificate is held in Bombay, Ahmedabad and Karachi, and that the subjects in which candidates are examined are generally those mentioned in the margin. The Institutions which prepare candidates for the examination are shown in the statement appended to this letter.

6. With reference to your request for rules regulating the grant of Foreign Technical Scholarships, I am to invite your attention to the Government Notifications mentioned below:—

Notification No. 157, dated the 26th January 1904, published at pages 132-136 of the *Bombay Government Gazette* of the 28th idem, Part I;

Notification No. 2101, dated the 10th November 1904, published at page 1550 of the *Bombay Government Gazette* of the 17th idem, Part I; and

Notification No. 571, dated the 29th March 1905, published at page 411 of the *Bombay Government Gazette* of the 30th idem, Part I.

I have the honour to be,

Sir,

Your most obedient Servant,

R. E. ENTHOVEN,

Acting Secretary to Government.

ACCOMPANIMENT TO GOVERNMENT LETTER to the General Secretary, Indian Industrial Conference, Amraoti, No. , dated the August 1906.

Statement showing the number of Institutions presenting candidates for the London Chamber of Commerce Certificate Examination.

No.	Name of Institution.
1	Accountancy Institution, Bombay.
2	Adenvala's Book-keeping Classés, Bombay.
3	English Typewriting Company, Bombay.
4	Commercial Training Institution, Bombay.
5	University Training Classes, Bombay.
6	Kalbadevi Short-hand and Book-keeping Class, Bombay
7	Commercial Educational Institute, Bombay.
8	India Typewriting Company, Bombay.
9	Aiyar's School of Commerce, Bombay.
10	B. J. College of Commerce, Bombay.
11	The Techno-Accountancy Institution, Bombay.
12	St. Xavier's High School, Bombay.
13	St. Mary's Institution, Bombay.
14	Mercantile Training Institution, Ahmedabad.
15	Commercial Training Studio, Ahmedabad.
16	Navalrai Hiranand Academy, Hyderabad (Sind).
17	Private Tuition.



## APPENDIX III.

## GENERAL SECRETARY'S CIRCULAR No. I.

OFFICE OF THE GENERAL SECRETARY,

*Amraoti, Dated 31st January 1906.*

To

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DEAR SIR,—I send herewith for your consideration and such action as may appear suitable to you, a copy of the resolutions passed at the Industrial Conference held at Benares on the 30th of last month. For the purpose of giving effect to the recommendations made and the course of action laid down in these resolutions Provincial Committees have been constituted for Bengal, Bombay, Madras, the United Provinces, the Punjab and the Central Provinces and Berar. You and the gentlemen mentioned on the margin form the Provincial Committee for..... You and the gentlemen mentioned are given the power to add others to your committee and to establish sub-committees wherever it may be considered desirable to do so. I beg your committee will kindly let me know what steps have been or are proposed to be taken in the matter. I would further suggest that your committee will select a Secretary and communicate his name to me in order to facilitate communication and obviate unnecessary correspondence.

The work before the Provincial Committees is so vast that they cannot be expected to undertake the whole of it at once. With a view to secure systematic efforts and concerted action I would beg to know in what direction and on what lines your Committee proposes to commence immediate work and in what order it considers that the other recommendations of the Conference should be given effect to. The views of your committee will be communicated to the other Provincial Committees whose views will be sent on to you.

I might be permitted to point out what work should be taken in hand by our Provincial Committees. The extension of scientific and technical instruction and the increase in the supply of articles of indigenous manufacture which are turned out at present should claim our first attention.

## (A.) SCIENTIFIC AND TECHNICAL EDUCATION.

In regard to scientific and technical education it is hoped that the Government of India will be pleased to make before long substantial grants to the Local Governments and administrations for the establishment of technical colleges and schools within their respective jurisdictions and to establish at least one Polytechnic Institute and academy of research for the country. In the Resolution which the Government of India issued two years ago on the report of the Committee on Industrial Education, they say:—"Such a scheme as has been sketched above both for larger industrial enterprises and for smaller handicrafts must, the Governor-General in Council thinks, in the main depend upon Government and not upon private management." The different Provincial Committees should, it is suggested, approach their respective Governments and move them to take action in the matter and to give effect to the direction contained in the aforesaid resolution. But it is possible that some time may elapse before Government decide what course to follow and it would obviously be undesirable to wait till Government take action or to depend entirely upon Government initiative and support. Bengal it seems will have before long at least one scientific and technological college established and maintained by private donations and subscriptions, and it is to be hoped that the other Provinces will make similar efforts to supply their deficiencies. To enable the Provincial Committees to determine their course of action I would mention some facts.

Bombay has got two institutions of the status of colleges where technical instruction is given—the Victoria Jubilee Technical Institute of Bombay and the College of Science at Poona. In the former provision is made for teaching mechanical and electrical engineering and textile manufacture; in the latter there is fairly due provision for mechanical engineering. There are also at Ahmedabad, Surat, Poona and Sholapur technical schools where what might be called elementary and secondary instruction is given. I ought not to omit the Kalabhuvan at Baroda, which in addition to mechanical engineering gives instruction in some industries also. In Berar there will be started soon the Victoria Memorial Technical Institute at Amraoti, where instruction will be given in mechanical engineering, carpentry, smithy, turnery and general fitter's work. In the secondary private school opened a few months ago at Amraoti by the Berar Education Society, it is proposed to add a weaving class in addition to the provision for general manual training and to have also classes for carpentry, smithy and turnery training. I mention all these things for this reason, that as the resources of our people are very limited, we should husband them properly, and first direct their application in those directions where no provision exists at present. For

instruction in mechanical and electrical engineering and manufacture of cotton or other textiles there is no facility in the three great presidencies of Bengal, the United Provinces and the Punjab, while the circumstances of our country require that attention must preferentially be bestowed on these. The Victoria Technical Institute of Bombay has applied itself mainly to these three courses. There was for some years provision made for teaching enamelling; but this course had to be abandoned owing to certain difficulties. The capital expenditure for establishing an institute like the Bombay one—and it is not very lavishly or sumptuously equipped—would not fall below 8½ lakhs. The maintenance and the recurring charges would not be less than Rs. 50,000 a year. Even an institution like the Amraoti Victoria Institute, which aims only at giving instruction in the mechanical engineering course in the higher school and in the courses of carpentry, smithy, turnery and fitter's work in the lower school, will require one lakh of rupees for capital expenditure and Rs. 14,000 a year for recurring charges. Twenty-five lakhs of rupees would be required before a technical college which goes no further than the Bombay Institute can be established. Instead, therefore, of spending funds on small schools in different localities the most suitable course to adopt at present would be to have one fully equipped Technical College for Northern India and two secondary colleges or high schools at Allahabad and Lahore. In the first college, in addition to the three courses mentioned above, there should be provision for teaching at least two more :—(I) Mfning and Metallurgy, and (II) Industrial Chemistry.

The requirements of Southern India are similar to those of Upper India. The matter for the Madras Committee to consider is whether the leaders of the educated community should not personally appeal to the rulers of the great states of Hyderabad, Mysore and Travancore, and obtain their help to the establishment of a fully equipped science and technological college. It would be well to have in addition to such college at least two secondary technical schools, one in the northern part of the presidency and the other in the southern.

As distinguished from general technical schools and colleges, stand the crafts schools. There are several so-called industrial schools; but the majority of them are failures. A few of them are doing good work; but in regard to the majority the Government of India have pointed out how very defective they are. Efforts should be made to have the course of instruction in these placed on a sound basis. The lines on which these schools should be conducted, how they are to combine effective practice in workshops with instruction in the principles on which a craft or industry is based, is shown in the resolution of the Government of India.

Educational institutions in India are still conducted on methods which were prevalent in England till the other day. Those methods are found defective ; and as in England facilities should be provided for the training of the eye and the hand, the development of the faculties of observation and experiment, and to bring the pupils of our schools more in contact with nature. The introduction of object-lessons and the incorporation of drawing and manual training in the school curriculum claim our close attention. For manual training in general schools the course laid down in the hand-book of Drs. Thomson and Alexander (College of Science, Poona) might be followed with great advantage.

#### (B.) DEVELOPMENT OF EXISTING INDIGENOUS INDUSTRIES.

In the absence of the long asked for industrial survey the only way for carrying out this object is to employ such agencies as our people possess, for collecting information from the different parts of the country regarding the main industries (besides agriculture) which give employment to any considerable body of persons. It is necessary to know what articles are prepared or manufactured, their quality, the approximate number of people employed thereon, the present state of the industries and their capability of improvement and expansion. If such information is obtained from the different Districts, I and the assistant secretary Mr. Chintamani will work in collating it and issue half-yearly or yearly directories based thereon. I beg you will kindly give all the information you can in regard to these matters and request such of your friends and acquaintances as are qualified to help the object of the Conference, to give us the benefit of their knowledge and experience. There are several industries which will be in a far more thriving condition than now if their products are consumed in larger quantities. So far as the restricted consumption of Indian articles retards the development of an industry the information collected is calculated to further such development.

#### (C.) ORGANISATION OF CAPITAL.

The third matter which deserves immediate consideration is what steps should be taken for raising the capital which is required for the creation of new industries and the improvement and development of old ones. So far as individual initiative and local organisations are supplying this want no action is called for just now from the Provincial Committees of the Conference. But there are important industries like the Mining industry for example, in which Indian capitalists have hardly ventured to put forth any efforts, but which have assumed or are assuming an importance which makes it incumbent upon us to take serious counsel and to devise ways and means to obtain a due share for our people in these valuable industries. To take the instance of the Mining industry, it is

not to be expected that Government will permit the mineral resources of India to be undeveloped, because our people have not taken care to equip themselves with the requisite knowledge and experience, and cannot raise the necessary funds either through lack of means or want of enterprise. Foreign companies, possessing all these requisites, have already taken the field, and if we do not stir ourselves betimes we shall see the Mining industry of the country passing into the hands of the foreign capitalists. The amount of capital required for this purpose will have to be very large; and this can be raised only if an united effort is made by the leading people of all the provinces. A Central Association in which such persons are combined and evince their practical interest by taking shares, will generate confidence and attract the help of the monied classes and the co-operation, according to their means, of the middle classes. Such an association will further have the advantage of possessing an influence which will further the grant of concessions by Government, and it will enjoy a credit which would enable it to obtain loans on easy terms either in this country or from abroad whenever any occasion arises for the same. I beg your Committee will discuss this matter with the leading men in your province and discover whether the suggestion made meets with their approbation and support.

I do not here make any reference to the textile industry, because I consider that Indian capital has already commenced to flow in that direction and further development may be left to the operation of natural causes. I regard the Mining industry as deserving of immediate attention and I therefore give prominence to it.

I am, Dear Sir, yours faithfully,

R. N. MUDHOLKAR,

General Secretary.

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## APPENDIX IV.

OFFICE OF THE GENERAL SECRETARY.

CIRCULAR LETTER No. II OF 1906.

*Amraoti, 3rd August, 1906.*

To

DEAR SIR,—In continuation of the enquiries made and information requested in my printed Circular of January last issued to the Members of the Industrial Provincial Committees and printed in several papers for general information, I send herewith a set of questions framed for the purpose of collecting the information which it is essential that the Industrial Conference should have to deal in a methodical, satisfactory and effective manner with the work with which it has charged itself. I trust that you will be so good as to give early attention to this matter and send your reply at as early a date as possible, so that the information so collected might be compiled, classified and assorted before the beginning of October next. If the information sought for is received within the period mentioned it is proposed to issue the classified compilation to the several Provincial Committees in time to enable the members to make specific proposals and recommendations based on it.

Yours faithfully,

R. N. MUDHOLKAR,

General Secretary,

Indian Industrial Conference.

## QUESTIONS TO BE ANSWERED.

## A.—AGRICULTURE.

1. What is the condition of the agricultural industry in your district ?
2. Has the whole or the greater portion of the culturable area been brought under cultivation ?
3. What is the general quality of the soil ?

4. What is the general condition of the land-owning and cultivating classes ?

5. To what extent are the lands held on a proprietary tenure by the cultivators themselves, to what extent by privileged tenants, and to what extent by mere tenants at will ?

6. What steps are being taken in your district for the improvement of agriculture by—

(a) Supply of cheap capital ;

(b) Extension of scientific and practical instruction ;

(c) Employment of improved appliances ;

(d) Resort to recuperative processes like manure, etc.

7. To what extent has advantage been taken of the village co-operative credit system, and what amelioration has it effected in the condition of the peasantry ?

#### B.—MANUFACTURING INDUSTRIES.

8. Name the existing manufacturing industries in the different towns and villages of your district under the following heads :—

(1) Textile fabrics—Cotton, Wool, Silk, and Jute.

(2) Vegetable and animal products.

(3) Leather, horn and paper.

(4) Pottery, porcelain and glass.

(5) Metals.

(6) Chemical industries.

(7) Furniture and decorations.

(8) Materials used in construction.

9. What is their present condition ?

10. What was their condition in the *past* ?

11. What is the approximate number of people employed in and dependent on them severally ?

12. What is the approximate amount of capital employed in them severally ?

13. State how far they have been affected by competition with imported articles.

14. What are the markets for the products of these industries, *i.e.*, do they supply only a local demand, or are they sent to other markets in noticeable quantities ?

15. What facilities exist to increase their supply if an increased demand arose ?

16. How far, in your opinion, are the existing industries capable of expansion,—

(a) by making advances to the artisans at low rates of interest ;

- (b) by the improvement of the appliances in use ;
- (c) by the imparting of special instruction, and
- (d) by the employment of power machinery ?

17. What industries existed in your district formerly but have since decayed ?
18. What are the causes of their decay ?
19. Is it practicable to revive any of them profitably ?
20. If so, suggest measures to bring about their revival.

#### C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. Name the mineral and other natural products of your district which are or can be manufactured into finished articles of consumption and use.
22. Which of these are manufactured in your district ?
23. Which, if any, of these are sent to other parts of the country for manufacture ?
24. Which of them are exported to foreign countries in their raw state, and re-imported as finished articles ?

#### D—CAPITAL.

25. What banking facilities are there for the support of the industries in your district ?
26. Have any urban industrial banks been started in any town of your district under the provisions of the Co-operative Credit Societies Act ?
27. If so, give particulars in regard to their organization, the capital employed, the conditions of lending and borrowing, etc.

#### E.—TECHNICAL EDUCATION.

28. What facilities are there for training young men in the various industries that exists in your district ?
29. If there are any special schools for the purpose, give particulars in regard to their curricula.
30. Is instruction given both in the practice of and the principles which underlie an industry, or is it theoretical merely or merely empirical ?
31. What success has attended these schools ?
32. Are industrial and commercial classes attached to any of the schools in your district ?
33. If so, give full particulars in regard to them.
34. Have any students been sent abroad from your district to acquire technical, industrial or commercial education.
35. What are their qualifications and were they tested ?



36. Who, or what agency, has sent them, and under what conditions, if any?

37. In what countries are they being trained?

38. What arrangements are made to utilise their special technical knowledge by the supply of capital or otherwise, to start or develop the industries in which they receive special training?

39. Are there at present in your district any persons who have received special training in any industry? If so, what are the industries in which they have been trained?

40. How are they employed at present?

41. If their knowledge is not being utilised, what steps can be, or are proposed to be taken, to utilize it?

F.—INDUSTRIAL ASSOCIATIONS.

42. Is there any industrial association in your district? If so, give particulars in regard to its objects, rules, funds, past work and present activity?

## APPENDIX V.

### Synopsis of the Statements received by by the General Secretary in reply to his Circular No. II.

#### (1) THE HON'BLE BABU JOGENDRA CHANDRA GHOSE, *Calcutta.*

We are publishing a book on the existing industries of which a copy shall be sent to you when ready. As regards technical schools, there are some District Technical Schools which are all but useless. The Government has promised to start a great technical school in co-operation with the Association for the Advancement of Scientific and Industrial Education of Indians. A scheme, framed by the Association has already been adopted by the Government. We hope to get a Technical College fully equipped and maintained at a cost of a lakh of rupees a year by the Government to be established in Bengal in the course of next year as a Model College for all India.

#### (2) KRISHNA RAO DESHMUKH, Esq., *Wardha (C. P.)*

1. (c) Sugar cane cultivation has disappeared almost, there being about 65 acres of land under Sugar cane cultivation in the District.
6. (a) Nothing is yet done for supply of cheap capital.
- (b) Extension of Scientific and Practical Instruction:—
  - (1) There is an Agricultural and Industrial Association at Wardha, and there are branch Associations at each Tahsil.
  - (2) There is an Agricultural Library containing several books on scientific agriculture and books are issued to the members, who are required to read them. An Agricultural Gazette is published every month at Nagpur to which some Malgusars and tenants of this district subscribe.
  - (3) There are some private experimental farms on a small scale.
  - (4) Exhibition of Agricultural products, specially of different varieties of cotton and of agricultural cattle and of improvements was held at Kotteshwar and Wardha during the last year. A son of a Malgusar is sent this year to the Malgusar Agricultural School at Nagpur.

(c) Swedish ploughs, fodder cutting machines are produced by some well-to-do classes, but for want of trained persons for repairs of these machines, they are of very little use.

(d) In Arvi Tahsil the Malgusars have got good stock of cows and cattle, and lands are richly manured. But in the Wardha and Hinganghat Tahsils, the people have not realised the importance of manure.

One Malgusar purchased Kainate (artificial manure). But its utility is not yet determined for the cotton crops.

7. No Co-operative Credit Society has been started in this district.

#### D.—CAPITAL.

No facilities for the support of industries. No Bank has been started.

#### E.—TECHNICAL EDUCATION.

One student belonging to this district has been sent abroad for receiving technical education. He is a Teli by caste. He is the first candidate from these Provinces who has been awarded a State Technical Scholarship. He left India six months ago to study Mining at the School of Mines attached to the Birmingham University. He studied up to the Entrance and then worked in the Warora Colliery.

(f) We have got one Industrial and Agricultural Association consisting of official and non-official members. The Deputy Commissioner is the *ex-officio* President. In order to have an Industrial Association fully and completely non-official in its character, we have started a district Industrial Association which is working not in opposition but as complementary to the Agricultural Association.

(3) R P. KARANDIKAR, Esq., Satara.

#### A.—AGRICULTURE.

6. (a) None.

(b) No scientific instruction is given; but it is intended to open a Model Farm soon in the District where scientific and practical instruction will be given.

(c) Some improved appliances are tried at Vita and Karad.

7. The District has been excluded from the Government scheme, but steps are being discussed by the people with a view to form Co-operative Credit Societies for the District.

#### B.—MANUFACTURING INDUSTRIES.

8. (1) Cotton:—Handloom industry in Satara and Watlookas.

*Wool*.—Blankets in the eastern parts of the District in Satara.

*Silk*.—Dyeing, in Satara and Wai.

*Jute*.—Nil.

(2) *Vegetable products*.—Greatly exported from Wai, Lenit, Mahableswar and Satara.

*Animal products*.—Eggs exported in large quantities from all big towns and villages in the district.

(2) *Leather Industry* at Satara. Boots, shoes, bags, cases, etc., are made.

(4) *Pottery*—at Satara.

(5) Brass and copper pots. are made at Satara, brass lamps at Shirala. An oil engine press has lately been opened in Satara to produce sheets of copper and brass out of the old utensils.

(6) *Match factory* at Dham. Soap at Satara. Extraction of tinctures from local herbs.

7. Furniture is made at Satara.

9. The industries are not in a flourishing condition. Some are lingering and some are in an embryonic state.

(4) SURENDRANATH TAGORE, Esq., *Calcutta*,

(Information supplied relative to his estate near Kushtea.)

A. 6. We have started an Agriculturists' Loan Bank,

(7) The Village Co-operative Credit System is not in vogue here.

B. 8. Cotton textile fabrics are manufactured in Kushtea and in some villages in the estate and these are sent to different markets in the province and are used as shirting and coating and reported to be of good quality. This industry is now in a tolerably flourishing condition and supports at least three thousand families in the Perganah.

16—20. Improved fly-shuttle looms have been introduced in some places, but this industry is capable of much expansion by the introduction of better appliances, imparting of special instruction and erection of small factories with power machinery.

C. Sugarcane and Jute are the chief natural products of the Perganah and these can be manufactured into finished articles of consumption and use. If a sugar factory and another of jute be established, they may prove profitable. Jute is exported in large quantity in raw state and re-imported as gunny bags, etc.

*E.* A Weaving School has been started for training young men and the institution has proved successful as it has trained many young men who have taken to weaving as their livelihood, and some of them have been taken as teachers in many weaving schools lately established in different parts of the province.

(5) AKSHOY KUMAR CHATTERJEE, Esq., Calcutta.

The information given below relates to the Districts of Khulna and Burdwan.

*A.* 6. Absolutely nothing is being done for the improvement of Agriculture. Supply of cheap capital is very necessary. Scientific and practical instruction are not required, as the knowledge which the tenants already possess is at present sufficient for their work. The ryots are too poor to pay for costly manures. All they use is scavengings from their kitchens and cowsheds. Some who can afford to pay for mustard cakes use them.

*B.* 8. Coarse cotton, tassar, and silk cloths; lac, *amchoor* from green and *amsatta* from ripe mangoes, mustard oil, indigo; earthen vessels; brass, copper and *Kansa* utensils, rough iron instruments, knives, padlocks, and bricks are made in Burdwan district.

And in Khulna district are made earthen vessels, *gnr*, jaggery and treacles, mustard oil, and coarse cotton cloths.

9, 13, 15. Excepting improved knives and padlocks all other industries have declined greatly and miserably, mostly on account of competition with imported articles which are generally of finer finish and nicer appearance with cheaper prices. Things made in this country are coarse, rough, uncouth.

16. The existing industries are capable of expansion by placing them in the hands of intelligent, business-like capitalists, using improved appliances, by special instruction and by employing power machinery.

17—20. Indigo and sugar industries existed formerly in Burdwan, and sugar and salt in Khulna, but they have gone under owing to foreign competition. Sugar can be revived, as also rearing of silk-worms and manufacture of silk. This can only be done by educated and intelligent land-holders living in the mofussil and by the work being carried on in accordance with modern scientific principles.

*D.* There are no banking facilities in either district.

*E.* There is one technical school at Burdwan, but it is practically useless as none of the above-mentioned industries are taught in it.

(6) LALA SUKHBIR SINHA, *Musaffarnagar*

A. 6. Virtually no steps are taken to improve the condition of the agricultural industry.

B. Woollen blankets of different colours and patterns are made in large quantities and exported to other districts. They are very durable and much liked by the people. And large purchases of the same are made by the Military Department of the Government.

Sesamum wood is much in use in the construction of buildings.

E. This year the District Board has sent one student to study in the Roorkee Engineering College.

(7) N. K. RAMSWAMI IYAH, Esq., *Tanjore*.

A. Co-operative Credit Societies have been formed at Melattur, Mannargudi and Needamangalam.

B. *Cotton fabrics* are woven at about a dozen places in the district; silk fabrics at Kumbakonam and two other places; all kinds of metal work are turned out at Kumbakonam and Mannargudi. Panganadu is noted for its brass work, Pisana-thur and Nachiarkovil for bell-metal work, and Negapatam for its steel trunks; and there are besides, Tanjore pith-work and metal carving.

The weaving industry has decayed most. It was most flourishing in the beginning of the nineteenth century and even down to the end of the first quarter thereof. The number of persons now employed in that industry may be said to be roughly only one-fourth of their former number.

The cotton fabrics of Tanjore district, besides supplying a local demand, find a market in other Tamil districts, Rangoon and the Straits Settlements. And if sufficient encouragement be forthcoming the number of weavers now pursuing their ancestral vocation can easily be quadrupled.

D. A co-operative urban bank has been started at Tanjore under the name of Nicholson Town Bank.

E. There is a weaving school at Ayyampet. And Weaving and Commercial classes are attached to the Kalyanasundaram High School of Tanjore.

(8) T. KOTHANDARAMA IYENGAR, Esq., *Tanjore*.

The Tanjore National Co-operative Emporium is the only Industrial association at present existing in the Tanjore district. It was started on the 15th November 1905,

as a direct outcome of the Swadeshi movement. Its objects are :—(1) to advertise and popularise all Indian manufactures by procuring the same and selling them to the members; (2) to induce the members to use only Indian goods as far as possible, and thus create a larger demand for them than at present exists; (3) to start or revive indigenous industries. The paid-up capital of the Emporium is Rs. 10,000 in shares of Rs. 10 each. Shares are not allowed to be withdrawn but they are transferable. The Emporium will be shortly registered as a limited liability company. The business of the Emporium is for the present limited to the storing and selling to the members of country-made articles, including in this term only those articles which are native Indian. So soon as funds permit it is intended to open a weaving factory fitted with improved handlooms.

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(9) K. S. NARAIN RAO, Esq., *Anakapalle (Vizagapatam District)*.

B. 8. The principal centres of weaving industry in the district are Pondur, Rajam, Anakapalle and Jammi. There is a Jute factory at Chittiralasa owned by Arbuthnots Industrials, Limited. There are tanneries at Vizianagram, where Mahomedans work according to the old methods. Horn, sandalwood and ivory work of high class is turned out at Vizagapatam. There are oil mills at Vizianagram and Pimplipatam. Goglets of Kaotin are made at Vizianagram, toys at Nakkapilli and Srungavarapukota, and brick and tile works at Anakapalle.

The salwood of Jeypore and blackwood of Agisa are very popular as building materials. A weaving company has been formed at Rajam, and Pencil Factories are to be opened at Bimlipatam and Anakapalle.

14. The Chittivalasa factory supplies gunny bags to other provinces of India as well as carries on an export trade in them, while Orissa and Rangoon are markets for cloth made in this district.

15. There is any amount of the finest raw material for expansion of the jute manufacturing business.

16. If steps be taken to improve the condition of the weaving industry by supply of improved ready-made warps to the weavers, by the imparting to them of special instruction suited to their calling, etc., the large number of weavers who have become agricultural labourers on account of difficulty in finding a market for the products of their industry, will revert to their ancient calling.

17-20. Lacquered and turned toys industry of Nakkapilli, which is on the grand trunk road, is steadily decaying. The people now use the railway and do not go by the trunk road, and there is consequently an increasingly less demand for them. The industry can be resuscitated by bringing down those workmen to a central place, where they may be employed on the salary system. At one time the Nakkapilli toys were more popular than Benares or Nasik toys, and if the industry be revived they may again find an extensive market. The Nakkapilli workmen also make shirt buttons and studs which are cheap and beautiful.

C. 21. *Manganese, plumbago, copper, iron, sappharine and kaoline* are among the mineral and other natural products of the district. Kaoline may be used as *porcelain*. Manganese and iron will give *Manganese steel* for which there is a steadily growing demand. There is scope for *copper manufacture* and the subsidiary industries. *Crucibles, lubricants and pencils* can be made of plumbago. There are manganese mines at Garividi, Kodur and Garbham which are worked by the Vizianagram Mining Co., Ltd. A Syndicate called the Eastern Ghats Syndicate is formed in Germany for prospecting for copper, iron and gold in the Kumpam estate, on which a Bengali mining expert Mr. S. C. Rudra, reported favourably some years since.

There is any amount of lac in *lakhamalua* over a forest area of several miles, and this can be turned into *sealing wax, varnishes* etc.

*Resin and varnishes* are made from salwood.

*Palm jaggery* can be made out of palm juice as there is a large number of palm trees in the district.

*Oil Seeds*—til seed, castor seed, niger seed,—are grown in considerable quantities, and there is therefore a good field for oil mills.

23. Ralli Brothers purchase large quantities of oil seeds for export, Jaggery is purchased at Anakapalli for Messrs Parry & Co.'s Sugar Cane Factory at Samalkot in the Godavari district. The approximate annual crop is 50,000 candies. About ten lakhs rupees worth of raw jute is annually exported from the district.

24. Jaggery is also exported to the United Kingdom. So is til seed. So are other raw materials.

D. There are no special banking facilities for financing the trade and industries of this district.

E. 28-31. There are no facilities for training young men in the various industries of the district.



32. Carpentry classes are attached to Mrs A.-V. N.'s College at Vizagapatam. Boys join those classes, if with no other motive, at least as they serve as gymnastic avoiding classes. The artisans who have learnt carpentry in these classes have turned out skilled workmen.

34 and 40. Two persons were sent from this district to learn soap-making and peppermint-making under Dr. S. R. Gokhale at Satara. They have come back, and one is practising as a second-grade pleader and the other is serving as a clerk.

42. There is no Industrial Association in the district,

(10) W. V. CHANDEKAR Esq. *Malkapur (Berar).*

#### A.—AGRICULTURE.

1. The condition of the agricultural industry in the Malkapur Taluq is very flourishing and thriving. The land along the "Purna" to the north of the railway is very rich and fertile, so is the soil in other tracts of the Taluq. The land of Nimgaon and Nandoora is noted for its superior quality, not easily affected by too much or too little rain.

2. The whole portion of the culturable area has been brought under cultivation. Some 50 acres of land abandoned at the last Famine was lying uncultivated, but that too has been taken up at high price.

3. The general quality of the soil is black. It can stand both rain and drought for a considerable length of time.

4. The land-owning and cultivating classes may be divided as under:—

- (1) Kunabies and Malies.
- (2) Mahamedans and Rajputs.
- (3) Pandharpeshes and Marwaries.

The bulk of the Kunabies and Malies are both owners as well as cultivators of the lands. Although some of them have grown so rich that they employ labourers to carry on their cultivation, yet the bulk of the cultivators work themselves. Generally speaking the condition of these classes is good.

Among the Kunabies is a class called "Pajanes." They are industrious and frugal, and hence free from indebtedness. If the other Kunabies would take a leaf from the life of these men their condition too is likely to improve.

Agricultural labour has of late become very dear. A common cooly earns four annas a day in the ordinary times and double of that in the busy season. It is feared that if this state of things continues the lands will cease to be profitable to non-cultivating land-owners.

The condition of the Rajput and Mahamedan cultivating classes is also very fair.

The Pandharpeshes and Marwaries do not earn that share of agricultural profits which they would if they carried on the agricultural operations themselves. Nearly half the land is in possession of these people and it is a question how long they will be able to retain it under the present circumstances and prospects that the labour is likely to become dearer.

5. The entire land in the Taluq is held on proprietary tenure. Nearly more than one-third of the land is held by the cultivators on a proprietary tenure. The rest is let out by the proprietors to the tenants at will.

(a.)

6. No steps are taken in the Taluq for the improvement of agriculture by supply of cheap capital. The agriculturists resort to the "Local Saokars" for a loan when they want it.

(b.)

Since last year an attempt has been made to give scientific and practical instructions, but it is still in a very crude form.

(c.)

The Department of Land Records and Agriculture has been sending seeds, and improved machinery, for being experimented upon. The working of the English and American ploughs has been exhibited in the Taluq and their utility has been demonstrated but apparently not much impression seems to have been made on the agricultural classes. There are some practical difficulties in the adoption of this machinery, the chief of which is that if anything goes wrong with the machine there is none who could repair it in the village, and unless this difficulty is met the free adoption of the improved machinery is beset with impracticable difficulty.

One or two big land-holders have, I understand, been using to an extent, the English ploughs. Their experience is that better work is turned out with, a saving of time and money. These implements are out of reach of small cultivators and are not likely to be profitable to them except on a system of hire. The winnowing machine has also been exhibited and its usefulness shown, but here again the agricultural people have not shown a desire for its adoption.

My own opinion is that the utilisation of this machine is likely to save much labour, and its adoption will be more popular if they could be supplied cheap and so contrived as

not to require repairs at least for the season. The kadaba culling machine has been exhibited and the economy which its use would produce impressed on the agricultural classes, but without much effect.

(d.)

The ordinary manures used are:—

Rubbish.

Rotten kadaba stalks.

Tur stalks.

Cotton stalks.

And cattle droppings.

In a few cases nightsoil also is used.

Chemical and mineral manures are unknown. Small leaflets on these subjects may be issued for instruction. Vishnusa had, I understand, used saltpetre (सोरा) as manure for cotton crop and he says it saved the crop from dying when there was a long drought and other plants suffered and died.

7. Co-operative Credit Societies have nowhere been established.

## B.—MANUFACTURING INDUSTRIES.

1. The industry of tanning leather was carried on at Nandoora until last year. The work turned out here was of a superior quality but the industry has stopped since the last 8 on 9 months. Its revival is a fit subject for the early attention of the Industrial Society.

Earthenware chatties made at Nandoora are reputed to keep water cool. In the hot weather there is a great demand for them and they are exported in large numbers to distant parts.

Nandoora is famous for its dyeing industry. The Rangaries there prepare Gulabies, Chaniadies, and Kasayas. The Rangaries in the villages close by it such as Kolabma, Vadali, Fege, also deal in this business.

Formerly the colours were made from Al (आल) but latterly this substance has disappeared and its place is taken by foreign colours sent ready made. The revival of native colours is also a subject which the Association may include among its practical activities. Khadies are prepared by Mahars in several villages.

At Bhuising, Nandoora and several villages, cheap Sadies (Bands) are prepared on hand looms. The coarse carpets at Jalgaon Jamod are famous. At Nandoora also some Dhangars prepare Tadhavas and Zulas for bullocks.

Bangles used to be prepared at Malkapur, but the industry had ceased to exist long since. There is material for its working and an impetus is needed for its revival.

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C.—MINERALS AND OTHER NATURAL PRODUCTS.

Nil.

D.—CAPITAL.

Nil.

E.—TECHNICAL EDUCATION.

Nil.

F.—INDUSTRIAL ASSOCIATIONS.

Nil.

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(11) DEWAN BHAḌUR K. KRISHNASWAMY  
RAO, C.I.E., *Madras.*

AGRICULTURE.

The soil of the District (Chingleput) in which I live, is comparatively poor, but the cultivators are very industrious and neglect no means of securing the fullest advantage possible under the existing conditions. All the culturable land has been brought under cultivation. Most of the cultivators are Ryotwari proprietors. Tenancy-at-will is very rare. Rural co-operative credit societies, recently established in this district (about 8 in number) are likely to supply cheap capital. It is not yet time to give a definite opinion on the results of their operations. As a class, cultivators are too poor and ignorant to use costly manures and adopt improved appliances. Owing to the operations of the Forest law, green manure is not available. Monsoons have become irregular. The agricultural instruction given in the Sydapet College during the last 30 years and in demonstration farms elsewhere, has proved a complete failure. The local Government is taking steps to open an Agricultural College and Research Institute in Coimbatore. There has been no perceptible improvement either in agriculture or in the condition of the cultivators. All the western methods are very expensive and beyond the capacity of our agriculturists. A large number of agricultural associations are devoting their attention to the improvement of agriculture. The local Government is rendering to them all possible help. But the great problem of "how to improve Indian agriculture" remains as unsolved as it was 50 years ago.

## MANUFACTURING INDUSTRIES.

The local manufacturing industries consist of cotton, silk, leather, pottery, metallic vessels, furniture, decorations and house-construction materials. They are all in a very poor condition and unable to stand the ever-increasing competition of imported articles. They are barely sufficient to supply even the local demand. More than 25 per cent. of the population live on them. They are as a class, uneducated and averse to adopt new methods. They show no desire for instruction. Even those that have received some instruction in the Schools of Arts, stick to the old processes and appliances. The manufacturers, more or less, are debtors of the local capitalists who hate all innovations lest their business may suffer. The formation of Urban Banks, under the Co-operative Credit Societies' Act, may relieve the manufacturers of the necessity of seeking the aid of the local capitalists and lead to some improvement in their condition. The introduction of power-machinery may, I fear, deprive a large number of existing manufacturers of their already scanty means of livelihood; but will increase the quantity of manufactures so as to make us independent of imported articles. In introducing power-machinery, care should be taken to do as little harm as possible to those who are living on local industries.

## MINERALS.

There are no minerals in this district.

## CAPITAL.

Native Bankers charge high rate of interest. European Bankers avoid dealings in small sums. The only way to supply the industrial classes with cheap capital, is the establishment of urban banks. There is in the town of Conjeeveram, one Urban Bank started under the Act. A majority of its members are weavers. It is worked on the "unlimited liability" principle. It has no capital of its own, but borrows money from the Madras Central Urban Bank formed under the Act, at rates of interest varying from 6 to 7½ per cent per annum, and lends to its members at 9 per cent. per annum, partly in thread and partly in money. The number of weavers that have become members, cannot be said to be even 1/400th part of the weaving male population of the town. As the bank has not been in existence for more than one year, it is too early to pronounce any definite opinion upon its results.

## TECHNICAL EDUCATION.

There is a School of Arts in the City of Madras wherein fine arts, aluminium manufactures, carpentry, chrome tanning and weaving with the aid of fly-shuttle loom are taught. It is

not a regular school of technology. It has, however, produced good results in the aluminium manufactures and chrome-tanning, which may now be counted among the local industries of Madras. Mechanical Engineering is taught in the Local Engineering College. But the results are exceedingly poor. We have not one mechanical engineer, the product of the local college, who had shown any degree of skill in mechanical engineering. Industrial and Commercial classes have been very recently attached to the Patchayapah's College. The world has yet to know what they are capable of doing. No student has been sent from Madras or Chingleput district to foreign countries for technical education. I hear that a few students have gone to Japan from the Telugu districts of the Presidency. I have no information regarding their course of studies or the agencies under whose auspices they are. A student who has gone to Japan from Bellary, to study glass manufacture, is promised some pecuniary help by the National Fund and the Industrial Association of Madras. There is none now in this Presidency, who has received technical education in foreign countries. The question of the employment of trained students is not likely to arise for 3 or 4 years to come. In the paper I submitted to the last Industrial Conference held in Benares, I have expressed at length my views regarding the establishment of a well-equipped and high-class college of Technology for the whole of India, without which all that is done either by individuals or by Government, in the way of technical education, must prove exceedingly poor and barren of good and substantial results. The approaching conference should, in my opinion, take special steps to secure the establishment of such a College.

#### INDUSTRIAL ASSOCIATIONS.

The National Fund and the Industrial Association of Madras, is the only industrial association I know of in this Presidency. Its object is to encourage technical education of Indian students in and out of India and to improve local industries on modern lines. It was started only 7 months ago. It has a funded capital of Rs. 6,000. The house-to-house collections on the day of Devali, donations given by patriotic gentlemen on festival occasions and the subscriptions of the members constitute the national fund. The association has been devoting its special attention to the improvement of hand looms in this Presidency.

#### GENERAL REMARKS.

In the City of Madras and in the adjoining Tamil districts, the idea of industrial and commercial regeneration of India and the spirit of Swadasisim have not taken hold of the minds of the capitalists, rich merchants and traders, and other

people in receipt of large incomes. They are content with being the media for the sale of imported articles, and for the export of raw materials. The formation of companies on joint stock principle even for business involving no great risks, is beset with formidable difficulties. The only hopeful sign is that there is now a greater number of earnest and educated men working hard in all directions to turn the public mind towards industrial and commercial development of India.

(12) GANESH NAGESH SAHASRABUDDHI, Esq.,

*Ellichpur, Berar.*

A.—AGRICULTURE.

Replies to questions:—

1. Ellichpur was a District in previous years. But when Berar was joined with the Central Provinces the district was reduced to a Taluq, and hence the information recorded below may be classed as that of three taluqs of Ellichpur, Daryapur, and Melghat Hills.

The condition of the Agricultural Industry in the three taluqs of Daryapur, Ellichpur, and Melghat, is just similar to that prevailing in the Province of Berar. The old method of agricultural operations is being followed without any improvement being made as regards agricultural tools and implements. Cotton is sown generally in the soil, which has been found to be a money paying crop, jowari being sown in a very small area.

Rabi crops are sown in greater portion of Daryapur Taluq, such as linseed, wheat, gram, etc.

In Melghat the aboriginal tribes of Gonds and Korkus, cultivate lands and produce jowari, gram, cotton, and their staple food articles, such as kutki, bhodli, kodo, &c. &c.

On the whole the condition of the Agricultural Industry in the taluqs is good, and the cultivators have kept up their old standard of agricultural operations.

2. A greater portion of the culturable area has been brought under cultivation in taluqs of Ellichpur and Daryapur, where there are some waste lands specially reserved by Government for grazing purposes. In Melghat taluq, there is still greater portion of waste land available for cultivation but nobody hazards to go and cultivate the lands owing to unfavourable weather and bad drinking water.

3. The general quality of soil in Ellichpur and Daryapur taluqs is good, Daryapur lands being superior black soil and very fruitful in agricultural out-turns of best quality. The

soil in some cases, in Ellichpur taluq, is inferior to Daryapur, and the soil requires but little rain for the production of the out-turn.

In Melghat although the lands are hilly, the soil if well ploughed is little red and good land for sowing potatoes, cotton, jowari, and grams, &c.

4. The condition of land-owning class is better than that of cultivating classes. Cultivating classes lease lands from others and if rains are sufficient and moderate these people do save something sufficient to maintain their family and children, but in cases of irregular and unpunctual rains, crops are destroyed or not produced, and poor people are obliged to pay Government Revenue and lose money, saving scarcely anything to support their wives and children. The condition of cultivating class is therefore generally not good. A scarcity of rain in a single year, pushes them on to relief works, that are kindly opened by Government at the outbreak of famines.

5. Less than one-third of the land is actually held by the so-called real cultivator, the remaining two-thirds being held by persons other than cultivators and cultivated by tenants at will. There are few privileged tenants, taking into consideration the area under cultivation. There is a village of Shahapur in Ellichpur Taluq in which privileged tenancy still exists. The above remarks apply only to Ellichpur and Daryapur Taluqs. As for Melghat, the land is held by Korkus and others on a yearly tenure from Government. The Government is thinking of surveying lands in Melghat and introducing a ryotwari system now obtained in other parts of Berars.

6. No steps are taken in my taluqs for the improvement of agriculture. There are no associations formed here to supply cheap capital nor are there any institutions or schools established to impart scientific and practical instructions in the matter. No system of employing improved appliances is in vogue and nor any special shops opened in taluqs for the sale of manures.

The money-lenders, especially Marwadi class, supply money to poor cultivators when they want money for cultivating purposes or family purposes. But this money is supplied not at a moderate rate of interest but at serious and heavy rates, which are generally charged by money-lending Marwadis. There ought to be some sort of Association established in Districts, Taluqs, consisting of educated and philanthropic gentlemen, well versed in agriculture, who should oftentimes go round the villages and impart education to Kunbis and supply them with scientific and practical instruments and improved apparatus necessary for agricultural operations.



The people have lately commenced to appreciate the benefits of night-soil and rubbish manure, which is nowadays amply used by cultivators. The Ellichpur Civil Station Municipality, of which I have the honor to be a vice-chairman, realised Rs. 2,500 in the auction sale of night-soil and rubbish lying within Municipal Limits. There is keen competition between people at the time of sales with a result that the committee get the enviable amount of Rs. 2,500. I myself have got some land which I cultivate personally and I am satisfied that the night-soil and rubbish manures are a great source of income from lands. But the question is, how it is practicable to supply the manure to all villages. In villages, I am told, the people find it very difficult (in fact they do not get at all) to secure manure for their lands. The lands quite near towns and villages, which are called "Akhar," are naturally provided with manure and villagers generally go to answer calls of nature in their lands. But no manure can be supplied to distant lands, which for want of manure are not very productive soils. I have also tried English manures sold by Mr. Richard Fett, of Bombay, and I found that these English manures are very costly and if the demand increases the proprietors will increase the prices to such an extent that it will be practically impossible for poor people of the country to purchase these manures. To remedy this evil I propose that shops of manure ought to be opened in each village and town, where manure can be sold at a very cheap and moderate rate, within the easy reach of the poor cultivators. The people will then surely purchase these manures and supply them to their lands, which must produce a satisfactory out-turn at the end of the year. I hope, therefore, that the attention of the Indian Industrial Association will be drawn to the subject and some measures will be adopted to improve the deplorable condition of the agricultural classes.

7. No advantage is taken of the village co-operative credit system in these Taluqs, as no societies having that object in view have been established. The system is being tried in the North-West Provinces and Punjab, and I am told success has been attained to a certain extent. The system is worth being tried here too, and I hope some educated gentlemen of the Taluqs will take the matter in their hands and do something to ameliorate the condition of the peasantry.

#### B.—MANUFACTURING INDUSTRIES.

8. There are no manufacturing industries, so to say, in my Taluqs under the heads of:—

(1) Textile fabrics; (2) Vegetable and animal products; (3) Leather, Horn and Paper; (4) Pottery, Porcelain and Glass; (5) Metals; (6) Chemical industries; (7) Furniture and decoration; (8) Materials used in construction.

But there are four Ginning factories and two cotton bale pressing factories at Ellichpur, and some at Anjangaon, Daryapur, Wanosa, &c., &c.

Under "Chemical Industries" I am glad to report a factory called "Match Factory" established at Paratwada, Ellichpur, by the Berar Match Manufacturing Company Limited, Ellichpur, in the month of April last. The company has collected a capital of one lakh of rupees by shares of Rs. 500 each and the business of the company has just commenced and is going on all right.

Under the head "glass," glass bangles are manufactured at Brahmanwada on an old style. The industry is in a primitive state. These bangles were exhibited in Amraoti Exhibition held in the month of April 1906.

Ellichpur City is inhabited by hundreds of weavers who manufacture Khaddes, Sushis, Rumals, Carpets, of various sorts, on hand looms of old models. Recently an energetic and rich weaver named Mr. Kashinath Raoji, owner of the firm of Purushottam Dewaji, has introduced hand looms of improved style with new fly shuttle attached to them, and the work of weaving dhotees will soon commence.

Anjangaon also produces lugdees and khuns, generally used by woman and men of the Brahman and Parbhus, and Kunbee communities.

If new models of looms and flyshuttle are introduced in Ellichpur and Anjangaon, the state of the weaver class will be much improved. I am awaiting with great interest the result of the introduction of new hand looms and flyshuttles by Mr. Kashinath Raoji mentioned above.

9. The Match Factory is recently established and is at present in a good condition.

10. As the Factory is recently established, I cannot say anything of the past.

11. About two hundred people are employed in the Match Factory, Ellichpur.

12. The amount of capital is one lakh of rupees, to be increased if necessary.

13. The matches produced in the factory are better in the opinion of the public, but the company has to compete with matches of Sweden, Norway, and Japan, and to try for matches in the markets at a cheaper rate. Competition with foreign articles is a great point for consideration of the promoters of the company, and help from people is necessary in this direction. Liking for swadeshi articles ought to be developed amongst people. I have observed that there is more talk of "swadeshi" than action in that direction.

14. As the factory is a new one, it supplies local market only at present, though the Director has despatched matches in Amraoti market, and intends to send them to Poona, Satara, Wai, and Sholapur, where there seems to be a great demand for the matches of Ellichpur.

15. If the demand is increased it is impossible for one factory to satisfy all demands. Similar factories must be established at Amraoti and other important and suitable places all over the country. It is hoped that the leading gentlemen of Amraoti and Akola will do something in the matter.

16. In reply to questions I have already described the condition of Ellichpur and Anjangaon, and if some organised association is established to supply them capital at cheap rates of interest and if improved appliances are provided to them, the condition will certainly be improved. The imparting of special education to these weavers will be of much benefit, but I am not for power machinery, which will throw hundreds of weavers out of employment.

17. Silk weaving at Anjangaon.

Al (आल) colour manufacturing at Ellichpur.

18. Importation of cheap colours from foreign countries has killed the local industry of producing the colour.

Silk industry decayed on account of keen competition of foreign goods and the reckless living of the weaver.

19. I can't say about silk weaving but am sure that if right efforts are made the Al (आल) colour when prepared by improved methods will be profitable concern. In dyeing the superiority of Al colours to other foreign colours is admitted by dyers.

20. An experiment on a small scale might be made by some rich man who has got some expert at hand with a small capital.

#### C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. Tikhadi (Rosa oil).

Shellac.

Hides, Horns, Bones.

Cotton Seed.

22. None.

23. All the above named articles are exported to other countries.

24. Hides, Horns, Bones. Those come back in finished articles. From enquiry I have found out that one hide costing Rs. 3 here when it comes back finished, is sold at Rs. 14. Bones and horns are made into handles of knives, umbrellas, &c. and the waste is turned into manure.

#### D.—CAPITAL.

25. There are no banking facilities for the support of the industries in the Taluqs. Those who wish to start industries borrow money on their credit and do the work.

26. No urban industrial bank has been started in my Taluqs; under the provisions of the Co-operative Credit Societies Act.

27. Hence no particulars can be given required in this question.

#### E.—TECHNICAL EDUCATION.

28. There are no facilities for training young men in various industries in my Taluqs.

29. There are no special schools, no information could therefore be given.

30. There is one man here named Mr. Karmerker, and one more Mr. Phadke, who have got special training and experience in match manufacturing business and the proportion of sulphur and igniting composition. They are employed in Ellichpur Match Factory.

(13) DEWAN BAHADUR R. RAGOONATH RAO,

*Kumbakonam.*

1. The condition of the Agricultural Industry is unsatisfactory in this Presidency.

2. The greater portion of the culturable area is under cultivation.

3. All sorts of soil exist.

4. The land-owning and cultivating classes are in an unsatisfactory condition.

5. Mostly the land is held on a proprietary tenure by the cultivators.

6. Very few effective steps are being taken for the improvement of agriculture for want of capital ;

(a) There is no cheap capital.

(b) No scientific and practical instruction is given.

- (c) None by improved appliances, some beginning is now being made towards it.
- (a) Manure, etc. has been rendered too dear.
7. The village co-operative credit system is not known.
8. There are manufacturing industries in the District as under :
1. Textile Fabrics, cotton and silk.
  2. Vegetable and animal products, none.
  3. Leather, horn and paper ; very little, merely nominal.
  4. Porcelain and glass, none ; country pottery exists.
  5. Brass, copper, lead, bell-metal, silver, gold, iron, gilding are manufactured.
  6. No chemical industries except soda-water manufactures and dyeing cloths.
  7. Very little of furniture and decoration. Timber is extensively used for house-building.
  8. Ordinary bricks, tiles and lime are made.
  9. Their present condition is tolerably good.
  10. Owing to less demand, they were not so good in the past.
  11. A very small number as owners.
  12. Not much capital.
  13. Imported articles have supplanted almost all of them.
  14. Indian articles are consumed by local markets, very few articles are exported to foreign countries.
  15. Labourers are plenty. There is no other facility.
  16. Existing Industries are capable of expansion.
    - (a) By making advances to the artisans at low rate of interest, as the principal advance would be jeopardised with particular conditions.
    - (b) Yes.
    - (c) Yes.
    - (d) Yes.
  17. Weaving.
  18. The importation of cheaper cloth, want of Co-operative Societies and Banks.
  19. Yes.
  20. Cultivate raw products, such as cotton, oil seeds, etc. Don't export, spin cotton here, weave here. The same with regard to oil-seeds.
  21. Only mica is said to be found in some parts of this district.
  22. Pebbles are found here and they are worked into spectacles, &c. But the trade is not flourishing.

- 23. No exports.
- 24. No exports.
- 25. None.

26 and 27. Some have been of late: but there has not been sufficient time for noticing them. Their organisation is difficult.

28 to 41. The answers are negative.

42. A few small ones exist.

(14) RAO BAHADUR G. V. JOSHI, *Satara*.

BRIEF NOTE ON SATARA AND ITS INDUSTRIES.

*Satara* is a *district of the Bombay Division*. It lies at the Western limit of the Deccan upland between 16° 15' and 18° 10' N. Lat. and 73° 45' and 75° 0' E. Long. It has an area of 4,825 sq. m. and a population of 11,46,559 souls, are about 238 to the square mile. It is divided for administrative purposes into 11 Talookas and has 8 towns and 1,335 villages.

The district is a *district of considerable resources*. It was at one time a blessed tract of varied industry and plenty, but is now the home of a sinking and struggling population.

The *population* since 1872 shows a serious decline. The variations have been as per margin. Assuming the normal increase at 1 p.c. per annum, the *loss of population* in the zilla during the 30 years from 1872 to 1901, was about 2.34 lakhs or 23 p.c. Increasing poverty, famine, and plague have had their effect. There could be no sadder or more eloquent testimony to the trials and sufferings of the conquered period.

Census Years.	Population.
1872 ...	10,62,121
1881 ...	10,62,350
1891 ...	12,25,989
1901 ...	11,46,559
Population in 1872...	10,62,121
Normal increase at 1 p.c. per year ...	3.18
	13.80 lakhs.
By census of 1901.	11.46 "
Loss since 1872	2.34 lakhs, 23 p.c.

Leaving out Government service &c. the distribution of population according to occupation (by the census of 1901) is as under:—

	Nos.	P. C.	
A. Professions ...	12,704	1.1	The <i>population</i> is thus almost exclusively <i>agricultural</i> . The shipwreck of non-agricultural industries, is all but total. Some of the old traditional <i>crafts</i> still survive, but only as <i>subsidiary rural occupations</i> , subserving local wants.
B. Commerce, including transport ...	8,493	.8	
C. Industry	1,35,089	12	
D. Agriculture and pasture	8,32,842	73	
E. Labour ...	50,100	4.4	
Partially agricultural	17,941		

We have here no mills or factories and no important manufactures of any kind.

A few Census figures regarding *male* workers under these heads of occupation may be of interest.

<p>A. Money lenders ... 674 Pleaders ... 90 Doctors ... 178 Actors, &amp;c... 131 Petition Writers ... 286</p> <p>B. General merchants 1,464 Grocers, &amp;c... 2,675 Shop-keepers, &amp;c... 54 Cartowners... 391</p>	<p>C. Cotton weavers... 4,688 Wool weavers, &amp;c.... 1,183 Rope, sacking, net makers 3,552 Oil pressers 2,121 Brick and tile makers ... 1,123 Bangle makers... 813 Workers in Gold, &amp;c... 2,096</p>	<p>C. Workers in iron, &amp;c. 1,487 Workers in brass, &amp;c. ... 471 Shoe-makers... 3,680 Potters 2,182</p> <p>D. Cattle breeders and dealers. 7,052 Shepherds and Goatherds... 4,603 Farm servants 1,075 Field labourers 13,968 Land-holders, &amp;c. 2,41,857</p>
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#### A.—AGRICULTURE.

The Zilla is a fine agricultural tract. It has a *rich soil*, a *healthy tropical climate* and a *splendid irrigational supply*.

The soils are of these classes, red in the hills, black and light in the plains. The black soil, found in belts along the rivers, is most widely distributed in the Krishna valley, making it the richest garden and dry-crop land in the zilla. The red soils of the valleys yield most of the rice the district produces.

The *climate* is a tropical climate favourable to varied culture. The seasons are regular and uniform and extremes of heat and cold are unknown.

The *rainfall* is about 43 inches, and the number of rainy days varies from 70 to 50. There are the vicissitudes of the seasons, to which the Deccan is exposed. The zilla, however, has *irrigational facilities*, which if properly availed of, would make it one of the best watered tracts in the Presidency. On the West, it is flanked along the entire length by the Sahyadri range, and beyond them the Ratnagiri and Kolaba districts. The rainfall in the Konkan zillas ranges over 100 inches in normal years—the whole of which admits of being impounded on the Ghauts with a view to irrigating the lowlands on the East. The rivers are the Krishna, the Mana, the Nira and their feeders.

The *forests* cover an area of about 4-5 lakhs of acres and contains valuable timbers, sissu, teak, sandalwood, &c.

The Zilla is at present passing through a severe *phase of agricultural depression*.

The past 15 years have been trying years for the agriculturists, years of deficient or irregular rainfall. Since 1890-1 we have had *no good harvest*. Famine conditions still exist. The famine of 1899-1900 was the worst in the century. Last year, again, we had a virtual famine, the *cropped areas*, the *cropping*, the *agricultural stock*, all exhibit a *serious falling off*.

Net cropped Agricultural area in lakhs of acres.		1888-9	1901-2	Land Revenue.
1888-9	... 17-71	Cattle. 622,099	444,361 (a)	
1890-1	... 17-98	Horses		1888-9.
1891-2	... 17-21	and		Lakhs of Rs.
1892-3	... 16-89	Ponies. 15,018	8,010 (b)	Khalsa land ... 12-18
1893-4	... 16-42	Sheep. 371,490	271,019 (c)	Judi on alien-
1894-5	... 15-95	Carts. 22,098	21,802 (d)	ated land ... 3-20
1895-6	... 15-86	Goats. 81,899	110,469 (e)	15-38
1896-7	... 14-93	Ploughs 49,174	50,224 (f)	1903-4.
1897-8	... 15-29			Khalsa ... 15-62
1898-99	... 15-22			Judi or Quitrent
1899-1900	... 14-31	A serious decline in a, b, c, d; under e and f. The normal increases have almost disappeared.		on Inams ... 4-23
1900-1	... 14-62			19-85
1901-2	... 14-89			Net increase during the period
1902-3	... 14-92			Rs. 4,47,161
1903-4	... 14-85			or about 29 p. c.
1904-5	... 14-44			
1905-6	... 8-83			
of which 7-72 failed to mature		An increasing state		Occupied area.
The falling off in cropped areas below 1890-1 and 1904-5.—3-54 lakhs of culties. acres.		demand on the land on a declining agriculture—has added to the ryots' diffi-		1888-9 ... 21-16
				1904-5 ... 21-31
				an increase of 15 only

This year, the agricultural outlook is much better. A few more such seasons, and the present depression will have passed away.

The permanent features of the agricultural position as we find it in the zilla, may be thus sketched,

No. of Villages.	Area in acres in lakhs.	Occupied area in lakhs of men.	Area available for cultivation.
Khalsa ... 965	24-70	17-81	18,532 acres in Khalsa villages.
Alienated ... 393	6-21	3-54	735 alienated.
	1,358	30-91	21-32
			19,267 acres.

#### No. and Extent of holdings :—

	Govt.	Inam.	
1 Under and up to 5 acres	...12,674	5,816	The system of agriculture holding is mostly <i>petite culture</i> . Over 70 p.c. of the holdings average 2½ acres and under. The large estates are rare. There is much sub-letting in this zilla elsewhere.
2 Over 5 acres up to 25	...25,571	7,457	
3 " 25 " 100	...16,703	3,116	
4 " 100 " 500	... 1,875	603	
5 " 500 "	... 18	49	
Total	56,841	17,041	
Average area of a holding	Acres. b. 24-27	acres. 20	



Land holders and their tenants (census 1891)	
Land occupants not cultivating ...	30,615
"    "    cultivating ...	669,425
"    Lessees of villages ...	3
Tenants and sharers cultivating ...	93,453
Govt assessment.—	
Khalsa lands ... ..	Rs. 15.62 lakhs.
Indi or Quit rent on Inam ... ..	4.23 "

The prevailing system of tenure is *Ryotwar*. The mirasi tenure does not exist, except in here and there an alienated village.

Total Rs. 19.85 lakhs.

Average in Khalsa villages per holding	Rs. 27.7-8.
Inam... ..	25-0-0.

Per acre in Khalsa Re. 1-1-9.

*Cultivation*.—It is for the most part *subsistence farming*: It is largely *unmanured* and *exhausting* cultivation. *Fallowing* is *extensively practised* as a restorative method; even in a normal year as much as 627,281 acres area is left in fallow or 30 p.c. (e.g. in 1902-3) 21,19,495 total occupied area.

*Rotation* is understood but *not much practised*. Jawari, Bajri and pulses occupy the major part of the cropped area year after year.

*Exhaustion of the soil*—is fast proceeding.

The available margin for extension of village is not over 20,000 acres.

And yet there is little that may be called intensive cultivation—little agricultural improvement.

The *Crop yield*—according to all accounts, is year by year *falling away*.

The *cropping* in 1902-3, a fairly normal year, was as under:—

	lakhs of acres.	acres	
Jowari ... ..	5.11	12 lakhs	75 p.c.
Bajri ... ..	4.77		
Other cereals ... ..	2.12		
		Total up to 16.19 lakhs,	

*Superior cropping*—on a comparatively small area, less than 5 p.c.

Cotton ... ..	10,488 acres.
Sugar cane ... ..	11,178
Tobacco ... ..	8,386
Garden produce ... ..	9,741
Wheat... ..	38,425
	<hr/> 78-218

*Irrigation*.—The total irrigated area in 1902-3 was 93,811 acres, the net cropped area being 14,92,214 acres, or about 6.7 p.c.

The rest of the cropped area was wholly dependent on the rainfall of the season—93·8 p.c.

The irrigated crops—were,	Wheat	...	...	...	20,898 acres.
	Rice	...	...	...	9,094
	Other cereals	...	...	...	34,582
	Other food crops	...	...	...	9,482
	Sugarcane	...	...	...	11,127
	Other crops	...	...	...	27,567
	Total	...	...	...	93,811

including 19,000 of double cropping. Of the irrigated cropping three-quarters is inferior cropping, irrigated owing to failure or deficiency of the later rains.

*Manure supply.*—The cost of firewood is almost prohibitive: 6 to 8 annas a maund, and though we have a forest area of about 4½ lakhs of acres, no effort is yet made to supply them with a cheap supply of fuel. The cowdung and other farm-yard manure is consequently for the most part burnt, and little is used as manure. Sheep folding is done on some smaller areas. Rab also here and there is to be met with. But such limited manuring apart, the *cropping of the district, generally speaking, is unmanured.*

*Ploughing.*—There is the deficiency of plough cattle. Oxen and he-buffaloes 177,000 or 88,500 pairs, or a little over a pair per holding. In the case of smaller-holdings ploughing is done by hired cattle. *Good ploughing is rare.*

An expanding population with a declining agriculture, and that, too, in a tract where agriculture is the sole surviving industry and which is exposed to the uncertainty of the seasons, naturally finds the struggle for life harder every day. There is practically no margin now left for extension of tith; and intensive farming is an economic necessity.

Prominent among the *causes of such agricultural deterioration* may be mentioned:

1. *Defective irrigation and water conservancy.*
2. *Absence of manures.*
3. *The Ryot's diminishing resourcefulness—and his ignorance.*

As regards *irrigation*.—

The irrigational *equipment of the zilla* is as under:—

(1) *Government canals and tanks, Mhasvad main-tank canal, Krishna canal, Revari canal, upper Mari river works, Yerla river irrigation works and Chikhli canal—in all 7 works.*

Capital outlay about	..	50 lakhs of Rs.	The streams
Area commanded	...	58,000 acres	are taken up not
" irrigated	...	28,000 "	far from their
Actually irrigated area	15,828	" 1904-5.	sources on this
			side of the Ghats.

(2) *Wells, budkis etc.*

Pakka and katcha together 26,946 in 1903-4 against 19,206 in 1892-3 <hr style="width: 10%; margin-left: 0;"/> Increase since 1892-3 6,740	}	Irrigating 56,062 acres or a trifle over 2 acres each.
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(3) There are about 18 irrigating tanks—with an irrigated area of 155 acres.

(4) Other Sources.—*The Bandhmas—pakka 99, and kutchha 6,315, temporary constructions for the season = 6,614, irrigating 35,433 acres or less than 6 acres each. In all irrigating 98,950 acres or 6.7 p. c. of the cropped area.*

The Zilla lies on the east side of the ghauts, and has a rainfall of about 43 inches. It is a plentiful rainfall for the crops—but it is uncertain. Sometimes scanty and often ill-distributed. Artificial irrigation is therefore one of the primary needs of the agriculture of the district. *We have a splendid source of such irrigational supply in the rainfall of the ghauts—but it lies yet untapped.*

Much has been done in recent years in the way of well-sinking: some 6,000 wells have been newly sunk. But in a tract like this, such well-supply is necessarily meagre and cannot be depended upon. The geological formation is trappean or basaltic, and we have no underground reservoirs or water-bearing strata of certain occurrence. Well-sinking under such conditions must be more or less in the nature of a speculation. The irrigational capacity can only be small—say 3 acres at the outside to a well. The lift is most expensive; and there is the risk of failure when the need is the greatest.

Government Canals and old tanks go more or less on the faulty plan of catching up the supply when it is scanty and precarious.

The Bandharas, now so few in the district—at one time constituted a most effective scheme of commercial irrigation. They served to impound the rainfall of the plains for agricultural purposes. At present the Patusthal assessment is heavy, about 8-6 rupees per acre, and most of the old weirs are gone; only 100 remain; the rest being temporary structures for the season, of use only for a couple of months or so after the close of the rainy season.

The situation of the Zilla is remarkable. It is divided by the Sahyadries from the coast districts of Ratnagiri and Kolaba on the west, where the rainfall is above 100 inches and is never known to fail. We have also on one side, on the east, a rainfall of over 40 inches. For a tract like this, *what is needed is a comprehensive scheme of irrigational works.*

(1) to catch up the rainfall of the ghauts at convenient centres, and pour it down on the plains: and

(2) to *bund up the fall on the plains* by means of weirs and utilise it for the lands. *Storage works on the ghats*—with canals and distributaries, and *bandharas* all over the tract, would give us all the irrigation we should require and serve to render the district immune to seasonal disasters. These *weir channels* would be all communal works—only the assessment on them requires lowering a good deal.

Again, we must have a *proper system of water conservancy*. As things are, streams, channels and runlets get silted up, and the waters spread, and flow on uselessly. Some arrangement would seem to be necessary for the removal of silt, and for the conservancy of these sources of irrigational supply.

*Manurial supply*.—The ryot must have a *cheap supply of fuel* before he can be expected to use his farmyard manure for his lands. The Forest Department is providing such *fuel reserves*. Besides, the use of *artificial manures* is necessary. The soil is much exhausted, and some such dressing for a few years—necessary with state aid—is desirable.

*The Ryot's diminishing resources.*

1. His *losses of crop and cattle* during recent years have been crushing.

2. The *enhanced demand of the state* on his lands, the enhancement by above 4·4 lakhs or 29 p.c., has added largely to his difficulties and more than sweeps off all his savings.

(3) *His indebtedness is heavy*. We have no means of ascertaining the extent of his existing debts. But we can't be far wrong if we take it that they average—generally speaking—about 10 times the assessment on the land—or say about Rs. 200 lakhs for the district. In 1904, his transactions are thus given in the Special Judge's Report:—

Value of Sale deeds	Rs. 10·84 lakhs.	(The District under
„ Mortgage bonds	12·00 „	the Deccan Agricul-
„ Simple money bonds.	22 „	turists' Relief Act of
		1879.)
Total Rs.	23·06 lakhs.	

Tagai advances and agricultural loans also were given in former years. The balance outstanding at the end of 1904, was 10·82 lakhs.

(4) We have here *no agricultural bank* to give him cheap credit. He gets his money accommodation almost exclusively from the Savkars. *Money-lending* is, however, on the old *individual basis*, and the *interest charge* is heavy, ranging from 9 to 12 and 18 p.c. per annum.

(5) The Ryot has not the help of commercial organisation, such as he enjoyed in days gone by. The *cohesion of the village community* is unfortunately a thing of the past.

(6) *His illiterary, his dense ignorance, is at the root of his misery and poverty.*

Satara district—Population=11,46,559—  
 literates=46,795—about 4 per cent.  
 45,211 males.  
 1,474 females.

In Javli Taluq with a population of 52,852 souls, we have persons knowing how to read and write=983 only.

(7) *His system of cultivation is primitive and wasteful.*

The Department of Agriculture does not yet send any itinerant teachers to teach him better methods.

Two agricultural associations have been recently formed and are doing useful work.

(1) The *Koyana Valley* (Javli) association, which is doing its work with much vigour, and

(2) The *Karad* agricultural association.

And, it is proposed to establish a *Co-operative credit Society* in Javli shortly. Under existing conditions, however, such societies have a poor prospect. The Ryots are at the end of their resources, and must be in a position to save, before they can be expected to exercise thrift.

Cattle are fast and *seriously deteriorating*, losing in size, bone and muscle, and our existing plough cattle, already insufficient in number, are less efficient for field work than ever. Some arrangement seems urgently called for with a view to *improve their breed and increase their working power*. The Veterinary Department ought to look to this, and ought not to lose a day. *More grazing* is also needed and for it we must look to the Forest Department.

The *agricultural needs of the Zilla* may be thus summed up:—

*Extended irrigation* on a better and more systematic plan by means of storage work on the Ghauts, with a network of distributary canals.

*Better manurial supply*, including the use of artificial manures.

*Improvement in the Ryot's position*—

1. The lowering of existing assessment on his lands.
2. Relief for the burden of debts.
3. Cheaper credit.
4. A comprehensive scheme of moral education.
5. Knowledge of better agricultural methods.
6. Association—co-operative organisation—to help him in his work.

*Improvement of cattle, more grazing, and better breeding.*

*Improved cultivation, Superior cropping.*

*Stock-rearing.*

There is a good deal of *uncultivable waste* in the district, the area is 272,469 acres, which is not available for cultivation; but a considerable extent of it, including hill-sides, might be utilised as a grazing area. It lies *outside the forest reserves. Stock-rearing ought here to thrive.*

*Cattle-breeding*—There is not much of cattle breeding as such in this district as there is in Khandesh or Gujrat, and what little we have is inferior. There is insufficiency in grazing and there is also an insufficiency of breeding bulls and bull-buffaloes. The number of such stud bulls has largely fallen off in recent years. In 1892-3 we had 664 bulls, and 161 bull buffaloes=825; in 1901-2, there were only 384 bulls and 155 bull buffaloes = 539, and *for a total of 1,358 villages.* This is, however, a branch of the agricultural industry which needs attention. Both the breed and the number of cattle urgently require improvement in the interest of agricultural efficiency.

*Horse-breeding*—The Man valley was at one time famous for its horses: but the industry is now almost gone and the number of horses and ponies in the zilla which was 14,012 in 1892-3, is now only 8,010. *Cannot anything be done, with the help and support of the military authorities to revive interest in the work?*

*Rearing of sheep and goats.*

There is still a considerable population dependent on this industry, over 15,000. In

Shepherds and goatherds ...	10,231	Maratha times, we had a
Workers in wool ...	4,784	fine breed of sheep and
Wool carders ..	282	goats, and our woollen in-
Wool dealers ...	194	dustry was one of the most
	15,491	thriving. Now, however, it
		is a declining branch of rural

work. Sheep are reared more for milk, meat and skin than for wool, and the breed is poor. The number has largely decreased since 1892-3, owing chiefly

● 1892-3—1901-2. to deficiency of grazing. There are  
 Sheep—371,490—271,019. the forest restrictions, and there is little grazing available outside except wayside, tree and hedge vegetation. The yield of wool, too, is meagre—not even 2 lbs. to the fleece, as against 4—5 lbs. in England and other countries.

*Sheep-rearing, however, for wool supply—deserves encouragement. Babul reserves might be formed for the purpose on private waste lands or sheep-runs on the hill-sides.*

*Gypsum* is found in abundance in the zilla, and is a most excellent manure for grazing lands intended for sheep. The grass so grown for the sheep is said materially to increase the weight of the fleece.

#### B.—MINING.

The industry as such is in this zilla *non-existing*.

Formerly the Dharuds did some iron smelting, but owing to the want of fuel and owing to the cheapness of imported iron—it has entirely ceased. The Dharuds earn their living as labourers.

The zilla does not seem to be rich in minerals. We have *Iron, Manganese, Gypsum* and *Copper* and there is some prospecting too going on at present in the district. As regards *Manganese* the official report states (vide Geol. Sur. Report Vol. XXXIII. part 2, p. 100:—“The manganese ores of the Mahableswar, and Yeruli (18°-2' and 73° 54') plateau in the Satara district occur as concretions of Psilomelane in a small thickness of laterite soil, resting on the Deccan trap. They never occur in sufficient quantity to pay for extraction, and have probably been formed by concentration of the manganese which all such basic lavas must contain.” The mineral can have *no commercial value*.

As regards *Iron*, near the Sahyadris, in 20 villages of Javli, 30 of Patan and 3 in Valvu, the ore is found in the murum or crumbled trap below the laterite—and is found in plenty. There is, however, no coal in the district, a serious disadvantage.

A suggestion may be thrown out. *Iron smelting—ana iron works might be started at some coast town* in the Rutnagiri collectorate, where we could get coal easily from Bombay and iron ore might be mined in this district, and carted to such works—the cartage charge would not be heavy, and certainly not prohibitive.

In Japan, there are such iron works, run at several places, for which the required supply of iron ore is received from China.

For the starting of such iron works in the Konkan, capital and enterprise are needed. The difficulties in the way are considerable, but could be got over.

As to *Gypsum*, it is a fine manure; it is in demand in some localities and there is no reason why it should not find a sale in the district itself, and it ought to pay to mine it.

*En passant*, it may be suggested that we should ask, as a necessary condition of practical effort in this direction, that there should be a systematic exploration by an expert of the mineral resources of the zilla. We have had no such exploration yet.

## C.—MANUFACTURES.

We have in this zilla, as elsewhere, a considerable number of old traditional crafts giving employment to a considerable section of the population. They are, however, poor trade concerns and those engaged in them earn but a precarious living. They are run, as of old, on the individual basis, and in some cases on a system of advances from the moneylenders or dealers, and without any special training or acquired technical skill—Weaving, metal work, pottery, etc.

We have also the following recently started :—

Soap making at Satara.

Metal works at Satara.

The Weaving, Dyeing and Trading Company at Wai.

Match making at Dhorne and Karad.

While the old crafts have but a poor chance, *these new beginnings are full of promise*. They are yet in their first stages of growth, and it would be too early to speak of their position or prospects.

It is, however, a pleasure to find that the new movement is under the supervision and guidance of a *strong and representative industrial association* presided over by *Rao Bahadur V. N. Pattak, M.A.*, and it would be of interest to watch the forward steps that might be taken along the new path under its auspices.

It would seem, we had at the start *best concentrate our energies on one or two selected industries* for which the zilla affords special facilities. *Sugar refining and oil-pressing (inter alia) would constitute a good beginning*. This is one of the few zillas in this Presidency which has considerable acreages under *sugarcane*. We have about *12—14,000 acres so planted*. Under *oil seeds*, the area is at present about *75,000 acres*. For a sugar factory, the amount of capital required for machinery and plant and working, according to Mr. Jordan, a sugar expert, is *Rs. 75,000*. An oil-mill would also need a like amount of capital. *The capital, therefore, for these two concerns would be 1½ lakhs*, which ought not to be beyond the resources of local enterprise. *Absence of coal in the district is a serious drawback*. But should we be fortunate enough to have a few storage works in the Ghauts for irrigational purposes, we should have at our disposal *an amount for electrical power*, which would meet all our requirements in the new effort. *It is this energy that is being utilised to an increasing extent in Japan*, and there is no reason why we should let it run to waste.

This opens up a vista of great possibilities of industrial development. But *the one condition precedent is the construction of such storage works on the Sahyadri Ghauts*.



The Assistant Secretary saw at Poona

(15) RAO BAHADUR K. R. GODBOLE; AND MESSRS. N. C. KELKAR AND N. A. DRAVID, and after questioning them obtained the following information.

There are the following private or organised corporate institutions in Poona, where industries are carried on, and the proprietors or shareholders of which receive fair returns on their investments:—1. Reay Paper Mills; 2. Silk and Cotton Manufacturing Co., Ltd. (Mills near the Railway Station); 3. Sugar Factory at Mundhwa; 4. Deccan Brewery Works at Dapudi; 5. Metal Manufacturing Co. in Kasba Pet; 6. Chitra Shala in Sadasiv Peth; 7. Aloe Fibre Works in Sadar Bazar; 8. Iron Foundries and Factories of Bari and Karanj Kar for preparing sugar-cane crushing mills; 9. Victoria Ice Company; 10. Ink Manufactories of Ghorpade, Shinde, Tupe, etc.

A local Gujarati merchant makes *caps* in imitation of Hungarian caps out of Swadeshi material. A large quantity of jaggery is prepared by the growers of sugarcane, and it is mostly, if not wholly, disposed of in the local market. Excellent ivory and blackwood *combs* are prepared at Poona. There are, too, a few small private *pottery* works here and there. Poona has three *metal manufactories* in which iron, brass and aluminium pots are made. At the Technical school workshop, private orders for furniture, etc., are executed. The Silk and Cotton Manufacturing Co.'s mill turns out *silk goods* which are mostly exported to Burma. These include different varieties of sarees, dhoties, pitambars, etc. The concern is heavily indebted. The debenture holders and commission agents earn good profits, but not the shareholders, who have only latterly been getting a small dividend. A new Cotton Spinning and Weaving Mill is in course of erection. The concern has only been recently floated with a capital of  $2\frac{1}{2}$  lakhs and is a product of Swadeshi movement. The Reay or Deccan Paper Mills, where paper of different varieties is manufactured have only latterly begun to pay. The Mills were established in the time of Lord Reay, and enjoy some substantial concessions from Government in respect of the water rate charged for the canal water used in their working. Till lately the only customers of the mill were the Government, but as a result of the Swadeshi enthusiasm there has grown up considerable public demand for the paper of the mills; and at present the mills have for sometime been working at high pressure. Some of the local papers, including the *Kesari*, which has a circulation of nearly 20,000, use the paper of these mills. *Lace*—Kalabattu—is made at Poona. All the lace turned out is consumed

locally. Handloom weavers use this lace in preparing bodice cloth for women. *Ghamelas* (iron pots) and ordinary brass pots and *drinking vessels* are made from imported sheet metal. The workers get enough to make a decent living. There are a few *stone quarries* near Poona. As the industries are mostly pursued by private individuals with small capital they are not thriving. There is scope for improvement if organised efforts are made. The small industries, at least some of them, have suffered not so much from competition; but probably because fashions have changed and the demand for those particular kinds of articles ceased to exist. By making advances to artisans at low rates of interest, improving the appliances in use, imparting special instruction to the artisans, as well as by the employment of power machinery, the local industries may be considerably developed.

Formerly there were wooden mills used for crushing sugarcane. Now for nearly thirty years, however, these have been displaced by iron crushing mills. Now almost all have taken to the use of the iron mills. They were introduced by one Soobrao, a copper-smith, who was a watch-maker. There are two factories, one belonging to Ramji Bari who is a *mali* by caste, and the other also owned by an Indian, where these iron sugar cane crushing mills are made. They are made out of old iron things like sleepers etc., and are sold at from Rs. 150 to Rs. 200 each. Well-to-do cultivators buy these mills and let them to others in their villages who are thus able to use them.

At present hides and skins and tallow are exported in their raw state. Tallow could be made into soap locally.

The following Banks are working in Poona city and paying dividends to their shareholders at from 10 to 12 per cent. per annum:—Bank of Bombay, Poona Branch; Deccan Bank; Mercantile Bank; Poona Bank. These banks get large deposits at from  $3\frac{1}{2}$  to 5 per cent. per annum, and lend money at rates varying from 6 to 12 per cent. per annum. Two of the banks finance two industries. The Deccan Bank has advanced money to the Gadag Cotton Mills Co. and the Reay Paper Mill, and the Poona Bank to the Cotton and Silk Mill. It must be stated that the organisers of the banks are also the organisers of the industries.

At present there are four educational institutions in Poona city where elementary technical education is given and manual work taught:—1, the workshop attached to the College of Science, Poona; 2, the Jubilee Municipal Technical School; 3, the class for manual training in the New English School; and 4, the Carpentry and Smithy classes in the Panch Howd Mission Schools. Private factories also offer scope for apprenticeship. The instruction given is

mostly practical. There are Drawing classes attached in almost all the schools. The College of Science prepares sub-overseers.

Three students have been sent to Japan—One for learning photography and allied businesses; one for learning match-making; and one has gone as Baroda State scholar for learning Mining and Metallurgy. The first two have been sent privately by their own guardians, and have only completed their secondary course. The third is a B.A. and will have to serve the Baroda State for ten years.

Mr. G. B. Athavale is an expert in cutlery who learnt his business in England and America. He was in the Miraj State workshop as cutlery Manufacturer. But the Chief of Miraj is said to be unwilling to invest a large sum in the concern, and Mr. Athavale has accordingly gone over to Poona to see if he could induce some capitalist to go in for the cutlery business on a large scale by investing, say a lakh of rupees in it.

Mr. Shejwalker, a physician by profession, knows the art of calico-printing and has a small concern in his charge. He employs only manual labour. His chief difficulty is that nobody is prepared to finance him. Since the Swadeshi movement has caught popular fancy, however, he has been faring better. At present he sells his cloth through the manager of the Chitra Shala Press.

There is another person, an artisan by caste, who is making umbrellas out of Swadeshi materials, except for the steel wire which is imported from England and the stick which is imported from Java. He was formerly employed in the Telegraph Department. He is a mechanical engineer himself, though he has not passed the examination. He has succeeded in his experiments, and is now fitting up his factory. Business will be commenced very soon on a commercial scale, and he expects to turn out umbrellas at the rate of one hundred per day. For the present he is working with his own capital; but as demand increases he intends to convert the business into a joint stock concern. Those who have seen the umbrellas say that they are as good as Japanese ones while they will be sold at a slightly lower price. There is a Swadeshi Co-operative Stores. There is another Swadeshi Stores in Budhwar Peth, under Mr. Krisandas Vishnudas, where all Swadeshi goods, and cloth and stationery in particular, are sold at cheap rates. Of Swadeshi stationery shops there are many. Besides, country made articles are sold by almost all the shopkeepers in larger quantities than before.

In a pamphlet entitled "Industrial Activities in Poona," which Rao Bahadur K. R. Godbole, B.A., M.C.E., has published and from which some of the information given

above is taken, it is stated that a Metal Manufacturing Co., a Dye Co., two Pencil factories, a Saw Mill Co., two Flour Mills worked by water power and steam power respectively, Oil Presses, and a Spinning and Weaving Co., worked by water power, were all started at Poona at one time or another, but that they have all failed on account of some reason or other. The Reay Industrial Museum which was started on the 1st of April 1890 and which was to comprise besides the Museum proper, a sale section, an export branch, an import branch, an information branch, a Library and a Reading Room, is now in a decadent condition. And the Industrial Association of Western India, which did good work in the first few years of its existence, has, according to Mr. Godbole, fallen into a moribund condition: Mr. Godbole urges, as steps that can be immediately taken at Poona to further the cause of industrial progress, the renovation of the Reay Industrial Museum and the resuscitation of the Industrial Association of Western India.

An important step in the history of Industrial Poona, is the early foundation of the Ranade Economic Institute of which the Hon'ble Mr. G. K. Gokhale, C.I.E., is the Secretary. The public have contributed liberally towards this project, of which the objects are stated as follows:—“(a) To collect all available information about past and present industrial undertakings and present and future industrial possibilities in India; (b) To collect statistical, historical and other information about other countries, which is likely to be useful to the industrial progress of India. (c) To publish from time to time reviews by competent persons of the Economic position, needs and prospects of India. (d) To send, as funds permit, scholars with good qualifications in Science, Engineering or Technical Arts, to England, Japan and other foreign countries to learn the manufacture of those articles for which there is a plentiful supply of raw material in this country, and which might therefore be profitably manufactured here. (e) To provide facilities to such scholars, on their return to India, to enable them to demonstrate by experiments, on a small scale, that the manufactures in question can be profitably started. (f) To advance in other ways the Industrial development of the country.”

V. M. MAHAJANI, Esq., M.A., Akola.

#### A.—AGRICULTURE.

1. Berar being an agricultural Province with about 75 per cent. of the total population supported by agriculture and with the chief industry affected by the products of the soil, it naturally follows that the material condition of people must depend on the condition of agriculture.

The total agricultural population in 1901 was 20,14,719, against 19,86,263 in 1891, or an increase of  $\frac{1}{4}$  per cent. This includes both workers and dependents. Many women and old people among the better class of agriculturists do not do any field work at all but confine themselves to household duties, &c. In 1901 there were 14,30,174 or 51.93 of actual agricultural workers t—

	1901	1891
Persons interested in land, land-holders, tenants, co-sharers, &c. ...	561,912 =	9,97,602
Agricultural labourers ... ..	14,52,221 =	9,86,644
Growers of fruits, &c. ... ..	586 =	2,017
	<hr/>	
	20,14,719 =	19,86,263

With the increase in area under cultivation there has necessarily been increase in the agricultural population. Apart from this the increase is probably due to the people adopting agricultural pursuits and forsaking other means of livelihood.

Cultivators—land occupants and tenants cultivating, and fruit growers &c., in 1901 were 5,09,314 or 18.5 p.c. of the population. If land occupants, tenants not cultivating and lessees of villages are added, the total number comes to 5,52,498 or 20.4 p. c.

<i>Labourers.</i> —Field labourers ... ..	13,47,448
Farm servants ... ..	1,04,773
General labourers... ..	45,833
	<hr/>
	14,98,054

or in all 14,98,054 represents 54.4 p. c. of the total population. The chief industry is the working and dealing in cotton.

2. Almost all culturable land has been brought under cultivation in the Akola District.

There are 3 classes of soil in Berar. Their description is as follows :—

3. Rich black alluvial soil covers the whole of the low-lying land of Berar. It is either black loam overlying basalt as in the Ellichpur and Amraoti Districts, forming the eastern-northern half of Berar, or a rich black alluvial vegetable mould; as in the case of Akola and portions of the Buldana Districts. In the latter case, the soil goes down to a great depth with a very underlying strata of yellow clay, lime except the portion mostly near hills, where it is shallow and overlying moorum or yellow clay.

A great deal of the Purna alluvium, about 10 miles on either side of the river, produces efflorescences chiefly of salts of soda and in many places wells sunk in this tract have brackish water.

A definitely marked saline tract commences just south of Akola and passes thence north-eastwards, Daryapur Taluq forming a belt about 10 miles broad from east to west and about 150 miles in length.

In the Balaghat or the southern hilly half of Berar, the soil consists of shallow alluvial overlying decayed trap or hard moorum, with repeated outcrops of trap stone. In parts where hard moorum crops up to within a foot of the surface, the soil covering it is very inferior and unculturable. The low-lying culturable portions form the best ground for Rabi cultivation such as wheat and grain.

4. Considering that the greater portion of the gins and presses are now driven by steam power, the labourers have better wages than those given at the time of hand gins.

There are three classes among the land-owning, &c., classes, viz.:

I. Persons possessing land.

II. Persons cultivating do.

III. Labourers—Working in general.

The first class is again sub-divided into:—

1. Persons possessing land but not actually working.

2. Persons possessing land and actually working themselves.

Of them the labourers have better state, and next to them persons cultivating land.

Persons possessing land and actually working are best of all; but this number is very limited. The sub-division *i.e.*, persons possessing land and cultivating class, have gone down.

The condition of people must depend on the condition of agriculture, as stated above in question 1.

(a) No private efforts have been made up to now, but the Government have intimated in this direction that they have selected the Akola Districts for experiments to create village credit banks (rural banks).

(b) No. The Government have selected Akola for establishing a farm for this purpose now.

(c) No. In a few cases, (*i.e.*, Mr. Gopalrao Kushalrao etc.) Appliances brought into use are:—

Appliances.—Plough, Fodder cutter, Wincrowing Machine, Grinding Machine, Windmill, Iron Mot etc.

(d) No. The old system of spreading cowdung ashes in the garden lands only, viz :—

*Taluqs.*

Ellichpur.	Akot.
Chikhli.	Amraoti.
Jalgam.	Morsi.
Akola.	Khamgaum.

7. Please see 6 (a) question.

R.—MANUFACTURING INDUSTRIES.

8. Please see the statement enclosed herewith for Berar.

(1) Cotton, Wool, and Silk are certain industries which will be seen from the state; jute not worth mentioning.

(2) Oil mills, Amraoti 2, Shegaon 1, Akola 4, of which 3 are very small.

In big villages as Akot, Karinja etc., there are oil presses, for oil extracting, by bullock power.

(3) Dhors etc., do for local requirements the business of leather.

Horn. Nil.

Paper working at Akola, Balapur, &c., has decayed.

(4) Generally big villages, towns etc., the business of pottery takes place. Tiles, Pots, Pipes etc.

Porcelain. Nil.

Glass. Bangles at *Bramhanwada Thadi* in the Ellichpur Taluq, *Dhad* in the Chikhli Taluq, are prepared; colors—red, green, blue, and black.

(5) 2nd working *i.e.*, from sheets of brass and copper pots are prepared at Akola, Khamgam, Amraoti etc., but not on a large scale,

(6), (7), (8).— Nil.

9. The present condition of the industries named above is not satisfactory as the requisite knowledge is wanting.

10. Their condition in the past was better, as the industries were supplying the local requirements and also exporting goods to a certain extent though manual labour was working.

No steam power was in use as it is now for cotton, oil-seeds, etc.

13. The imported articles have been sold cheaper, the tendency of the people is to buy things at low price, not minding the quality, whatever it may be. The steam power industries work much and produce articles in abundance. So the dealers sell them cheap. Thereby all the industries have decayed and the artisans have been reduced to labourers.

In order to compete with foreign trade the requisite knowledge is not up-to-date among the artisans, i.e., lack of knowledge in the present time is the cause of ruin.

14. Even the total demands are not supplied by the industries in this part except the agricultural industry which sends outside in noticeable quantities raw cotton and cotton seeds, some quantity of grain, as wheat etc. The following are the firms:—Riley Brothers, Breul & Co., Sabhapathi, Mulji Jetha & Co., export the above articles.

15. Raw Cotton Industry, Coal mines, etc. (To turn the raw materials into industries).

(a) Advances should be given but an organised body must supervise their work every day.

(b) It will.

(c) It is the chief thing, and then to take up the question of (b) and then (a).

(d) This is next to (c).

17. (1) Paper, (2) Salt, (3) Opium, (4) Bhang and Ganja, etc.

The 3rd and 4th industries were principal in Berar.

18. (1) Importation of foreign articles and, (2) their cheap sale.

(3) Government monopoly with regard to opium, ganja, &c.

(4) Lack of requisite capital and self-confidence.

(5) Lack of knowledge in a special branch of industry according to the world's progress in time.

19. Yes.

20. (1) Opium, salt, ganja industries can by the help of Government.

(2) Special training.

(3) Spread of education among the masses.

(4) The rich must be educated so that they will be ready to invest money.

(5) Honest working in any business, which requires a religious education. So that self-confidence must be aroused in the rich class.

#### C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. Red earth can be manufactured into tiles like Bangalore.

Marble stones in the Nun District can be used.

22 & 23. Nil.



24. Raw hides are exported and re-imported as finished articles.

D.—CAPITAL.

25. Branch of the Bombay Bank is the only one at Akola and other at Amraoti in Berar.

26 & 27.

E.—TECHNICAL EDUCATION.

28. There is one class in the factory named "Native Ginning, &c." which has produced a certain number of engineers for the cotton gin and press working (Akola).

There is also one class for carpentry in "the Industrial School" conducted by the missionaries, but it is restricted to the Christians only (in Akola).

There is a class at Amraoti in the Industrial school of the Government.

29. There was one Industrial school at Basim but it has been closed now.

32. Please see answer to question 28.

34 to 37. Nil.

38. No proper arrangements have been made.

39. Mr. Tambah in the Ulhara ginning factory is employed as engineer. He is trained specially for the matches.

Mr. Karmarkar is in the match factory at Ellichpur, is engaged for this purpose.

There are several engineers in Berar for the mills (cotton) ginning and pressing factories.

Cotton Mills, Badnera.

Do. Akola.

40. Mr. Tambah is employed as engineer in gins.

Mr. Karmarkar is employed in the match factory.

41. Mr. Tambah has been given a trial for pencil and match factories.

F.—INDUSTRIAL ASSOCIATION.

There is one, but nominal. It has worked to a very little extent. No activity it has shown up to now.

District	Tehsili.	Name of town or village.	Distance from Railway Station.	Description of articles produced in the Berar Industries.	
Akola	Akola	Panchpimpla Akola	Akola station, 2 miles .. Itself	Tadhas from Cotton. Do. country blankets, brass and copper pots from sheets imported, &c. Chunam oil mills, flour mills, yarn and weaving mill. Dyeing, Leather preparing, &c. Oil pits, Lac bangles.	Paper making at Akola, Balapur, &c. Died out.
		Kutasa, &c. ... Karsi Takli ...	Do. 19 do .. Do. 11 do ...	Salt making (not now). Khadi cloth.	Opium, Bhang, Ganja, Salt. Restricted Govt. help.
	Akot	Akot	Do. 28 do	Carpets, khadi cloth by old hand-looms.	All Dyeing has gone out at Nandura. Lac do do.
		Telhapa	Do. 40 do	Introduction of Match and Pencil Factory by hand-made Machineries.	
	Balapur	Balapur	Paras 6 do	Silk as well as cotton cloth, <sup>मुँ</sup> Carpets, Dhoti, Turbans, Laced cloth for males and females, &c.	
	Basim	Pathur	Akola 21 do	Stone quarry (black)	
		Basim	Do. 51 do	Female Garments, cloth, khadi, turbans, &c. Dyeing for local wants.	
	Manguel Murtzapur	Risode	Do. 58 do	Dyeing by hand-made instruments.	
		Shelca	Do. 30 do	Butter Market.	
	Amraoti	Amraoti	Karinga	Murtzapur 20 do	Soap industry in its infant state Dye industry for local requirements, red powder <sup>कुँ</sup> which is also exported.
Amraoti			Amraoti station	Khadi, Turbans, oil mills, oil pits, flour mill, leather making for local, lac bangles requirements.	
		Kholapur	Do. 20 miles	Silk and cotton cloth for men and women.	

Amraoti	Mersi ...	Badura ...	Badura station ...	Mill (cotton)
		Bulgaon ..	Amraoti station 6 miles.	Dyeing industry.
	Ellichpur ...	Mersi ...	Do. 34 do...	Khadi.
		Hingkhed ..	Do. 40 do..	Red-powder कुंकू.
		Benwad ...	Do. 42 do..	Cutlery but for local requirements, &c.
		Jasur ...	Do. 32 do...	Dyed khadi, rumal, carpets, female cloth
		Ellichpur ..	Do. 38 do..	( गुलाबी ) Dyeing industry, lac industry means toys, painting, &c., Combs (carpentry) Toys, &c. Match factory, leather making locally prepared, lac-bangles.
	Chandur ...	Dhamangam ...	Do. 52 do...	Khadi cloth.
		Bramhanwada Thari. ...	Do. 38 do	Bangles (glass) industry.
		Karjgam ...	Dhamangam station ..	Khadi, Tadhao.
Dhamangam ...		Murtzapur 13 miles ...	Khadi.	
Daryapur ...	Babhali ...	Do. 24 do ...	Silk, female and male cloth, cotton cloth, turbans, &c.	
Melghat ...	Suyi Anganjgam	Do. 62 miles	Do. do. do.	
	Chikalda Melghat ...	Amraoti station 62 miles	Teakwood, Angrabolams हिरडा, बहेडा आवळकटी, rosa oil, lac, first produced, coffee at Chikalda, bamboo, grass, &c. oil pits, butter is exported from the taluq.	
Buldana	Chikhli ...	Chikhli ..	Malkapur 42 miles ...	Country blankets, khadi.
			Khamgam 29 do	
	Mehkar ...	Dhad ...	Malkapur 56 do ...	Bangles (glass)
		Dedgaon Raju...	Do. 63 do ...	Female garments, oil pits.
		Deolghat ..	Do. 34 do ...	Cutlery.
	Mehkar ...	Do. 70 do ...	Khadi.	

District.	Tehsili.	Name of town or village.	Distance from Railway Station.	Description of the articles produced in the Berar Industries.
Buldana	Malkapur ...	Lonar ...	Do. 82 do ..	Salt, exported.
		Shirdkhed ...	Julna 10 do ..	Country blankets.
	Malkapur ..	Malkapur ...	Malkapur station ...	Stone quarry.
		Nandura ..	Nandura do ...	Leather, dyeing industry, khadi, &c., Carts, good market for bulls.
Yeotmal	Jalgaon ...	Jalgaon ...	Do. 16 miles ...	Tadhas, Khadi, betel leaves exported.
	Khamgaon	Suirgaon ...	Do. 18 do ..	Do. do. do.
		Khamgaon ...	Khamgaon station ...	Lanterns, brass pots from sheets, iron pots from sheets, &c., lac bangles.
		Shegaon ...	Shegaon ...	Oil mill.
Pusad	Yeotmal Mun	Babulgaon ...	Dhamangaon 12 miles ...	Khadi,
		Mun ...	Warna 14 do ..	Jajams, khadi, laced cloth, dhoti, female garments, carpentry (old), stones for engraving, coal (mines not yet opened).
	Darwha ..	Pusad	Akola station 39 do ...	Oil pits; rosa grass.
		Umerkhed	Do. 111 do ...	Khadi.
		Digras	Dhamangaon 56 do ...	Dye industry, bullock market.

(17) R. GOPALA KRISHNA IYER, Esq., B.A., L.T.,  
*Trivandrum.*

A.—TRAVANCORE INDUSTRIES.

1. Only the traditional primitive system is in vogue. Improved methods have nowhere been introduced. The only change that is worthy of mention with reference to this industry is the cultivation of garden crops (Palms, Plantains, &c.) in many parts of the state in lands formerly under food-grains, pulses and oilseeds, as the former is more remunerative than the latter. Agricultural classes are mostly lazy and not disposed to give much exertion (physical and otherwise) on the lands.

2. Acreage under cultivation of different crops is not given in the Government report as also the acreage that is still to be reclaimed for human use. The total area of the state is 7,129 sq. miles, of which more than two-thirds consist of jungles and forests. Of the remaining one-third, a fourth may be occupied by backwaters, tanks, rivers and human habitations so that a fourth of the total area *i.e.*, 11,40,640 acres may fairly be taken as the total acreage more or less fit for agricultural operations; of which nearly 6 lakhs of acres are under wet cultivation, as stated in the Government report. The acreage under dry cultivation is not given anywhere; but roughly between 2 or 3 lakhs of acres may be estimated, leaving thus a balance of 2 or 3 lakhs of acres still to be brought under cultivation. Of these lands now lying fallow some are unculturable without special irrigation, organised capital, colonisation of tenants and other facilities of an extraordinary nature; while others, though fertile and well watered, are situated in the malarial tracts thoroughly unfit even temporarily for human habitation. To reclaim them, special remedial measures on a large scale of drainage, &c., of the most advanced scientific type will have to be introduced either by Government or properly organised, wealthy, influential and well informed Agricultural Associations or chartered companies with special concessions from Government.

3. Generally fertile for the cultivation of Coconut, Arecanut, Ginger, Tapioca Roots (of a big size), Plantains, Pepper, and unfit for cereals, except in the taluqs of Thevale, Augusteswaram, Edainel Karunagapalle and Karthigapalle. The forests are fertile for Sylviculture. In the taluqs like Ambalepozhe (hollow uneven tracts known as Kuttanad) wholly submerged under water, a special variety of paddy is grown, which yields profitably. Occasionally, marshy tracts by the sea or backwaters are emptied of their water and an ordinary variety of paddy is raised therein, but the yield is precarious

4. Landowning classes have to a very large extent only small holdings insufficient to keep them above want, and the cultivators have mostly wages too low for their maintenance. Further there is not an unfailing demand for labour in the plains. Many are attracted to the hill plantations (coffee and tea, &c.), under Europeans, where they have to groan under some special disabilities and disadvantages.

5. Lands may be said to be held in fairly equal extent by the three classes of cultivators, (land owning, privileged tenants and tenants at will).

6. None.

7. *b, c, and d.* Nil.

(18)

## B.

1. (a). *Cotton*, fine fabrics with or without silk, border and with or without lace at Kottal and Crainel. Coarse stuffs at Cheranyihkil (Kidakkaval), Valuapuram and Kanjarepally in Chenganechery taluq.

Good checks, kerchiefs, &c., are woven at the local Central Jail, and School of Arts, and Technical Schools at Nagercoil, Trivandrum and Attingal.

Lace making and Embroidery in Christian Girls' schools at Trivandrum, Nagercoil, Quilon, Aleppy and Kottayam.

(b) Plantain fibre at the Local School of Arts and Parul (near Quilon).

(c) Pineapple fibre to a slight extent at the School of Arts.

(d) Wool Carpet weaving at the School of Arts.

(e) Cocanut fibre on a large scale (coir stringing and matting) all along the Arabian sea (where cocoanuts abound) in the hands of an enterprising class (Iluvars). This is the chief remunerative industry of this state at present.

2. (a) Sugar (country) at Alengad, Alwaye, Ettumanur, Kottayam, and Chengannur.

(b) Palyre fibre } in Thonala, Augustiswaram, Elaniel,

(c) Aloe fibre } Kalkulam and Kulittali.

(d) Lemon grass oil all along the lower altitudes of the hills.

(e) Copra (dried cocoanut kernel) is prepared, which is partially manufactured into oil locally at Aleppy, and Quilon oil mills (under native firms recently organised).

(f) Tapioca.

(g) Ginger.

(h) Areca-nut.

(i) Pepper.

(j) Roots.

(k) and Plantains of several kinds (Ettan, Poovan, Annan, Padayamkodan, Mouthan, Kappai, Padathi, Thevan-kathali, Kathali, Chambai, Annan, Kalungathali, Pachaivettan, Chingan), are grown at the foot of the ghauts in Menachil, Chenganachery, Thodupayha, Chengamure, Karthigapally, Karunapatty, etc.

(l) Timber. Teak, Blackwood, Ebony, Vendik, Them-baga, Jack, Augili, Sandal, in the forests and also Casuarina.

(m) Rubber and Sisal are being experimented and camphor.

(n) Minor forest products. Wax, Honey, Resin, Gallnuts, Soapnuts, &c., in the hills.

(o) Coffee, Tea, Cardamoms, Camphor and Spices in the hills and forests.

3. (a) *Leather*. Boot and Shoe making to a very slight extent in towns Nagercoil, Quilon, Trivandrum and Aleppy to supply a local demand (very limited).

(b) *Horn*. Snuff boxes, walking sticks (with swords inside), handles for knives, hatchets, &c., at Mavelikara.

(c) Ivory carving (superior) at the local School of Arts and by private artisans at Trivandrum.

(d) *Paper*. Manufacture on a large scale was attempted at Punalur, which proved a failure.

4. *Pottery*. Ordinary at Cherayinki and Kottal. Glazed, ornamental, machine mould, and cask mould at the School of Arts (Ink-wells, Urinals, Flower-pots, Jars, &c.)

5. (a) *Cutlery*.—Nutcrackers, sword blades, knives at Mavelika.

(b) Brass and copper ware at Quilon, Trivandrum and Aleppy. Betel and jewel boxes (brass) at Valapalle near Haripad.

(c) Bronzeware at Kottar.

Gendis (Water jug with protruding spouts) at Valapalle  
Bronze Mirrors are a speciality of *Arumula* near Ambale pulyha.

(d) Silver and Gold-ware at Trivandrum and Aleppy.

6. Nil.

7. Teakwood, Rosewood, Them-baga, Jack, *Furniture*, Angili, Bamboo and Rattan furniture at Trivandrum, Aleppy and Quilon and Thangachery (a British outpost Varkalai, near it) cane boxes of varying sizes at Varkalai matting with leaves aloe &c.) in the north

8. Bricks and tiles, at Kunjerevale near Trivandrum, and Mulla Mudu near Eraniel, (both under native firms). The same are manufactured on a large scale at Quilon with costly machines under European and American firms, for pushing on the sale of which out agencies have been recently opened at Trivandrum, Aleppy and Kottayam.

9. Decaying.

10. Better in most cases. In some cases there is now an improvement owing to the recent Industrial awakening.

11. (From the latest Census report.)

Occupation.	Population engaged.		Percentage to the total.
	Supported.	Workers.	
(1) Agriculture ... ..	1,392,712	490,720	47.2 p. c.
(2) Buildings ... ..	28,703	12,192	1 p. c.
(3) Textile fabrics ... ..	177,022	115,316	6 p. c.
(4) Metals ... ..	51,334	17,579	
(5) Earthen and stoneware ...	8,349	4,900	
(6) Wood, cane and leaves Aloe &c. Matting ... ..	84,489	38,436	
(7) Minor forest produce ...	1,028	397	
(8) Leather, horn and bone ...	999	370	

12. It is not possible to supply accurate information on this head without a special Industrial Survey authorised by Government.

13. To a large extent. Except the Iluvars who are enterprising and hard-working, the natives of the soil are mostly lazy.

14. They are sent to foreign markets in noticeable quantities as under, extracted from the latest Administration report (M. E. 1080-1904-1905).

Out of the entire external trade exports amounted to 75 p. c. and imports 25 p. c. (The corresponding figures for the whole of British India being 58 and 42 p. c. for 1905-1906. (Mr. Noel Paton's), showing clearly that it is much poorer than British India.)

Total external trade with (1) British India, 90 p. c.; (2) Pondicherry and Marseilles below 1 p. c.; (3) Ceylon, 1 p. c.; (4) Other Asiatic countries, 5 p. c.; (5) United Kingdom, 2½ p. c.; America above 1 p. c.

Value of Exports Rs. 171,48,056.

Imports „ 57,41,246.

During the particular year there was a very considerable decrease owing to general scarcity, 36 p. c. by sea, 49 by back-water, and 15 by land.



	EXPORTS.	Rs.
(1) Copra ...	...	15,45,112*
(2) Coir	...	39,12,499
(3) Cocoanut oil	...	13,07,762
(4) Fibre ...	...	9,627
(5) Cocoanuts	...	3,21,714
(6) Areca-nut	...	1,49,887
(7) Dry Ginger	...	5,57,232
(8) Coffee ...	...	2,430
(9) Jaggery...	...	3,50,114
(10) Salt-fish	...	1,59,482
(11) Tamarind	...	1,70,197
(12) Timber	...	1,61,814
(13) Pepper...	...	15,83,157
(14) Hides ...	...	1,86,991
(15) Cardamoms	...	20,309
(16) Tea ...	...	79,115
(17) Other Articles	...	66,30,614
	IMPORTS.	
(1) Piecegoods	...	9,38,523
(2) Thread	...	1,61,268
(3) Cotton ...	...	2,77,588
(4) Rice ...	...	8,82,881
(5) Paddy ...	...	14,62,909
(6) Tobacco	...	84,778
Minor articles, Oil, Ghee, &c.	...	19,33,362

Tobacco is almost universally used by the people. Government imports it and derives very considerable revenue from it. Revenue Rs. 1,38,066. The average consumption was 3.72 lbs. per head omitting young children, &c. the abstainers (one-third of the population). The leaf is imported from Coimbatore and Tinnevely (Jaffna, Ceylon.)

15. (a) Labour (unskilled) is cheap.

(b) Means of communication are cheap by backwaters and sea. There is a considerable area under sea board which is manufacturing. There are good ports, Aleppy, Quilon and Trivandrum, where steamers call, and minor ports Colachel and Anjengo wherefrom and whereto native ships, boats and katarans carry on minor trades.

(c) Natural resources (mineral and forest) are very rich still, even after European exploitation to a considerable extent.

(d) The Government of a Native sovereign without the drain of home charges and costly defence should, of course, do much towards the development of the rich natural resources under the well directed influence of strong and authoritative agencies.

\* One-third of the previous year's.

16. To a very great extent, the industries are expansible with efforts and facilities shown under a, b, and c.

17. Weaving and Paper manufacture. Neither Agriculture nor any one of the minor local handicrafts can maintain a family entirely. In many cases there are more than one occupation.

18. (a) Competition of cheap foreign articles.

(b) Poverty of the craftsmen.

(c) Want of sympathetic encouragement either from the Government or the moneyed class.

(d) Want of proper technical knowledge.

(e) Want of good habits of method and system.

(f) Utter absence of industrial awakening.

(g) Non-existence of proper ideals of public life and well directed ambition and enthusiasm.

(h) The all-absorbing pursuit among the literate of seeking Government appointments.

(i) Government's comparative indifference to the promotion of industrial enterprise by the natives of the State, at the same time that considerable facilities are given to European producers and merchants.

(To illustrate the above-mentioned Europeanised control, during the year (1904-1905) nearly a lakh of rupees was given by Government to *Kannan Devan* planters for opening roads as they liked in the High Range. More than 3 lakhs was already granted for the same purpose. With this 4 lakhs of hard-earned Government money, 28 miles of road have been opened in the High Ranges by *Kannan Devan* planters.)

(j) Utter absence of organised unofficial agencies either for independent industrial, social or other work, or for bringing wholesome influence to bear on the actions of the Government.

19. Decidedly.

20. (1) Starting with the help of Government urban and rural banks to provide cheap capital for the handicraftsmen.

(2) Opening special industrial schools for training boys of the special industrial classes in the particular industries.

(3) Sending to Japan qualified young men for industrial training instead of sending the sons or wards of influential officials to the United Kingdom to qualify themselves for entering the service of the state.

(4) Appointing an industrial expert properly qualified for the work and extremely enthusiastic about his duties to prepare an accurate and elaborate Industrial Directory for the state. (Information detailed about all the mineral, natural or other raw produce, produced or produceable, and the ways and

means for manufacturing any or all of them into finished articles for local consumption and export.)

(5) Starting Industrial Associations for doing active work in the improvement of industries.

(6) Utilising for practical work the unused expert knowledge of the heads of the Government School of Arts and Agricultural Demonstration Farm.

(7) Discouraging foreign exploitation and encouraging indigenous activities.

(8) Facilitating the means of communication.

(9) Infusion of the spirit of Swadeshism.

(10) Substantial recognition by Government of patriotic unofficial work.

21. All the exported raw products and rubber, camphor, gold, plumbago, mica, iron, banana, yams.

22. Coconut oil, copra to a slight extent.

23. Copra, oil fibre, hides, jaggery and country sugar, tapioca, plumbago, mica and forest produce.

24. Hides, etc. all the above.

#### D.

25, 26 and 27. Absolutely Nil.

28 and 29. In the Government school of arts, Trivandrum, instruction in pottery, ivory carving, cotton, plantain fibre and wool weaving is given. In the Nagercoil Technical Institute carpentry and weaving are taught. In the Attingal and Trivandrum Technical Institute weaving of cloths (checks etc. towels). In the Christian girls' schools at Kottayam, Aleppy, Trivandrum, Nagercoil and Quilon, lacemaking and embroidery are taught. In Mission Boys' schools for the backward classes carpentry is taught. In the Government Agricultural Demonstration Farm instruction in agriculture and allied science *may be given*; but now only the students of the Normal school receive instruction once a week on elementary agriculture to be used in the teaching of the subject in the rural Primary schools to which they go after their period of training is over.

30. Merely empirical industries taught, not being scientific at all.

31. They are of recent growth and doing useful work. Government gives 75 per cent. grant-in-aid for Industrial and Engineering subjects and 50 per cent for Commercial subjects taught in such schools. The existing ones are capable of much improvement under proper control and initiation, if the educative value of such school is predominated to the commercial and engineering.

32 and 33. Commercial classes are attached to the Fort High School and Native High School. Shorthand, typewriting, banking, book-keeping and commercial correspondence as well as surveying and levelling, mensuration, estimates and design, building materials and construction, &c., are taught in the above schools as well as in the Nagercoil Technical Institute.

34. Yes, for Mining, Agriculture, Medicine, Engineering and Textile Fabrics.

35. They were not tested. They are the sons or otherwise related to the influential officials of the state.

36. The Government. To serve the state.

37. In the United Kingdom.

38. No arrangement known till now they will be given appointment in the service.

39. The Heads of the Industrial School and Agricultural Demonstration Farm; the former in pottery (advanced) and carving and the latter in agriculture and applied sciences.

40. Not very usefully for the improvement of the industries they may be expected to foster.

41. A scheme of practical work should be given to each of them and efficient control should be exercised over their work. All possible facilities and encouragement should be given to them by Government. The former may be asked to go round the state and select the places where pottery industry can be newly started or existing crude form of it may be improved by special glazing processes or new designs etc. Specimens of pottery manufactured in the Government school with locally procured clay may be shown to the people and they may be persuaded and encouraged to improve their methods. The latter may experiment by rotation the cultivation of one or more special products congenial to the Travancore soil in his farm on scientific methods and communicate impressively the new knowledge thus gained to the people of the parts where such products are at present grown in the old primitive way, by holding there actual Demonstration classes, stopping if necessary for a considerable time at any one place. Publishing occasional leaflets. Distributing new seeds that may be profitably introduced with special instructions relating to their cultivation.

42. None native.

There are of course European associations well organised. The only exception is the one Agricultural Association recently started at Chenganechery, not yet doing much useful work.

(18) V. V. JOGIAH, Esq., *Berhampore, (Madras Presidency).*

The Industries of this District are not in a flourishing condition. Berhampore was once reputed, and I may even say it has not as yet ceased to have the reputation, as being an emporium for the best and most durable *Silk Manufactures*. The weavers for want of sufficient encouragement and on account of poverty have been leaving the District for Calcutta and other places to work in the mills there. It is said their residence in other places has been teaching them thrift and self-help which they wanted most when they were here. A number of improved looms and their practical working, if exhibited here to the advantage of the weavers, may to some extent benefit the wearers by inducing them to take to these looms and thus increase the outturn of their industry.

Chicacole, a town about 90 miles from Berhampore, is reputed for its *shirting cloth*. It is generally used for summer wear. Though it is not thick, it is durable and is generally in use in the District. *Superior cotton cloths* are made at Ampola near Chicacole, and Narasampeta, a town of some importance; while *coarse cloth* which is worn by the common people and is said to be durable is made at Itchapore, Sanpett and other places.

There are also other industries in the District. *Sugar* is manufactured in a Factory at Aska. This has been under the management of Mr. Menchin, a well known European merchant in these parts for a long number of years. *Brass utensils and brass betel-nut boxes and fancy works* are made in a village called Pitala and Bellagunta in the Gumsur Taluk of this District. The work is considered very superior. At Russeludi in the Gumsur Taluk there is a Mohammadan merchant by name Nyaz Mahamed Sahib who has two big godowns to convert raw hide into *tanned hide* for export and his business is flourishing. There has lately been established a *rice-mill* by a Godavery merchant of repute in Sanpett, a railway station, about 32 miles from Berhampore. Just at present, it has not been as profitable as it was expected to be. It is said that there has not been a sufficient supply of paddy for the mill. It is suggested that if it is made a joint-stock concern taking a large number of influential men of the District as shareholders, the latter may be able to secure large quantities of paddy for the mill and that the result will be large profits. It is encouraging to hear that Mr. Kovvuru Basivi Reddi, who has opened factories elsewhere and who is the owner of the mill at Sanpett, contemplates taking a large number of shareholders. By this means the working of the mill can be made a success, and of profit to all concerned.

I should say there is nothing like industrial activity in the District. An Industrial Association—a co-operative concern—was formed with the object of encouraging the sale of Swadeshi goods and of purchasing looms and exhibiting the same for the benefit of the weavers here. It has not done much work as yet, but it is to be hoped that it will do some work in the future.

In this connection I must not omit to mention the good, useful and practical work which the Baptist mission have been doing at Berhampore. They have started a workshop and have been training Native Christians in weaving coarse cloth, towels, &c., with improved looms, in carpentry, carriage building and repairing, furniture-making and shoe-making &c.

As for agriculture, the District may be said to contain a large and fertile tract of country fit for this purpose. At present almost the whole of this tract is brought under plough. Generally only one crop is raised. It is very unusual to raise a second crop. There is an Agricultural Association in the District with the Collector as its President and it has opened an experimental farm in Berhampore.

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(19) G. R. GAMBHIR RAO, Esq., *Deshmukh of Savada*  
(*Khandesh district*).

There are no manufacturing industries of any kind. There are no minerals. There are no banking facilities. There are no facilities for technical education. And there is no industrial association.

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(20) THE EDITOR, "*The Khandesh Vaibhar*," *Dhulia*.

Same as above.

## APPENDIX VI.

### THE INDIAN INDUSTRIAL CONFERENCE.

#### Prizes for Model Hand-looms.

A prize of Rs. 300 cash will be given to the best factory hand-loom and one of Rs. 200 to the best cottage hand-loom which will satisfy the following conditions:—

The factory loom should be able to work 100 to 120 picks per minute without undue fatigue to a practised weaver, should be able to work at this speed on a warp of 40's counts without undue breakage, should be simple of construction and easy of repairs by a town mechanic, should have automatic taking-up motion to control the number of picks per inch in the cloth, and should not exceed Rs. 100 in price for a 45 inch loom.

The cottage loom should be able to work 100 to 120 picks per minute without undue fatigue to a practised weaver, should be able to work at this speed on a warp of 40's counts without undue breakage, should be simple of construction and easy of repair by a village or town mechanic, and should not exceed Rs. 50 in price for a 45 inch loom.

The inspection and examination of the competing hand-looms will take place at Calcutta in December next in the week of the meeting of the next Indian Industrial Conference, and will be conducted by competent men selected for the purpose. The place for the exhibition of the model looms will be announced later on. All intending competitors should communicate to the undersigned their intention to exhibit their models before the 15th November 1906.

R. N. MUDHOLKAR,

*General Secretary,*

*Indian Industrial Conference,*

*Amroats (Bevar),*

## APPENDIX VII.

### JOINT STOCK COMPANIES.

*Number and Particulars of Joint Stock Companies Registered in each Province in British India in the nine months ending the 30th September 1906.\**

No.	Name of Company and Situation of its Registered Office,	Object.	Capital.
<b>I.—BANKING AND INSURANCE.</b>			
(a) BANKING.			Rs.
1	Indian Mills, Co-operative Life Assurance and Mahomedan Central Banking Co., Bengal	Erecting mills and factories for the production of cloth, etc., carrying on the business of life and other forms of insurance and the business of banking	10,00,000
2	Sidlaghatta Sri Suryanarayanawami Bank, Mysore	Banking and Trading in Silk and Jewels	20,000
3	Lahore Bank, Lahore, Punjab	Banking and General Trading	2,50,000
4	Canara Banking Corporation, Udipi, S. Canara, Madras	Banking	90,000
5	Pioneer Investment Co., Lahore	Lending money, dealing in shares, receiving deposits, etc.	2,50,000
6	Kapur Commercial Agency, Lahore	Money-lending and Commission Agency	1,00,000
7	Swadeshi Bank, Bombay	Banking	1,00,000
8	Hindustan Bank, Multan, Punjab	Banking and Agency	2,50,000
9	Marwar Bank, Hissar	Banking	10,00,000
10	Chalapuram Bank, South Malabar, Madras	Do.	40,000
11	Banking and Ornament Manufacturing Co., Meerut, U. P.	Banking and Ornament Manufacture	1,00,000



12	Islamia Bank, Delhi, Punjab...	Banking	10,00,000
13	Bank of Western India, Bombay	Do.	25,00,000
14	Bank of India, Bombay	Do.	1,00,00,000
		<b>Total, Banking</b>	<b>1,67,00,000</b>
<b>(b) INSURANCE.</b>			
15	Indian Mutual Assurance Co., Vizagapatam, Madras	Life Insurance	20,000
16	Co-operative Assurance Co., Lahore, Punjab	Fire and Accident Insurance	5,00,000
17	All India United Insurance Co., Bombay...	Fire Insurance	50,00,000
		<b>Total, Insurance</b>	<b>55,20,000</b>
		<b>Total, Banking and Insurance</b>	<b>2,22,20,000</b>
<b>II.—TRADING.</b>			
<b>(a) NAVIGATION.</b>			
18	East Bengal River Steam Service, Bengal	Carrying on the business of ship-owners and carriers by land and water	6,00,000
19	Madras Steam Navigation Co., Rangoon, Burma	Navigation between Rangoon and the Coromandel Ports	10,00,000
20	Port Shipping Co., Bengal	Business of carrying by land and water and of ship-owners	15,00,000
21	Bombay Steam Navigation Co., Bombay	Business of ship-owners and charterers	60,00,000
22	Shah Steam Navigation Co. of India, Bombay	Ship-owners and charterers of ships, etc.	30,00,000
		<b>Total, Navigation</b>	<b>1,21,00,000</b>

\* Compiled from the Indian Trade Journal.

No.	Name of Company and Situation of its Registered Office.	Object.	Capital.
II.—TRADING.—(Continued.)			
(b). CO-OPERATIVE ASSOCIATION, ETC.			Rs.
23	Kumbakonam Co-operative Stores, Kumbakonam, Madras	Co-operative Stores, etc.	10,000
24	Munshiganj Co-operative Co., Bengal	General trading, and trading in Indian arts and manufactures	20,000
25	Magura Desiya Bhandar, Bengal	Trading in country-made goods	15,000
26	Bengal Industrial and Trading Co., Bengal	General trading	50,00,000
27	Laxmir Bhandar, Calcutta	Trading in Indian Manufactures and products	1,00,000
28	Oriental Match Manufacturing Co., Bengal	Manufacturing Matches	1,00,000
29	Shragers, Bengal	Spinning and doubling cotton, flax, etc., and manufacturing linen	1,00,000
30	Swadeshi Vastu Prachar Co., Maghiana, Jhang, Punjab	Encouraging Indian Arts and Industries	20,000
31	Ahmedabad General Agency Co., Ahmedabad	Commission Agency	1,00,000
32	Swadeshi Hitechu Traders Co., Nasik, Bombay	Trading in cloth	20,000
33	Swadeshi Vyapar Ootejak Mandal, Satara	General trading	20,000
34	Kishorganj Trading Co., Mymensingh, Eastern Bengal and Assam	Do.	20,000
35	Habiganj Jatiya Bhandar Sanuti, Sylhet, Eastern Bengal and Assam	Banking, Agriculture and General Trading	50,000
36	Cachar National Union Club, Cachar	General trading	20,000
37	Bharat Champad, Cachar	Do.	20,000
38	National Stores, Bengal	Do.	1,00,000
39	Beliaghata Cardboard Manufacturing Co., Bengal	Manufacturing strawboards, cardboard, etc.	50,000
40	Krishnagar Desiya Drabyagar, Bengal	Trading in Indian arts, manufactures, etc.	20,000
41	Jubilee Workshop, Aligarh, U. P.	Trading in leather, rubber, wood, etc.	30,000
42	Salem Shevvapet Sri Ramalinga Samdesvari Yarthaka Co., Shevvapet, Salem, Madras	Trading in cloth, etc.	1,00,000
43	Central Indian Co-operative Stores & Manufacturing Co., Delhi	Manufacture of and trade in Indian goods	1,00,000

44	Shet Rustomjee Devicha and Co., Ahmedabad	...	...	Carrying on the agency of a mill	...	3,200
45	Kushtea Desiya Bhandar, Bengal	...	...	Dealing in articles of Indian or Japanese art and Manufacture	...	20,000
46	Bengal Pottery Works, Bengal	...	...	Manufacture of Terracotta, porcelain and earthen-ware	...	20,000
47	Shripad Ramchandra & Co., Poona	...	...	Commission Agency	...	20,000
48	Swadeshi Knitting Factory, Tanukur, Madras	...	...	Sale of country-made goods	...	5,000
49	Swadeshi Stores, Godavari	...	...	Trade in indigenous articles, etc.	...	10,000
50	Giridih Swadeshi Gola, Bengal	...	...	Trading in Indian art, manufacture and produce	...	20,000
51	Chhatra Bhandar, Bengal	...	...	General trading, etc.	...	20,000
52	Amta Shilpa Samity, Bengal...	...	...	Development of Cotton Industry, etc.	...	5,000
53	United Bengal and Assam Pharmaceutical and Chemical Works, Bengal	...	...	Manufacturing Medicines and Chemicals	...	3,00,000
54	Bagirhat Bharat Bhandar, Bengal	...	...	General trading	...	10,000
55	Sholapur Handloom Weaving Co., Sholapur, Bombay	...	...	Trading in hand-made cloth	...	15,000
56	Swadeshi Vastu Bhandar, Sholapur	...	...	Dealing in Country goods	...	10,000
57	Gujarat Candle Factory and Asbestos Works, Bombay	...	...	Manufacturing Candles, Soaps & Asbestos Wicks.	...	1,00,000
58	Indian Bobbin Manufacturing Co., Surat, Bombay...	...	...	Making bobbins, Shuttles, and other articles of wood	...	75,000
59	Athani Swadeshi Vyaparotejak Co., Athani, Bombay	...	...	Trading in Indian goods	...	20,000
60	Sind Weaving Co., Sind	...	...	Encouraging textile industry by use of handlooms.	...	20,000
61	Indian Co-operative Society, Bombay	...	...	Trading in Indian Articles	...	1,00,000
62	Desiya Stores, Vizagapatam...	...	...	Do.	...	10,000
63	Oriental Glass Works, Aligarh, U. P.	...	...	Manufacture of Glassware	...	50,000
64	Pioneer Handloom Weaving Co., Jullundhur, Punjab	...	...	Weaving cloth	...	50,000
65	Swadeshi Hitachintak Mandali, Jalgaon, Bombay	...	...	Trade in country goods	...	10,000
66	Dosabhoy Bagbahai & Co., Ahmedabad, Bombay	...	...	Agency of a mill	...	8,000
67	Parlakemidi Weaving Co., Ganjam, Madras	...	...	Manufacture and sale of cloth	...	12,000
68	South Indian Stores and Agency Co., Madras	...	...	General Merchants and Commission Agents, etc.	...	25,000
Total, Co-operative Associations, etc. ...						70,53,200
Total, Trading ...						1,91,53,200

No.	Name of Company and Situation of its Registered Office.	Object.	Capital.
<b>III.—MILLS AND PRESSES.</b>			
<b>(a) COTTON MILLS.</b>			
66	Bengal Luxmi Cotton Mills, Bengal ...	Spinning and Manufacturing of Cotton ...	12,00,000
70	Ahmedabad New Edward Manufacturing Co., Ahmedabad ...	Spinning and Weaving Cotton, etc. ...	5,25,000
71	Bankey Behari Lal Jai Narayan Cotton Mills Co., Etawah, U P. ...	Manufacture and Sale of Cotton, etc....	1,20,000
72	Ahmedabad Swadeshi Spinning and Manufacturing Co., Ahmedabad ...	Spinning and Weaving Cotton, etc. ...	8,00,000
73	Poona Swadeshi Weaving Co., Poona ...	Do. Do. ...	2,50,000
74	Rehmani Mills, Bombay ...	Do. Do. ...	10,00,000
75	Vizagapatam Spinning and Weaving Co., Vizagapatam, Madras	Do. Do. ...	1,00,000
76	Finlay Mills, Bombay ...	Do. Do. ...	20,00,000
77	Desi Cloth Mills Co., Bengal...	Spinning, Manufacturing, etc., cotton, cotton stuffs and fabrics ...	8,00,000
78	Godavari Weaving Factory, Tamerker, Godavari, Madras ...	Spinning and Weaving Cotton, etc. ...	12,000
79	Coimbatore Imperial Cotton Mills Co., Coimbatore, Madras...	Do. Do. ...	7,00,000
80	Ganesh Cloth Mills Co., Bengal ...	Do. Do. ...	5,00,000
81	Madras Mercantile and Industrial Corporation, Madras ...	Do. Do. ...	25,00,000
82	Tripura Co., Bengal ...	Business of Spinners, weavers, etc., of cotton jute, hemp, etc. ...	15,00,000
83	Bharat Hitaishi Spinning and Weaving Co., Bengal ...	Business of Manufacture, dyeing, etc., of. cotton, cotton stuffs, etc. ...	10,00,000
84	Barsi Spinning and Weaving Mills, Bombay ...	Spinning and Weaving Cotton, Flax, etc. ...	10,00,000
85	Akola and Central India Spinning, Weaving and Manufacturing Co., Bombay ...	Do. Do. ...	7,50,000
86	Edward Mills Co., Beawar, Ajmer, Merwara ...	Spinning, Weaving, ginning and packing cotton ...	6,40,000
87	Pratap Spinning, Weaving and Manufacturing Co., Khandesh .	Weaving cloth and spinning cotton, silk, etc ...	10,00,000
88	Kamala Mills, Bengal ...	Weaving yarn ...	1,30,000

88	Gordhan Spinning and Manufacturing Co., Ahmedabad	...	Spinning and Weaving Cotton	...	...	5,25,000
90	Burhanpur Tapti Mill, Bombay	...	Do.	Do.	...	12,00,000
<b>Total Cotton Mills</b>						<b>1,80,52,000</b>
<b>(b) JUTE MILLS.</b>						
91	Belvedere Jute Mills, Bengal...	...	Spinning, weaving, manufacturing, etc., Jute.	...	...	14,00,000
92	Lawrence Jute Co, Bengal	...	Spinning and Weaving Jute, etc.	...	...	15,00,000
<b>Total, Jute Mills</b>						<b>29,00,000</b>
<b>(c) OTHER MILLS AND PRESSES.</b>						
93	Dattatraya Oil Mill Co., Khandesh, Shirpur, Bombay	...	Expressing Oil	...	...	85,000
94	Sharada Mills Co., Delhi, Punjab	...	Spinning, weaving, manufacturing wool, etc.	...	...	5,00,000
95	Aya Ram Ginning and Press Co., Dera Ghazi Khan, Punjab...	...	Ginning and pressing cotton, etc.	...	...	1,00,000
96	Narnarayan Press and Manufacturing Co., Broach, Bombay	...	Do.	Do.	...	60,000
97	Sholapur Oil and Flour Mills Co., Sholapur, Bombay	...	Millers and oil compressors	...	...	50,000
98	Rannabennur Ginning and Trading Co., Rannabennur, Bombay	...	Ginning and pressing cotton, etc.	...	...	50,000
99	Gujarat Oil Mill and Manufacturing Co., Ahmedabad	...	Manufacturing and selling oil	...	...	2,50,000
100	Krishna Ginning Co., Shikohabad, United Provinces	...	General trading	...	...	80,000
101	Sialkot Swadeshi Co., Sialkot, Punjab	...	Ginning, pressing, etc., textiles, fabrics, wool, etc.	...	...	50,000
102	Coromandel Baling Co., Cocanada, Godavari, Madras	...	Baling and pressing	...	...	3,00,000
103	Punjab Brothers Co., Multan, Punjab	...	Ginning, pressing, etc., wool, hemp, etc.	...	...	2,50,000
104	Dhanki Ginning and Manufacturing Co., Ahmedabad, Bombay	...	Ginning and pressing cotton	...	...	10,000
105	Barai Cotton Ginning Factory Co., Bombay	...	Do.	Do.	...	40,000
106	Mhow-Woon Rice Mill Co., Hanthawady, Burma	...	Rice Millers and Traders	...	...	1,11,750
<b>Total, other Mills and Presses</b>						<b>18,86,750</b>
<b>Total, Mills and Presses...</b>						<b>2,28,38,750</b>

No.	Name of Company and Situation of its Registered Office.	Object.	Capital.
<b>IV.—SUGAR MANUFACTURE.</b>			
107	Anakapalle Sugar Works and Trading Co., Anakapalle, Vizagapatam, Madras ...	Sugar Manufacturing and trading ...	
108	Maharajgunga Desi Sugar Works, Bengal ...	Manufacturing, refining, etc., Sugar, Molasses, etc. ...	,00,000
<b>Total, Sugar Manufacture...</b>			<b>5,00,000</b>
<b>V.—PLANTING, MINING AND QUARRYING.</b>			
109	Indian Cotton Cultivation Co., Bengal ...	Cotton Cultivation ...	10,000
110	Western India Cotton Growing Syndicate, Bombay ...	Growing Cotton and other fibrous substances ...	52,000
111	Peninsular Mineral Co., of Mysore, Bangalore City ...	Mining of Manganese ore ...	3,00,000
112	British India Coal Co., Bengal ...	Colliery business ...	1,00,000
<b>Total, Planting, Mining and Quarrying</b>			<b>4,62,000</b>
<b>VI.—OTHERS.</b>			
113	Ice Factory and General Mills, Shahpur, Punjab ...	Erecting ice and other factories ...	50,000
114	National Indian Trustee Association, Lahore, Punjab ...	Acting as Executors, Administrators, Receivers, Guardians, Managers, Agents and Trustees for Wards, Clients and Charities of Investment, etc.	5,00,000
<b>Total, others ..</b>			<b>5,50,000</b>
<b>Grand Total ...</b>			<b>6,67,23,950</b>

*Abstract Table of Companies Registered in the Months  
January—September, 1906.*

No.		Capital Rs.
14	Banking Companies ... ..	1,67,00,000
3	Insurance Companies ... ..	55,20,000
5	Navigation Companies ... ..	1,21,00,000
46	Co-operative Associations, etc. ... ..	70,53,200
22	Cotton Mills ... ..	1,80,52,000
2	Jute Mills ... ..	29,00,000
14	Other Mills and Presses ... ..	18,86,750
2	Sugar Manufacturing Companies ... ..	5,00,000
4	Planting, Mining and Quarrying Companies ... ..	4,62,000
2	Other Companies ... ..	5,50,000
114	Grand Total ...	6,57,23,950

## APPENDIX VIII.

## INDIAN PATENTS.

(Filed in the ten months December 1905—September 1906.)

## APPLICATIONS FILED.

1. Suraj Narayan Verma, of Rae Bareli, and Jagat Narayan of Sultanpur, for improvements in shaft bearings applicable to sugarcane crushing mills.
2. Balkrishna Chintaman Chhatre, of Bombay, for improvements in fibre extracting machines.
3. Abdeali Haji Sultanaly, and Dinshaw Eduljee Dotivalla, both of Amraoti, for improvements in cotton gins.
4. Khan Bahadur Haji Sajan Laljee, and Dosabhoy Jamsetjee Kanga, both of Secunderabad, for manufacture of an artificial blue colour.
5. Rai Bishambar Nath, Executive Engineer, Public Works Department, Punjab, for a cheap country oil lamp.
6. Rai Bishambar Nath, Executive Engineer, Public Works Department, Punjab, for a cheap bed warmer.
7. Rai Bishambar Nath, Executive Engineer, Public Works Department, Punjab, for a cheap water heater.
8. Mirza Mahamed Ali Khan, of Tonk, for improvements in chaff cutters and the like.
9. Laljee Madhowjee, of Sukkur, for improvements in clocks.
10. Akshoy Kumar Mazumdar, of Mymensingh, for "Tarunia," or form of wood-substitute.
11. Bonkim Lal Das, of Calcutta, for an improved handloom.
12. Gangadhar Ramachandra Mangrulkar, of Bombay, for a grass match-box.
13. R. B. Patel, of Baroda, for automatic fly-shuttle arrangement for handlooms.
14. Ebrahim Abdul Razaq Moulvi, Alishaik Bidree, and Mohamed Ishaq Bidree, all of Sholapur, for improvements in basing mechanisms for warping machines and the like.
15. Rao Bahadur Chevur Krishnchar Subba Rao, of Coimbatore, for a Ryots' improved water-lift and genera worker.

\* Compiled from the lists published in the numbers of the *Indian Textile Journal* from January to October 1906.



16. The Bengal Rhea Syndicate, Limited, of Calcutta, and H. E. Whitehead, of Dalsingh Serai, for improvements in and relating to apparatus for cleaning fibres.

17. Bonkim Lal Das, of Calcutta, for a loom to be called Bonkim's Domestic Loom.

18. Gulam Hyder, of Bombay, for self-acting orifice cleaning needle for petroleum vapour lamp or stove.

19. Shapoorji Burjorji Fraser, of Bombay, for improvements in the smoke-burning apparatus of steam boiler furnaces.

20. Ram Nath, of Delhi, for a new process for reproducing copies of drawings on paper in blue-black lines on perfectly white ground direct from tracings which may be coloured or uncoloured.

21. Lalit Chandra of Ganhati, Assam, for improvements in spinning and twisting machines.

22. Banwari Lall, of Arohra, for improvements in the sugar cane crushing mill.

23. Gangadhar Ramchandra Mangrulkar, of Bombay, for improvements in the manufacture of matches.

24. Hari Sakharam Chowan and Karve, of Nasik, for a mote for pumping or drawing out water from wells by means of bullock power.

25. Madan Lall Kapoor, of Peshawar, for a machine (Head and Treadle or Power Loom) for weaving cotton, silk or similar yarn into cloth.

26. Chandra Nath Bose, of Bally, for a process for manufacturing celluloid choories (bangles).

27. Puran Chandra Chatterjee, of Calcutta, for an improved fly-shuttle loom to be called "Sree Krishna" loom.

28. Sait Mutumull and Sait Naraindas, of Sukkur, for improvements in the construction of reservoirs for obtaining and storing water for drinking or other purposes.

29. Krishna Chandra Dass, and Brindaban Chandra Maitra, both of Calcutta, for an improved and simple form of automatic loom entitled "Krishna Brindaban's Patent Jahar Loom."

30. Nur Din, Siraj Din, Shah Mohammad, and Nur Ahmad, all of Lahore, for a syphon fitted with filter for drawing oil or spirits from cans and casks.

31. C. M. Roy, of Lucknow, for improved brick burning in a trench or over ground kiln.

32. A. Subramania Servai, of Athikady, for a water lift.

33. Khetromohon Doss, care of L. Deveria, Alipore, for the "Bengal" self-acting brick and tile-making machine, and the "Bengal" season and weather-proof kiln.
34. Khetromohon Doss, care of L. Deveria, Alipore, for the "Bengal" season and weather proof kiln.
35. A. L. Gange, and Kumud Nath Mazumdar, both of Calcutta, for a process for making waterproof and enamelling ordinary native earthenware to be known as enamelled pottery.
36. Bandu Ganoba Kalhaikar, of Nasik, for an iron water mot.
37. Pestonjee Cursetjee Mehta, of Bombay, for a new fuel briquette.
38. Kedarnath Mendul and Hiralal Mendul, of Howrah, for hand wheel boomur press for pressing of loose jute in one bundle of one and a half maund in weight.
39. Gangadhar Ramchandra Mangrulkar, of Sholapur, for paper or cardboard box making machine.
40. Varajlal Karsandas Davda, of Bombay, for improvements in lamp chimneys of mica.
41. Dr. V. K. Kirloskar and V. K. Tembe, of Sholapur, for an improvement in the bath boiler for heating water for domestic purposes.

42. Ganesh Chandra Aduck, of Calcutta, for improvements in hand power jute and similar presses.

43. Priya Nath Roy, of Darjeeling, for a semi-automatic spinning wheel, a rustic machine with common material to be called "Sarala Charka."

#### SPECIFICATIONS FILED.

1. Surapati Ghatak, Shahapur, for a continuous revolving machine for dryin and roasting grains and small leaves.

2. Suraj Narayan Verma, and Jagat Narayan, both of Delhi, for a road ramming machine.

3. David Dhanakoti Raju, of Madras, for an oil extracting machine.

4. Ardeshir Temuljee Mirza, of Jamnagar, for improvements in automatic sluice gates.

5. Villupuram Rajaratna Swaminatha Mudaliar, of Madras, for a self-bucket lifting and depositing hand sanitary cart.

6. Mahomed Abdul Kuddus Badsha Sahib, of Madras, for improvements in the construction of curtains or screens known as "rust screens."

7. Govind Karsan Ramji, of Kalian, for an improved method of working kilns for burning bricks,

8. Ardeshir Temuljee Mirza, of Jamnagar, for improvements in hydraulic modules.

9. Ardeshir Temuljee Mirza, of Jamnagar, for improvements in automatic canal regulators.

10. Merwan Ruttonji Khareghat, of Madras, for an automatic falling and rising shutter for weirs, sluices, etc.

11. Banwari Lall, of Arohra, for improvement in sugar-cane crushing mill.

12. Sadasukh Shrivam, of Sholapur, for improvements in warping machines.

13. Haribhoy Dhanji Mistri, of Lusala, for improvements in cotton gins.

14. Balkrishna Chintaman Chhatre, of Bombay, for improvements in fibre extracting machines.

15. Abdeali Haji Sultanaly, and Dinshaw Eduljee Dotivalla, both of Amraoti, for improvements in cotton gins.

16. Luxminarayana Bhawaniram, and Karimsahib Manoobhai Nadap, both of Sholapur, for improvements in hand warping machines.

17. Mirza Mohamed Ali Khan, of Tonk, for improvements in chaff cutters and the like.

18. Hari Sakharam Chowan and Karve, of Nasik, for a mote for pumping or drawing out water from wells by means of bullock power.

19. Madan Lall Kapoor, of Peshawar, for gold thread making machines.

20. Akshaya Kumar Mazumdar, of Mymensingh, for tarunia or a form of wood substitute.

21. Raji Bhailal Patel, of Baroda, for automatic fly-shuttle arrangement for handlooms.

22. Khursedjee Sorabjee Jussawalla, of Bombay, for a floating apparatus for developing water power from the currents of rivers, obviating the necessity of any masonry work and for raising water to any height for irrigation and other purposes.

## APPENDIX IX.

THE INDIAN COTTON INDUSTRY AND THE  
SWADESHI MOVEMENT.

A member of a well known cotton firm in Bombay sends to the *Indian Textile Journal* for January 1906, the following review of the prospects of the cotton trade in India:—

The cotton industry to-day is in as good a position, if not better, than it was this time last year. The demand is so great that it is very difficult to obtain cloth for near delivery. Mills have contracts to-day for yarn and cloth up till the end of this year. Manufactured article already under contract, the manufacturers have nothing to fear for twelve months ahead, if not more.

Of course the cloth market has received a great impetus from what is known as the Swadeshi movement. At one time English manufactured cloth compared to the Indian cloth of approximately the same quality, fetched about 12 per cent. higher prices. This under the stress of the Swadeshi movement has disappeared. Not only do the Indian dhoties fetch as good a price as English dhoties, but in some cases a shade better. But the sudden demand made by Bengal on the weaving industries of Western India has not been adequately met. Where it has been met, the result has been very disappointing to the Bengalee buyers. Cloth woven in Bombay mills is as a rule under 32's, while the demand for Bengal, which mainly consists of dhoties, must be met by articles woven out of 30's and 40's, and also 40's and 60's. These the Indian mills have not been in a position to make. Indian cotton being a short staple, one can scarcely go beyond 32's, and although American cotton is imported, as well as yarn from Lancashire, these have been utilised to a very small extent. We do not think that Bombay has sold to Bengal more than 5,000 bales of Swadeshi dhoties. Whatever was sold, however, by Bombay, has not given the buyer so great a disappointment as his purchases from Ahmedabad, which have been put at 20,000 bales. No doubt Ahmedabad has made money out of the Bengalee. They have not only got very remunerative prices, but have sold the poor buyers very inferior stuff, full of size and inferior all round. So great has been the disappointment felt by the Bengalee purchasers that some bales have been sent back to Bombay to be disposed of, as the Bengalee would have none of them. This, no doubt, is a great mistake on the part of the manufacturers. At the same time it is impossible to meet the sudden demand made

by Bengal on the productive powers of Western India. Things will right themselves before long. Twelve thousand looms have been ordered out by Ahmedabad and Bombay, and there is great activity in both these industrial centres. It is expected that by the end of the year most of these looms will have commenced work. It will be found that at no period in the history of the industry have so many looms been ordered out within so short a space of time as twelve months. By referring to statistics, it will be seen that in 1895 we had in India 35,000 looms. In 1904 we had 45,000 looms. It took practically all that period to add 10,000 looms, whilst we have now added something like 12,000 looms in about twelve months, which speaks volumes for the vitality of the industry. The profits realised throughout India have been very handsome, and during the years 1905 and 1906, it is computed that, including agents' remuneration, they will come to about 14 crores, or at the rate of 7 crores per annum. It is, therefore, evident that those who have made money out of this industry will hasten to invest the bulk of it again in plant and machinery. It has been recently mentioned that the progress of textile India has been very slow, and that during the last ten years we have altogether invested but three crores of rupees, whilst in order to supply the Swadeshi demand for cloth we ought at least to invest three crores every year. It is an error to suppose that if we did not invest during the last ten years more than three crores, it was owing to want of capital, for the simple reason that, as we have shown above, we added 12,000 looms within a short period of twelve months. The reason why the investment was so meagre was that the profits realised by those interested in this line were extremely poor, and consequently there was absolutely no inducement for capitalists to invest. It is after all a question of profit. What with good times, a risk demand for yarn, a moderate price for cotton and the Swadeshi movement, we now find that our Western Presidency is going ahead and is bound to do so as long as the profits remain very high. A country which can import precious metal to the tune of about 75 crores during a period of three years need not be very much distressed at an apparent want of capital. There is money enough in the country for all legitimate industrial ventures and given a profitable return, we are sure that an appreciable expansion in this industry is bound to take place.

## Appendix X.

*List of persons elected as delegates to the Second Indian Industrial Conference held at Calcutta on the 29th and 31st December 1906.*

1. *By a Public Meeting held at Faridpur on the 12th December*—  
Messrs. Kshetra Gopal Sircar and Sarat Chandra Banerji.

2. *By the Surma Valley Association at a meeting held at Sylhet on the 16th December*—Babus Sarada Charan Shyam, Radha Benode Das, Nikunja Behari Dutt, Ambica Charan Das, Satish Chunder Dutt, Sasindra Chandra Sinha, Hemendra Chandra Sinha, Promode Chandra Dutt, Nagendra Nath Dutt, Dharani Nath Dutt, Rajkishore Dev, Nadia Behari Das, Rajani Kanta Bhattacharya, Satish Chandra Chowdhuri, Broja Nath Chowdhuri, Harakinkar Das, Peary Lal Shome, Ishan Chandra Sinha, Sarat Chandra Shome, Anand Charan Gupta, Kali Kishore Das, Durga Kumar Das, Ramani Mohan Das, Prasanna Kumar Dutt, Pavitra Nath Das, Sanath Kumar Dutt, Dwarka Nath Chowdhuri, Krishna Kishore Swamy, Girish Chandra Sinha, Prem Narayan Kar, Jogendra Mohan Palit, Devendra Chandra Dutt, Sudarsan Das, Sasi Kumar Chowdhuri, Anukul Chandra Dhur, Karuna Kumar Chaudhuri, Krishna Prasad Ray Chaudhuri, Haris Chandra Ray, Siris Chandra Dutt, Manoranjan Sinha, Kali Kumar Purayasth, Dwarka Nath Dutt, Vidya Kumar Chaudhuri, Brojo Sunder Sarma, Girish Chandra Dutt, Jadu Nath Sen, Nobin Chandra Chakravarti, Radha Govinda Chaudhuri, Dwarka Nath Chaudhuri, Raj Govinda Chaudhuri, Joy Chandra Chaudhuri, Narmada Kumar Sen, Kamini Kumar Chanda, Mohesh Chunder Dutt, Raj Chandra Das, Avanti Nath Dutt, Kali Mohan Dey, Kailas Chandra Dutt, Kali Charan Pashe, Bama Chara Syam, Sharma Charan Dev, Sunder Mohan Das, Bepin Chandra Pal, Mahendra Nath De, Nogendra Nath Chaudhuri, Suresh Chandra Dev, Braja Sundar Roy, Tarakishore Chaudhuri, Brajendra Lal Ganguly, Kedar Nath Chakravarti, Umesb Chunder Dutt, Jagat Chandra Dutt, Sivdhan Vdyarnabha, Manmohan Das, Sirish Chandra Das, Krishna Chunder Dutt, Basanta Kumar Nandi, Jogendra Kishore Sinha, Radha Charan Das, Jogendra Chandra Chakravarti, Kamini Kumar Bhattacharya, Iswar Chandra Roy, Krishna Kumar Chaudhuri, Ananga Mohan Gupta.

3. *By the Faridpur People's Association and Swadeshi Samiti*—  
Babus Ambica Charan Mazumdar, Kshetra Gopal Sircar, Chowdhuri Afimazzaman, Chowdhuri Ghulam Mowla, Chowdhuri Mahomed Ismail,

Babus Prasanna Kumar Sanyal, Kali Prasanna Sircar, Mathura Nath Maitra, Purna Chandra Mittra, Hem Chunder Mukerji, Bireshwar Sen, Sasi Bhushan Biswas, Kali Prasanna Bagchi, Kamini Kumar Sen, Rajendra Kumar Gupta.

4. *By the Bande Mataram Samiti, Poona*:—Babus Promoda Ch. Chowdhuri, Bama Chandra Mazumdar, Kali Charan Sen, Birendra Prasad Bose, Bidhu Bhusan Bhattacharya, Jadav Chandra Goswamy, Kunja Lal Sahai, Jagadish Chandra Bysack, Satish Chandra Bysack.

5. *By a Public Meeting held at Ahmedabad on the 17th December*:—Dewan Bahadur Ambalal Sakarlal Desai, Sheth Chimanlal Nagindas, Sheth Ambalal Sarabhai, Sheth Haridas Achratlal, Sheth Chemanlal Girdharilal, Sheth Balabhai Girdharilal, Mr. Govindrao A. Patel, Mr. Ramanbhai Mahipatram, Messrs. Mulchand A. Shah, Harjivan B. Shukla, Popatlal Hemchand, Dolabhai Nagindas, Thakoral H. Desai, Trimbak Vithal Joshe, Chamanlal P. Broker, Hematlal Dalsakhram, Dr. Jammadas Premchand, Dr. Pitambardas Kabirdas, Sheth Govindlal Manicklal, Messrs. Chandulal Manilal Desai, Vaidya Jatasankar Lildhar, Chandulal Chhotalal, Shambhu Prasad C. Thakore, Bhogindra R. Divatia, Shankar Nath Sahiyad, Punjabhai S. Bhat, Chimanlal Kriparam, Balmukund A. Desai.

6. *By the Punjab Chamber of Commerce, Delhi*:—Rai Saheb Girdharilal of Saran & Co., Ltd., Delhi; Mr. N. S. Rudolph of Parke, Davis & Co., Bombay lately Simla; Mr. Ram Narain of Jumna, Dass Fakir Chand, Amritsar.

7. *By the Swadeshi Industrial Association, Baroda*:—Messrs. R. C. Dutt, C.I.E., Abbas Shamsuddin Tyabji, Mazumdar K. G. Deshpande, Shirgaoker, Nimbalkar, Naik, Mannabai, Uhai, Vevai Manikrao.

8. *By a Public Meeting held at Satara*:—Messrs. R. P. Karadikar, N. K. Agashe, G. B. Phansalkar, W. R. Bhurker.

9. *By the Pudukkottai Agricultural Association*:—Mr. R. Mutukrishna Iyer.

10. *By the Central Agricultural Committee, Madras*:—Messrs. V. Krishnaswami Iyer, G. A. Netsan, N. Subbarao Pantula, L. Sreenivasa Raghava Iyer, H. E. Haughton, F.L.S., F.R.H.S.

11. *By the Association of the Chamarajendra Technical Institute, Mysore*:—Mr. G. Subhuswami Iyer, Superintendent, Government Technical School, Mysore and Mr. M. G. Ramachandra Rao.

12. *By the Kurnool District Agricultural and Industrial Association*:—R. Ramchandra Rao, Esq., Collector and District Magistrate,

S. V. Narasinha Rao Pantulu Garu, S. Sesha Sastri, Esq., K. Sriavasa Rao, Esq., C. Venkata Ranga Reddi, Esq.

13. *By a Public Meeting held at Indore on the 18th December.*—Babu Haridas Chatterji.

14. *By the Indian Industrial Association, Calcutta.*—Rajah Peary Mohan Mukerji, C.S.I., Rajah Ranjit Sinha Bahadur, Moulvi Abdul Hamid, Mr. T. N. Mukerjee, Babu Sarat Chandra Bose, Moulvi Syed Erfan Ali, Rai Yatindra Nath Chaudhuri, Babus Kamal Krishna Banerjee, Jogendra Lal Bose, Rai Parvati Sankar Chaudhuri, Dr. Nil Ratan Sircar, Babu Behari Lal Banerji, Dr. D. N. Ray, Rai Bahadur Dr. Chuni Lal Bose, Dr. Barid Baran Mukerji, Rai Bahadur Trailakya Nath Chatterjee, Babus Siris Chandra Dutta, Haripada Ghosal, Panchanan Mukerjee, P. N. Bose, J. Ghosal.

15. *By the Kashi Sujan Samaj, Benares City.*—Mr. G. L. Shaw, Babu Kali Das, Munshi Sankta Prasad, Babu Syam Sundar Das, Munshi Kalika Prasad, Dr. Satish Chandra Bhattacharjee, Babus Nanda Gopal, Jagannath Prasad Mathur, Joogal Kishore, Nand Kishore, Madho Prasad, Narottam Das, Buldeo Das Vyas, Hari Das, Rao Gopal Das, Babus Batuk Prasad, Gauri Sankar, Durga Prasad, Mehta Krishna Ram, Dr. Ganesh Prasad, Pandit Vishnu Dutt Sharma, Babu Ganga Prasad Gupta, Rai Bahadur Gosain Bhawanipuri, Babu Balkrishna Das, Gosain Ramcharan Puri, Babus Gopal Krishna, Kesho Das, Badri Prasad, Gokul Chand, Pandit Kali Prasad, Babu Ram Prasad Chowdhuri, Munshi Bam Nandan Prasad, Rai Bahadur Raghu Nandan Prasad, Mr. C. V. Chintamani, Pandit Ikhal Narain Gurtu, Babu Narendra Nath Roy, M. Mahadeo Prasad, Babus Baij Nath Das, Jagannath Das Varma, Kalyan Das, Bhagawati Prasad, Bhagawan Prasad, Pandit Chhannoo Lal, Jani Raviram, Mr. Dadabhai Naroji.

16. *By the Behar Landholders' Association, Bankipore.*—Babus Krishna Sahay, Chatturbhuj Sahay, Harihar Prasad Singh, Chandra Sekhar Prasad Singh, Nareswar Prasad, Nand Kishore Lal, Mahesh Narayan, Messrs. S. Sirha and Syed Husain Imam.

17. *By the Bangiya Vaisya Barujibi Sabha of Jessore.*—Babus Revati Kanta Sircar, Rohini Kanta Sircar, Jagindranath Samaddar.

18. *By a Public Meeting held at Barisal.*—Babus Aswini Kumar Dutta, Nibaran Chandra Das Gupta, Purna Chandra De, Satish Chandra Chatterji, Nagendra Nath Dutta, Sarat Chandra Guha, Satyabhushan Das, Ganesh Chandra Das Gupta.

19. *By the Swadesh Bandhab Samiti, Barisal.*—Sreejuktas Deenavandu Shaha, Purna Chandra De, Satish Chandra Chatterjee.



20. *By the Bengal National Chamber of Commerce, Calcutta*—Babu Janaki Nath Roy, the Hon'ble Rai Sita Nath Roy Bahadur, the Hon'ble Babu Radha Charan Pal, Rai Srinath Pal Bahadur, Babus Prasad Das Burul, Muralidhar Ray, Amulya Dhona Adya, Nibaran Chandra Dutta, Moti Lal Pal, Mr. R. H. M., Rustomjee.

21. *By the Anjuman-i-Taraqqi-Sanat-o-Hirpat-i-Hind (Association for the Advancement of Indian Arts and Industries), Delhi*—Mr. Shankar Nath, Mr. Prem Lall, Mr. T. C. Morton, Babu Shiv Narain, Babu Krishna Dayal, Professor Raghunir Dayal, L. Chander Lall Chowdhwalla, L. Chandu Lal Kapur, L. Chandu Lall, L. Sri Ram Gotewalla, Rai Saheb Girdhari Lal, L. Kedar Nath, Sanjid Haidar Risa.

22. *By the Rajmundry Industrial Institute*—Messrs. N. Subharao Pantula, G. Lakshmanrao G. Venkata Ramiah, K. Srimamula, T. Srimamula, S. Bhima Sankara Rao, A. Kanakarasa, A. Mukhyaprana Rao, K. Venkataratnam, M. Ramachandra Rao, K. V. Sita Ramchandra Rao, Ganesh Raghunath Sattayi.

23. *By the Broach District Association*—Messrs. Ambashanker Uttarnram Malji, Jamiytram Narbheram Trivedi, Maneklal Sakarlal Desai, Antoldas Hargovindas Jambusaria, Sakarlal Dagabhai Desai, Thakorlal Pranlal Maula, Harilal Govandas Jahaveri.

24. *By the Swadesi League, Calcutta*—Babus Devendra Nath Bagchi, Basanta Kumar Bose, Abinash Chandra Ghose, Rajani Kanta Sinha.

25. *By a Public Meeting held at Nellore on the 9th December*—Messrs. T. V. Venkataram Iyer, A. B. Arunachala Iyer, A. S. Krishna Das Pantula, T. Purushottam Pantula, V. Krishnaswami Rao Pantula, A. Santanarama Iyenger, V. Narasinga Rao Pantula, S. Narayanaswami Chetty, G. Srinivasa Chariar, D. Venkatasubbiah Pantula.

26. *By the Council of the Deo Samaj, Lahore*—Srimans Pandit Kanti Narayan Agnihotri, Padit Dev Ratan, Hassamul Zowkilram, Dr. Paras Ram, Mr. Govardhan Das.

27. *By a Public Meeting held at Masulipatam on the 25th November*—Srimant Raja Yarlagedda Ankividu Prasad Bahadur, Messrs. S. Hanumanta Rao Pantula, Tadepalli Hanumantha Rao, Rao Bahadur P. Venkatappiah, Tadepalle Sriramala, V. Suryanarayan Rao, G. Umamaheswara Rao, K. Hanumantha Rao, N. Somayajulu, K. Madhava Rao, Krishna Rao, M. Krishna Rao, Namhuri Subharao, V. Ramakrishna Rao, P. Seta Madhava Rao, V. Ramadas, C. Sundara Ramayya, K. Chidambara Rao, N. Narasimham Pantula, P. V. Subharao.

28. *By the Kistna Distrit Association, Masulipatam*.—Messrs. K. Sektaramanjanyula, Bh. Viswanadham, V. Ramachandra Rao, Bh. L. Narasimham, M. Subrahmanyam.

29. *By the Bombay Millowner Association*.—The Hon'ble Mr. Vithaldas Damodher Thackersey, Messrs. Dinsha Edulji Wacha, Govardhandas Khataw, Mulraj Khataw, Mahomedbhoy Currimbhoy Ibrahim, Hansraj Pragji Thackersey.

30. *By the North Arcot District Association, Chittoor*.—The Honourable Dewan Bahadur L. A. Govindaraghava Iyer, Messrs. L. Venkataraghava Iyer, C. Duraisawmy Iyengar, N. Krishnamachariar, M. Sundarachariar, V. Lakshmanasawmy Mudaliar, V. C. Seshachariar.

31. *By the Swadesa Vastu Pracharini Sabha, Bombay*.—The Honourable Mr. Daji Abaji Khare, Mr. R. B. Mantri, Dr. M. G. Deshmukh, Mr. P. N. Kelkar, Rao Bahadur C. V. Vaidya, Mr. Harichand Mancharam, Seth Manmohandas Ramji, Mr. K. R. Mitra, Rao Bahadur Vasantji Khimji, Mr. V. B. Paranjpe, Mr. M. R. Bodas, Messrs. R. B. Kirtikar, V. P. Vaitya, K. P. Mehendale, G. K. Gadgil, B. R. Manerikar, Ali Mahomed Bhimji, D. G. Padhya, P. P. Khare, M. R. Jayakhar, M. V. Bhat, Shet Raju Babaji, Gavardhandas, K. Makanji, P. G. Vaidya, Tukaram Javji, Dr. Ganes Bhau Kulkarni, Shet Khemraj Sri Krishnadas, Dr. K. N. Gokhale, Shet Raghunathji, Shri Khemraj, Messrs. K. B. Joshi, N. B. Ranade, Waman Ramchandra Joshi, Dr. G. B. Kher, Pandit Shivratan Vajsyaya, Mr. V. H. Athanale, S. S. Parshe, H. A. Talcherkar, F. K. Lalan, J. R. Gharpure, G. G. Athalye, B. N. Phatak, Mnilal Trivedi, Chunilal Lakshmiram, V. R. Shinde, B. P. Avalekar, S. V. Paranjpe, G. L. Page, E. G. Bhnadara, V. G. Wadekar, P. V. Desai, V. V. Jerajani, S. B. Sardesai, L. Y. Khandwala, Y. L. Bhandarkar, L. G. Mahajani, M. K. Patel, V. B. Soman, K. V. Apte, V. S. Apte, H. K. Gokhale, Rao Bahadur K. V. Acharya, K. P. Phadake, G. N. Sohoni, V. B. Limaye, B. R. Nara, M. N. Patankar, S. B. Kulkarni, Munshi Shaik Mahatap Gulbarga, K. N. Sane, K. S. Masurekar, B. Tilak, N. C. Kelkar, S. K. Damle, V. G. Joshi, G. K. Doodhar, N. A. Dravid, the Hon'ble G. K. Gokhale, C.I.E., B. B. Deshpande, G. K. Chitale, S. S. Dev, B. V. Bhat, Saijid Saipuddin, V. S. Khare, N. P. Patanker, V. B. Ganpule, Daji Sahib Ketkar, Moulvi Nizamuddin, V. R. Lele, V. R. Kirloskar, G. V. Kale, V. S. Jog, R. N. Sane, Govinda Rao Salakhi, G. K. Tilak, M. B. Karmakar, S. B. Bhate, G. B. Deshpande, M. G. Telang, T. K. Pitre, S. R. Dharap, S. B. Patal, Krishnaji Kashinath Phadke, V. L. Bhave, G. B. Patwardhan, J. N. Simaye, Krishnarao Mudiadkar, Ganuath Rao Phatak, V. K. Parank, Govindarao Dev, Babu Surendranath Banerjee, Lala Lajpat Rai, H. L. Patel,

R. Karandikar, Ambalal Raghunath Mallaji, Gokuldas Dwarkadas, N. K. Agashe, G. B. Phansalkar, Motabhai Motilal, Chunilal Gandhi, V. G. Bhide, M. G. Abhayankar, N. P. Sanghvi, Dewan Bahadur Ambalal Sakarlal Desai, D. L. Lele, V. G. Bijapurkar, Rao Bahadur R. M. Kulkar, Rao Bahadur R. N. Mudhalkar, S. K. Aitekar, V. B. Raniker, G. S. Khaparde, Dr. B. S. Moonje, Vithalrao Valinbe, R. K. Kamat, M. K. Padhye, Kesavarao, K. T. Dongre, Mrs. Krishnabai Beawalkar, Messrs. S. G. Phadke, Motilal Khanji, Rao Bahadur K. G. Deshpande, Joseph Baptista, V. V. Simaye, D. N. Abhayankar, Nanalal Brabharan, N. V. Kathavate, M. N. Jadavkar, G. N. Tere, G. B. Deval, B. Raghavayya, K. P. Gadgil, M. K. Kale, G. G. Gandhi, T. G. Sanghvi, M. G. Vase, Damodar Khetsi.

32. *By the South Indian Association, Madras*:—Messrs. V. Krishnaswami Iyer, P. R. Sundara Iyer, Dewan Bahadur L. A. Govindaraghava Syer, N. Subharao Pantula, V. S. Srinivasa Sastri.

33. *By the Rate-payers Association, Asansole*:—Babus Gopal Chandra Mitra, Pasupati Nath Hazra, Sarat Chandra Banerji, Pandit Preonath Sastri.

34. *By a Public Meeting held at Hospet*:—Rao Bahadur C. H. Gond.

35. *By the Sholapore Industrial Committee*:—Messrs. P. L. Nagpurkar, S. R. Kirloskar, R. M. Sane, V. S. Jog, Deshmukh, Dr. V. K. Kirloskar.

36. *By the British Indian Association, Calcutta*:—Rajah Peary Mohan Mukherjee, C.S.I., Mr. R. D. Mehta, C.I.E., Babu Kisorelal Goswami, Maharaj Kumar Rishicase Law, Babu Deve Prasad Sarbadhikari, Rai Yatindra Nath Chaudhuri, the Hon'ble Babu Bhupendra Nath Basu, Babu Sirish Chandra Sarvadhikari, Babu Harendra Lal Roy, Babu Muralidhar Roy, Mr. R. H. M. Rustomjee, Babu Kiran Chandra Roy, Mr. J. Ghosal, Rai Hariram Goen Bahadur.

37. *By the Bombay Native Piece-Goods Merchant's Association*:—Messrs. Vrijlal Bhugwandas, Devi Das Madhavji, Ranchordas Thackersey, Dhurmse Meghji, Govardhandas Khimji.

38. *By the Kayastha Sadar Sabha Hind, Lucknow*: Babu Fateh Bahadur Nigam, Babu Beni Prasad Singh, Mr. Chandi Prasad, Babu Ganga Prasad Sarma.

39. *By a Meeting held at Fysabad*:—Pandit Manshar Nath and Mr. P. N. Sapru.

40. *By a Meeting held at Jullundur*:—Dr. Pandit Ram Nath.

[The Bombay Chamber of Commerce, while recognising the importance of the movement for the Development of Indian Industries, regretted its inability to send delegates.]

## Appendix XI.

# The Industrial Conference Handloom Competition.

*Report on the Handloom Competition held under the auspices of the Indian Industrial Conference at the Calcutta Exhibition of 1906-07, with remarks on the Handloom Section of the Exhibition.*

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The harmonious action of the following five principal motions in loom produces cloth :—

1. Shedding (dividing warp threads into layers).
2. Picking, or motion of the shuttle.
3. Beating up the weft, or motion of the slay for driving in the weft.
4. Taking up the cloth woven.
5. Letting off the warp.

There is also a sixth necessary motion which does not work, *vis.*, pushing back the slay to make room for the next stroke of the shuttle.

The looms exhibited may be classified with reference to the mechanical contrivances adopted to secure the working of these motions.

*CLASS I.—In which all the above movements are actuated by the action of foot-treadles or by a wheel turned by hand, or by the movement of the slay.*

The following were the important exhibits under this class :—

- (1) *The loom exhibited by Mr. B. K. Ghose of Chandernagore.* It is a copy of the Japanese handloom worked by foot-treadles. Its working was satisfactory though the loom was a little too heavy to work. The loom is priced at Rs. 90.
- (2) *Shivaji loom exhibited by the Bombay Loom Company.* This is a modification of the Japanese handloom. The weight used to regulate the taking up motion is made to hang down, instead of being lifted up and a balance wheel is

provided to secure the steady motion of the crank shaft. The loom is priced at Rs. 130.

(3) *The Lame and Blind Automatic Loom.* This is also a modification of the Japanese handloom; taking up motion is connected with the motion of the slay and the upper shaft is directly turned by a handle connected with it by level-wheels. The frame work was not steady. The price of the loom is Rs. 95.

(4) *Krishnabrindevan's Patent Fajar Loom.* This should be considered a power-loom rather than a hand-loom. This was the only loom in the Exhibition which showed real originality and good workmanship. All the motions of the loom are secured by the revolution of an ecliptic wheel attached to one shaft. As necessity is the mother of invention, the inventor finding it difficult to get a proper crank shaft for this loom, which was meant to be a copy of the power-loom, hit upon this new method of communicating motion. The inventor of this loom should be encouraged to make a handloom of proper size, as one of that kind is likely to work very smoothly and lightly. If it be properly made, it may supersede all the existing costly automatic handlooms in the market.

(5) *The loom exhibited by Mr. B. K. Dhar* was a copy of the power-loom meant to be a handloom, but not useful as such.

(6) *Messrs. Hattersley's Domestic Loom.* This was found to be capable of giving greater production than any other automatic loom and was found somewhat heavy in working. Our weavers accustomed to lazy working of very light wooden looms may not willingly take to it. The price of the loom is Rs. 80.

**CLASS II.**—*Only shedding being actuated by foot-treadles, the rest of the motions being connected with the motion of the slay worked by both the hands.*

The following were the important looms under this class:—

(1) *The loom exhibited by Mr. Osborne Maxwell of the Salvation Army Works, Anand, Gujarat* was the best of this kind. The loom seems to be after Mr. Churchil's loom with the picking and taking-up arrangements improved. The loom

is well constructed and sound in all its parts. The price of the loom is Rs. 80.

- (2) *The factory loom exhibited by the Sayaji Loom Works, Baroda*, requires greater stability in some of its parts, It has proper arrangements made for adjusting the levels and heights of slay and yarn beams. The price of the loom is Rs. 50.

**CLASS III.**—*Shedding and picking being joined and actuated by foot-treadles, and the beating up of the weft and the taking up of the woven cloth being done separately by hand as in ordinary hand-looms.*

*The Simplex Loom of Pali Silpasala* was the only one of this kind. The price of the loom is Rs. 35. This is simple in construction.

**CLASS IV.**—*Shedding done by foot-treadles picking connected with the back motion of the slay which is worked by both the hands. The rest of the movements secured directly by hand as in ordinary handlooms.*

A loom of the kind was the *Sayaji Poor Man's Loom* exhibited by the Sayaji Loom Works, Baroda. In this loom the weaver has to work sitting at a pit, having his warp stretched on the floor as in ordinary looms. This is simple and cheap. The price of this loom is Rs. 52.

**CLASS V.**—*Loom with fly-shuttle slay attached.*

There were three varieties of this kind—

- (1) *Fly-shuttle slay adapted to ordinary pit-loom without yarn beam being provided.*
- (2) *In addition to slay, yarn beam also provided to the pit-looms.*
- (3) *Slay adapted to a moveable frame work containing yarn and cloth beams.*

In all these looms the movements are caused independently of one another, as in ordinary country looms, worked directly by hands and feet.

*Frame Fly-shuttle looms exhibited by Messrs. B. K. Ghose of Chandranagar and P. M. De of Chinsura, and Laskar & Co. of Raipur (Birbhum). Pit Fly-shuttle looms provided with yarn beams were exhibited by the local weavers, Babus Kiran Chandra Sen, Hari Chandra Das and three others, and Mr. P. N. De of Chinsura. These were found the cheapest and most convenient forms of fly-shuttle looms*

to be adopted by weavers that do their work in their own homes. These looms, with slight modifications in forms and sizes, are the same as the Madras, Bombay, Madura and Mysore fly-shuttle looms, all of which are copies of English fly-shuttle looms.

Two looms were exhibited, one by the Bengal Silk Mills Company and the other by the Sayaji Loom Works, Baroda. The former, a foreign one, was in good working order and cloth of six foot was woven in three hours 30 minutes. The latter was an attempt to construct such a loom with as many locally made parts as possible, but was not in working order on account of breakages in transit.

Messrs. Hattersley and Sons exhibited a Tape Weaving Loom priced at Rs. 250, a Towel Loom priced at Rs. 180, and a Silk Weaving Loom priced at Rs. 235.

There were also Benares Looms for weaving Kinkabs with skillfully arranged Hornesses for picturesque designs.

The National Weaving School of Calcutta exhibited different kinds of looms used in the school, viz., Hattersley, Fly-shuttle Looms, etc.

Besides the above looms, which were in working order, there were a number of model looms. Some of them were exhibited by students fresh from college and by some Government officials. In these models very ingenious, original mechanical inventions were displayed in crude form. If their school education had offered opportunities for having their hand and eye trained in mechanical work, their ideas would have brought them credit as useful inventions. They were not trained to appreciate form and proportion, as the eye had not been exercised in drawing and practical work, nor the hand used to the handling of tools and instruments and hence, can do but very crude work.

The Model looms exhibited by Messrs. Bankim Lal Das, Mani Mohan Ghosh, Lalit Mohan Ghosh, Romesh Chandra Dordar and N. M. Mookerjee contain original ideas which can be usefully developed with more practical knowledge of the different processes of weaving.

### Appliances for Processes preparatory to weaving. 1

#### *Spinning Machines.—*

There were three exhibits useful for the purpose. One of them from Darjeeling intended for spinning wool, is an ingenious adaptation of the mill-spinning spindle for hand work.

The second one was from the Weaving Institute of Hole-Narsipur in Mysore State. In this the spindle is turned by a foot-treadle and both the hands are used for spinning. This is used for spinning wool and any kind of fibre and cotton.

The third was a local exhibit, a simplified form of Charka.

*Winding Machines :—*

1. A useful bobbin and pern winder exhibited by the Sayaji Loom Works, Baroda.
2. There were useful models from the Weaving Institute of Hole-Narsipur, Mysore, and from Mohendralal Banerji of Calcutta.
3. A bobbin-winder with 12 spindles priced at Rs. 152 and a pern-winder with 12 spindles, priced at Rs. 172, were exhibited by Messrs. Hattersley and Sons.

*Warpings Mills.—*

One machine was exhibited by Messrs. Hattersley and Sons. This is suited for making warps more than 100 yards in length but these warps are not useful for sizing after the Indian methods. This serves the same purpose as the old English wooden warping mills used in the Basel Mission factories. These latter, however, had a greater facility for putting in leases. Hattersley's mill was priced at Rs. 150.

The other warping mill is an original invention exhibited by Sadhu Charan Sarkar, Hari-Narayanpur, Nadia, a poor man not a weaver by caste. This is an improvement upon the native peg warping, and is a real advance from within.

A wheel 4 ft. 9 in. in diameter is divided into 3 concentric circles and pins arranged round the circumference of these circles receive the yarn as the wheel rotates and preserve the leases formed. The machine, when tested by actual work, was found capable of warping one knob in 30 minutes. The mechanism for turning the wheel is roughly made and does not work smoothly without jerking. This was priced at Rs. 50.

*Sizing Machine.—*

There was one exhibited by the Sayaji Loom Works, Baroda. This is yet in its experimental stage and is intended for handloom factory works.

The other sizing machine was exhibited by Messrs. Hattersley & Sons and it is intended to saturate the warp with size and to squeeze out the superfluous size, brushing and drying being done on a separate frame. These machines were not exhibited in their working order.



## LOOM COMPETITION.

The Industrial Conference had announced awards of Rs. 500 to the best Cottage and Factory Handlooms exhibited. A Committee of Experts consisting of Rao Bahadur Raoji Bhai Patel, Director of Agriculture and Industries, Baroda, Messrs Henry H. Ghosh, Bysat, and Kunja Behari De of Calcutta, Mr. B. L. Govilla, Textile Engineer and Chemist, Kurja, United Provinces, and Mr. M. A. Sompath Iyengar, Superintendent, the Weaving Institute, Hole Narsipur, Mysore State, was formed. The Committee examined the looms in their capacity and in the construction of their important parts. The looms were kept working for seven hours and the results of their examination have been given below, and a tabulated statement is appended.

For the second time, a loom competition was held on behalf of the Exhibition Committee. In this competition a few local fly-shuttle looms were specially got in to compete for the prize, so that their working capacity might be compared side by side with the new improved looms. In this instance, looms were kept working for six hours. The results of this competition also have been given below and a tabulated statement is appended.

### *The Competition Test.*

The looms were tested by the Committee with reference to the following points—

1. Mechanical improvements and construction.
2. Adaptability.
3. The work done.

Under the head of Mechanical Improvements, much importance was attached to the arrangements made to secure the easy and proper working of the shedding, packing and taking up motions, and of the motions of the slay. The looms were also tested to see whether the parts were strong enough to bear the required strain, without being unnecessarily bulky. The general workmanship in the manufacture of the machine was also noted.

In regard to Adaptability, the Committee took into consideration the following points—

1. Whether the price was within the means of those for whom the machine was intended;
2. Whether the loom was suitable for working with warps prepared according to the country method or necessitated the use of preparatory processes to which our weavers

were unaccustomed, or the use of appliances which would be too costly to be possessed by individual weavers ;

3. Whether the construction of the loom was simple enough to get damaged parts repaired easily by local artisans ?

The Work Done was tested by—

1. The highest number of picks per minute attained in fast working for a short time.
2. The effective number of picks per minute arrived at as follows :—
  - A. Work was taken for 7 hours 15 minutes, and the total number of picks on the cloth divided by the number of minutes in the whole time.
  - B. The structure of the cloth produced.

*The Results of the Tests.*

In the first test the following were found the most successful :—

1. Salvation Army Loom. Prize Rs. 150.
2. Mr. B. K. Ghose's Loom of Japanese pattern. Prize Rs. 100.
3. Laskar & Co.'s Loom (Ordinary fly-shuttle loom of English handloom pattern), Prize Rs. 100.
4. Sayaji Poor Man's Loom, with automatic picking which is actuated by the back motion of the slays. Prize Rs. 150.

In the second test, the following were the most successful :—

1. Mr. B. K. Ghose's Japanese Loom.
2. Sayaji Poor Man's Loom.
3. Mr. B. K. Ghose's Ordinary Flyshuttle Loom.
4. Babu Kiran Chandrā Sen's Pit Flyshuttle Loom.

*General Remarks* :—All the looms were worked by expert weavers with more than ordinary speed and, at the end of 7 hours, all appeared much tired. In the hurry to turn out as much work as possible, the structure of cloth was somewhat neglected. In the second test, they were more careful. Fly-shuttle looms in different forms have all equally done good work. Automatic looms, on account of their high prices, are entirely beyond the means of individual weavers to possess them. To take full advantage of the increased speed of the shuttle in these looms, better processes of winding warping and sizing than the weavers are accustomed to will have to be introduced, with the help of costly new mechanical appliances.

Now the vital question that has to be decided in the development of the handloom industry in India is whether it is possible to develop it along the lines in which it has so far progressed.

One of the great authorities in cotton weaving, Mr. Richard Marsden, has expressed himself as follows :—

“The skill of Eastern races seems to have spent itself in achieving the most perfect results of which manual processes are capable. The products of Indian, Chinese and Japanese arts, especially in textiles, in excellence of colouring variety, beauty of designing and perfection of execution, are something that the mechanical production of the West is a long way from equalling but to which they may with advantage aspire.”

Our weaving industry has developed so far as a cottage industry. If it is to continue as such, our mechanical improvements to increase the efficiency of hand labour must be such as will not compel the weavers to become mere flesh and bone parts of some costly machinery, having no idea of how and why the machinery performs its rythmical movement. And our efforts to improve the industry should not become subject to such condemnation as Prince Kropotkin has made: “Skilled artisanship is being swept away as the survival of a past condemned to disappear, for the artist who formerly found æsthetic enjoyment in the work of his hands is substituted the human slave of an iron slave”.

Apart from the large portion of weaving work that power mills should do, handlooms have got as much work or even more work to do. Each has its own sphere and, although factory work economizes labour, the economic gains to be derived from this domestic industry for a hundred years to come should not be undervalued even in pounds, shillings and pence.

Improvement in the human machinery of the weaver by systematic education and regular work must go hand in hand with the improvement of the appliances for his work. The industry can flourish only under the stimulus of a well-organised trade, which must be helped by every citizen of India with the responsibility felt and expressed by a prudent economist :—

“The trade does not belong to the merchants, capitalists and work-people of the present generation. But that is a great national property in which they possess only a life-interest. This they are bound by every sentiment of affection for their children and love for their country, to pass on to succeeding generations, not only unimpaired but increased in value. To neglect this duty will be to deprive millions of English people in the future of the means of livelihood and the nation of its most important resources. This would be practically criminal.”

**RAOJI BHAI PATEL,**

*Director of Agriculture and Industries, Baroda.*

**M. A. SAMPATH IYENGAR,**

*Supdt., Holenarsipur Weaving Institute, Mysore.*

*The Second Indian Industrial Conference Handloom Competition, Calcutta*

**FIRST TRIAL**

No.	Kind of Loom.	Name of the Exhibitor.	Time.	Cloth wover.	Width of the cloth.	Effective picks.	REMARKS.
1	Simple fly-shuttle loom similar to English handloom	Mr. K. Ghose, Chandernagore.	hrs. min. 7 15	ft. in. 21 11	in. 40½	33'6	Clean edges, breakages good many, 40's yarn.
2	Automatic handloom resembling Japanese handloom, worked by foot power	Ditto ditto ...	7 30	24 7	40	34'6	Edges clean, structure good, 40's yarn.
3	Sayaji factory loom ...	Sayaji Loom Works, Baroda.	7 30	22 4	42	31'2	Cloth damaged, full of breakages, 40's yarn.
4	Sayaji pit factory Loom ...		7 30	15 7	42	20	
5	Sayaji cottage loom ...		7 30	17 2½	43	30	
6	Factory loom ...	Mr. Osborne Maxwell of the Salvation Army, Anand, Gujarat.	7 30	25 2	40½	37'3	Structure quite satisfactory, 40's yarn.
7	Ordinary fly-shuttle loom of English handloom pattern.	Laskar & Co., Raipur, (Birbhun).	7 30	23 0	44	31'9	Structure satisfactory, 40's yarn.

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# Calcutta Industrial Exhibition Handloom Competition

## SECOND TRIAL

No.	Kind of Loom.	Name of the Exhibitor.	Time.		Cloth woven.		Width of the cloth.	Effective picks.	REMARKS.
			hrs.	min.	ft.	in.			
1	Simple flyshuttle loom similar to English handloom.	Mr. B. K. Ghose, Chandranager.	6	18	25	8	44	33	Edges not clean, breakages not pieced up satisfactorily, structure fine, 40's yarn.
2	Automatic handloom resembling Japanese handloom to be worked by foot power.	Ditto ditto ...	6	15	28	10	43	41	Clean edges, uniform structure, 40's yarn.
3	Poorman's loom or flyshuttle slay adopted to ordinary pit loom with automatic picking arrangement.	Sayaji Loom Works, Baroda.	6	0	25	10	42	48	Edges clean, structure good, 40's yarn.
4	Factory loom, picking and take-up motion connected with the motion of the slay to be worked by hand, shedding by foot treadles.	Ditto ditto ...	5	11	20	1	42	34	Structure somewhat poor.

5	The lame and blind automatic loom worked by hand power.	Mr. Shaki Mahomed Bakur	6	15	19	8	41	25	Clean edges, uniform structure.
6	Pit flyshuttle loom ...	Babu Kiran Chandra Sen	5	51	16	3	46	43	Warp and weft 80's, well finished cloth
7	Ditto ...	Mr. Goluck Behari Rokhir.	6	21	15	0	45	30	40's warp & 50's weft, clean edges, uniform structure.
8	Hattersley's Domestic loom	Messrs. Allen Bros. ...	5	30	63	0	22	92	Warp and weft 40's double, very close structure, during the whole period two persons worked alternately, uniform structure, well finished cloth.
9	Pit flyshuttle loom ...	Mr. Harishchandra Das	6	0	13	0	44	30	
10	Pit flyshuttle loom ...	Mr. P. N. De ...	6	0	12	0	41	20	
11	Frame flyshuttle loom ...	Ditto ...	6	0	12	6	41	21	
12	Simple loom ...	Ditto ...	3	0	4	8	426	15	
13	Jacquard machine ...	Bengal Silk Mills Co. ...	3	30	6	0	...	...	
14	Benares loom for Kinkab...	Mr. Habibulla ...	3	30	3	6	...	...	

## THE SECOND INDIAN INDUSTRIAL CONFERENCE.

### A BIRD'S-EYE VIEW OF INDIAN SERICULTURE.

By BABU NITYA GOPAL MUKERJI, M.A., F.R.A.C., AND F.H.A.S.

#### L—PRELIMINARY.

GREAT interest has been taken in the subject of sericulture by our Government, by Native States and by private individuals, within recent years, and considerable progress is to be seen in different local areas, which makes it incumbent on us to consider the question of a more general adoption of improved methods, and to get a clearer view of the situation as it stands at present. In Bengal, in parts of Maldah, Birbhum, Murshidabad and even in Midnapore (where the industry has almost died out), the silk-rearing peasants now recognise that their salvation lies in the following of scientific methods of sericulture. For the past fifteen years, for instance, more than a dozen cultivators have been using the microscope with success in obtaining seed-crops, and the silk rearers of a village in the Garhbeta thana of Midnapore, called Uparshol, where a nursery on a scientific basis has been started, have been trying to get a similar nursery started for them at Punishol in the district of Bankura. These two villages exchange seed with each other, and they have come to recognise that the establishment of a seed-rearing nursery in their own village alone is not sufficient to benefit them. For the sake of a parasitic fly, it is impossible in Bengal to rear silkworms successfully for two generations successively, and the people of one district must go to another district, or to a very distant, but recognised, place in the same district for seed. To benefit one part of a country, both parts must be taken in hand at once. This is one of the many examples which shows the importance of understanding the subject, if the cocoon-rearing industry is to be benefited. The starting of nurseries at a haphazard is not enough. We have defects to remedy not only in Bengal, but in Kashmir, in Mysore, in Baroda and in some other parts of India where the industry has been taken up of late years, and where more or less progress has been achieved, notwithstanding faulty application of the scientific system.

2. It is very necessary, therefore, that a succinct and clear account of sericulture should be at hand, which would obviate the necessity in the first instance, of reading up various books and reports that have necessarily sprung up with the 'recent' activities. While I call these activities 'recent,' they are at least 20 years old

and more progress might have been achieved if the improvements had been introduced with sufficient knowledge of the subject. A rude shock is sometimes received, when a party, which has been rearing the Eri silkworms, finds out he ought never to have attempted the task in the particular climate, or where a man who has been trying to introduce the Japanese mulberry, finds out that the tree he has been using is not mulberry at all, but a so-called "paper mulberry" which silkworms never eat, or where a man who has been using the microscope for years in eliminating Pebrine finds out that there is no Pebrine at all to eliminate, or when for years seed, which has been accepted as rigorously "cellular" and free from disease, is found out to be really full of Pebrine. The history of the application of scientific methods in various parts of India, is replete with such examples of mistakes.

3. I do not disparage by any means the literature that has grown up within recent years, and I may say, the bulk of it is from my own pen; but it is necessary to keep the main points in view with regard to the development of the mulberry, the *tusser* and the *eri* silk industries, and this is my plea for adding another 33 pages to the already existing literature on the subject. In the following pages matters to which special attention is called are printed in heavy type.

## II.—CLASSIFICATION.

4. Various classes of silkworms are reared, some indoors and some on trees in the open, which spin cocoons, out of which silk is obtained of various classes. Silkworms fall under two main groups—the Bombycidæ and the Attacidæ. The former make **reelable cocoons** and the latter **unreelable ones**, which have to be carded and combed and spun

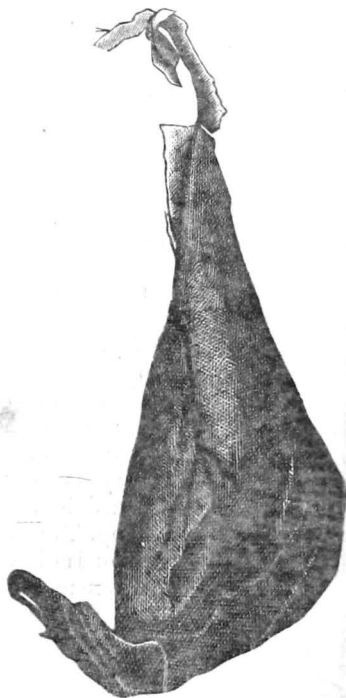


FIG. 1.—ATTACUS ATLAS COOCON.



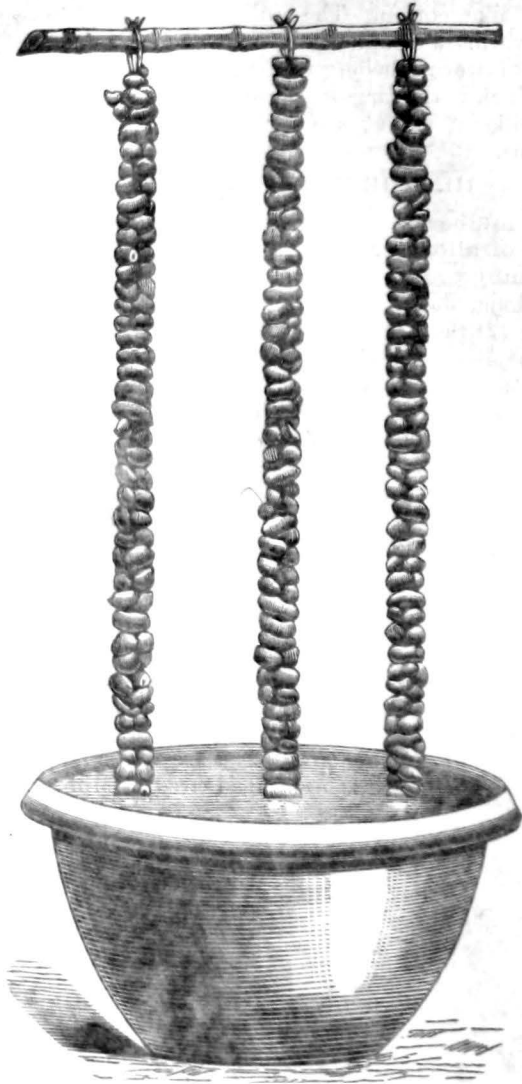


FIG. 2.—*BOMBYX MORI* COCOONS STRUNG UP FOR SEEDING.  
(The vessel underneath is for maggots of  
the parasitic fly to drop in and  
accumulate.)

into yarn, like cotton. The mulberry feeding silkworms and the tussler silkworms of commerce all come under the Bombycidæ, while the Endi silkworms belong to the Attacidæ. The *Attacus Atlas* (Fig. 1) which is the largest cocoon of all, out of which come the most magnificent moths, are unreelable and practically worthless wild cocoons.

### III.—THE MULBERRY SILKWORM.

5. The mulberry feeding silkworms, which are the most profitable of all to rear, are divided into the following groups:— (1) the *Bombyx mori* (Fig. 2), or the annual silkworms reared in Europe, China, Japan, Kashmir and some of the Western Asiatic countries; (2) the *Bombyx textor*, or the Barapalu, the annual silkworm of Bengal, the cocoons of which are flossy and not hard like the *Bombyx mori* cocoons, and the eggs of which do not require such intense cold as the eggs of *B. mori* for their hibernation; (3) the *B. Arracanensis* of Burmah and the *Barapát* of Assam which are closely allied to the *B. textor*; (4) the *B. Meridionalis* of Mysore and Kollegal, which yields 7 or 8 times of cocoons in the year instead of one, the cocoons being greenish white and almost as good as Barapalu cocoons; (5) the *B. C. (Madras)* or *Nistari*, the golden yellow cocoons, which breed 8 times in the year in Bengal and which produce very fine and strong silk; (6) the *B. fortunatus* (the *Chhotopalu*), a brighter yellow variety of Bengal containing a larger proportion of stronger silk than the *B. Cræsi*; and (7) the *B. Sinensis* or the *Chin* cocoons, which are the smallest yellow cocoons of all, reared in Midnapore.

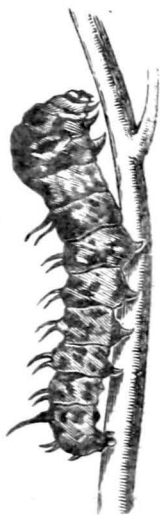


FIG. 3.—WILD THEOPHILA HUTTONI SILKWORM.



FIG. 4.—MOTH OF THEOPHILA HUTTON

is a white variety of *B. Sinensis* also reared in Midnapore, which is called the *Bulu*; (8) the *Theophila* cocoons found on the mulberry trees in the Himalayas are wild (Figs. 3 and 4).

#### IV.—TUSSEER SILKWORM.

6. The tusser cocoons are also divided into several groups, of which the *Antheria Yamamai* of Japan (Fig. 5), which yields a greenish white silk, somewhat rougher and coarser than white *B. mori* or *B. textor* silk, is the best. The *Antheria pernyi* (Fig. 6) or the China tusser, comes next. The *Antheria assama* or Muga of Assam is just as good as the China tusser. The *Antheria mylitta* or the Bengal tusser proper, comes last. The tusser of China and Japan is reared on oak-trees. The Muga of Assam is reared on the Sum (*Machilus odoritissima*), the Sualu (*Tetranthera monopetala*), the Mejankuri (*T. polyantha*), the Jhampaka (*Michelia champaka*) and other trees. The Bengal tusser is reared chiefly on the Asan or Sáj tree (*Terminalia tomentosa*), a tree which can be freely pollarded, also on *sal*, *arjuna*, *sidha*, *dhau*, *baer*, country-almond and other

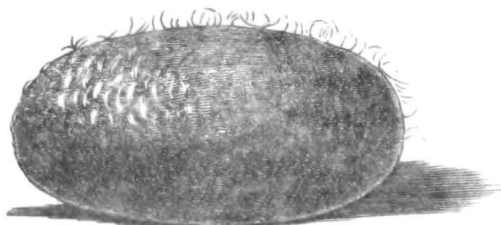


FIG. 5.—ANTHERIA YAMAMAI COCOON.

The moths from tusser cocoons come out very irregularly, specially when the cocoons are large and strong, some eg out within three weeks of their formation, while others not come out for two years. This accounts for tusser

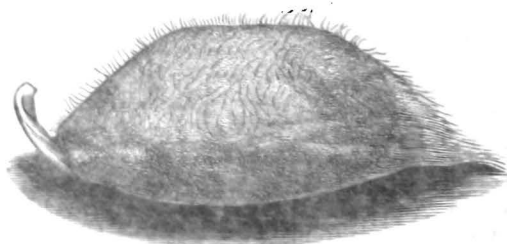


FIG. 6.—ANTHERIA PERNYI COCOON.

rearsers choosing thin and small cocoons for seed, as eclosion of moths from such cocoons is more regular. An experiment conducted by the author, showed, that large and hard cocoons

can be used for seed, if the chrysalids are extracted from the cocoons and kept exposed or buried in saw-dust. This is one important step which can be taken in ameliorating the condition of the tussler silk-industry, which is going down on account of disease. The use of genuine wild cocoons for seed is another step.

#### V.—THE BENGAL TUSSER.

7. There are *three main classes of Bengal tussler*, the Narya, the Daba and the Bugui. (1) The Narya (Fig. 7) is obtained out of the small sized cocoons, generally wild, though domesticated cocoons are often fraudulently sold as wild cocoons. From the wild or domesticated Dhuria or summer cocoons of J...

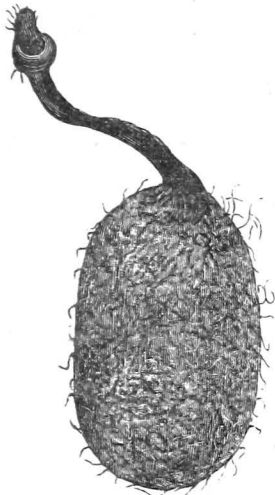


FIG. 7.—WILD LARYA  
OR NARYA COCOON  
(Dark, Small, Hard, Short  
and Thick Peduncled).



FIG. 8.—AMPATIA LARYA  
COCOON (FLIMSY COCOON).

are obtained an Ampatia or flimsy crop of cocoons (Fig. 8, July and August, and from this Ampatia crop is obtained regular crop of the year, the Barsati crop, in October (Fig. A Jaddui or cold weather crop (Fig. 10) of Narya is also sometimes taken; but it takes nearly three months taking Jaddui crop. (2) The Daba is now always taken from the domesticated stock and not from the wild stock, but it can be ta...

and ought to be taken from the wild stock, though, being the strongest breed of all, the domesticated *Daba* does not give such hopelessly bad results as the domesticated *Narya*. The origin of the *Daba* cocoon is probably the *Muda Muga* cocoon (Fig. 11), *i.e.*, the large wild cocoon that does not cut in August or September of the year they are formed, but in the following

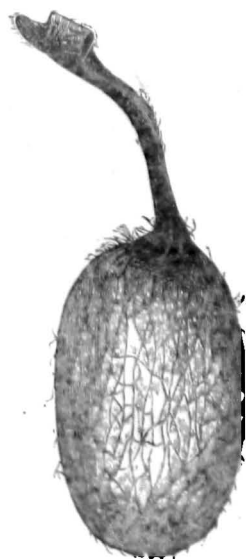


FIG. 9.—BARSATI LARYA COCOON  
(Small-sized, Hard Cocoon).



FIG. 10.—JADDUI LARYA COCOON  
(Light-coloured, Long Peduncled,  
Small-sized Cocoon).

in June or July. In September or October such large and uncut cocoons can be picked out in *hats* from among pierced seed-cocoons, and they ought to be looked for and reserved for seed till at June, when moths will come out of them, lay eggs as in the case of other tusser cocoons, and give an *Ampatia* (Fig. 12).

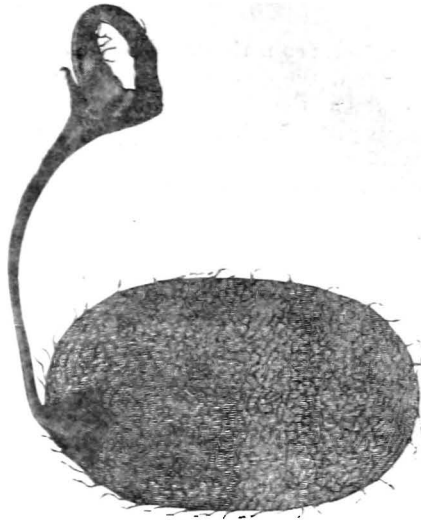


FIG. 11.—MUDA-MUGA COCOON.

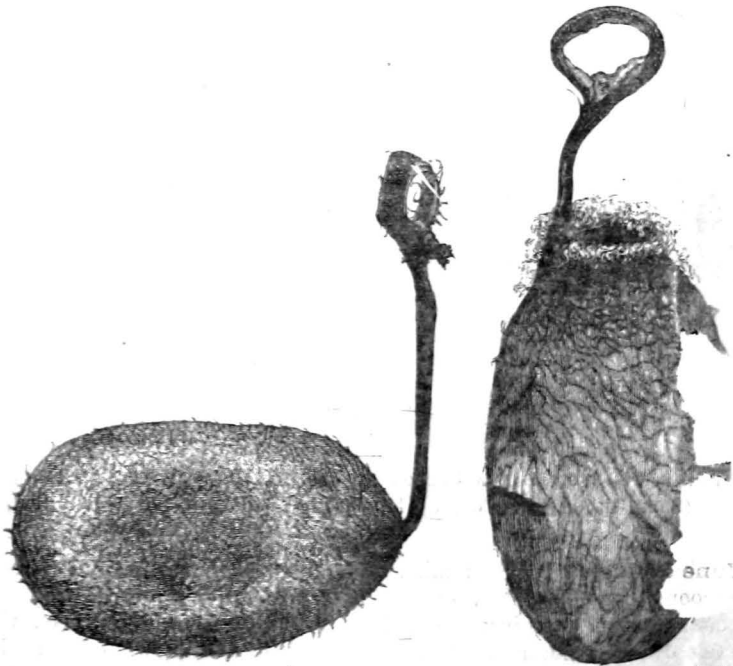


FIG. 12.—ANPATIA DABA COCOON.

FIG. 13.—BARSATI DABA COCOON.

and a Barsati (Fig. 13) crop of healthy *Dabas*. Some of the largest and hardest Barsati cocoons can be reserved for seed till next June, and the domesticated breed kept on until disease appears among the stock, when the wild stock must be resorted to again, in the manner already described. (3) The origin of the Bugui (Fig. 14) is the large-sized wild tusser cocoons (called Bar-

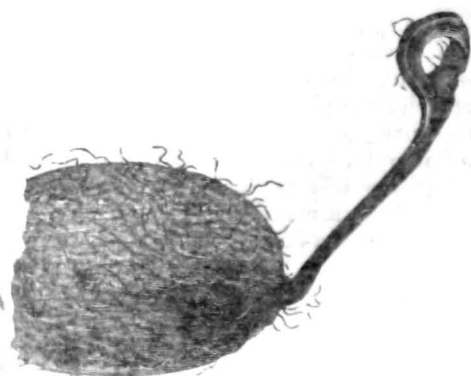


FIG. 14.—BUGUI COCOON.

ra, see Fig. 15), out of which moths cut out usually in September. It yields one crop of cocoons in November and December. Thus Bugui breeds once in the year, *Daba* twice, and *Narya* three times. The cocoons obtained from October to January, are the best, and those from July to September, are the worst. When the Barsati cocoons are

selling from Rs. 8 or Rs. 10 a *kahan* (= 1,280 cocoons), the *Ampatia Naryas* or *Dabas* would sell for only Rs. 2 to Rs. 3 per *kahan*.



FIG. 15.—BAR KA COCOON.

## VI.—THE REARING OF THE TUSSER SILKWORM.

8. The method of rearing of all the three classes of tusser cocoons is the same. The moths begin cutting out of cocoons about 4 P.M. At 9 or 10 P.M. the male moths fly away. About 3 A.M. those or other male moths come to the female moths. To facilitate the visit of the male moths, the rearer must keep his females out of doors (usually they are kept perched up on bow-like sticks) and watch them against the attack of bats, birds, lizards, etc.

The moths remain paired till about 4 P.M., when they either separate themselves or are separated by the rearer, the females being kept pinned down in leaf receptacles, and the males given to domestic fowls. The eggs are collected after three days, and kept in smaller leaf receptacles, the eggs of two or three moths (about 500 eggs) being kept in each receptacle. On the ninth day the eggs hatch, and as soon as they hatch, they are put out on trees in which they are secured by pinning them on to leaves. The trunks of trees should be brushed clean of ants and other insects, and afterwards they are each given a circle of Bhela oil to protect the worms from the attack of ants, etc. To each tree about half a dozen to a dozen of seed-receptacles are pinned on at different places, that the whole of the tree may get covered with the worms and not any particular part of it only. The trees have to be kept low for facility of watching the insects against ants, wasps, birds, squirrels, a bug called *chányá*, a mantis, scorpions, centipedes, a large carabidæ beetle called *chha-bundia*, and other vermin. In this matter great care is necessary. The principal epidemic from which the tusser silkworm suffers, is Grasserie (Fig. 16), which is a disease which is produced readily, both among tusser and mulberry silkworms by feeding them with leaf, thinner, i.e., sappler, than leaf that the worms have been eating hitherto. As sap rises from the ground, a heavy shower of rain makes the greatest difference of consistency in the leaf in the case of short trees, as by capillary action sap rises to a height of about 4 or 5 feet. No worms should be kept on branches within 4 or 5 feet from the ground, or such branches should be lopped off from the very first.

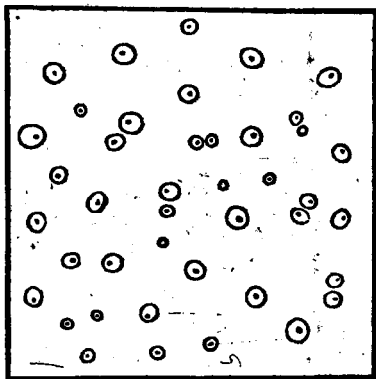


FIG. 16.—MICROSCOPIC APPEARANCE OF GRASSERIE CRYSTALS (X 600).

For tusser rearing the annual pollarding should be so done, that all the branches may be above 5 feet and below 10 feet from the ground, that Grasserie may be avoided, while the worms may be kept under close supervision. Another precaution which may be taken to prevent epidemic, is the daily removal and burial of droppings and dead worms from under the trees. A stick with bird-lime (peepul tree gum mixed up



with warm mustard oil and kept covered with a bamboo tube when not in use) ought to be always in the hand of the rearer, that he may effectively scare away wasps and birds. A bow and pellets of mud are also of great help. In tusser rearing localities, one scarcely sees a bird, the watch kept by the rearers being so strict. When the leaf of one tree is eaten away, the branches are lopped off with the worms on them and transferred to another tree, or several trees, and this continued until the cocoons are formed. When the cocoons are all formed, they are brought down with the adhering branches of trees, carefully separated from the branches and sold off in *hâts*. When they cannot be sold so readily, they must be killed. For killing the cocoons, they are put inside a *kulsi* (earthen pot), and inside the mouth of the pot a few sticks are inserted, so that when the pot is upset with its mouth downwards, none of the cocoons may fall out. The pot is then put in this reverse condition over another in which water is boiling over an oven. In about half an hour all the cocoons are killed with the steam rising from the one pot and going into the other. They are then dried in the sun and kept for reeling. The effect of domestication of tusser cocoons are :—(1) the cocoons tend to get smaller, (2) they get lighter and lighter in colour, (3) the silk gets finer, (4) the peduncle gets longer and slenderer, (5) the worms get more and more subject to disease. Domesticated cocoons are preferred by weavers, as they produce the whitest and finest cloths.

#### VI—REELING OF TUSSER.

9. The reeling of tusser cocoons is done by patent processes in the European factories in Bengal, soda or potash being the chief solvent ingredient in use and glycerine the substance for keeping cocoons moist while they are reeled. A single person can reel off the silk from 250 tusser cocoons a day in European factories. The native process consists in boiling the cocoons in water to which ashes of Asan, Kenja, or other tree or plant (such as linseed plant ashes), are added, or *saji*. For 500 cocoons about half a *seer* of ashes are used, or half a *chhitak* of *saji*. A refined method would be the using of lye instead of the crude ashes. The lye may be obtained out of the ashes by repeatedly passing the water through the ashes kept over a piece of calico, until the water looks oily in appearance. The cocoons may be boiled in this lye for about half an hour. All cocoons are not softened equally by the boiling, and those that do not work off easily while they are being reeled, are kept separate and boiled the next day with a fresh lot of cocoons. Large and hard cocoons require stronger alkali and longer boiling. When the cocoons

have been boiled, they are kept in a pot between folds of a cloth over some ashes, and reeling commenced at once. One day's cocoons are boiled in the morning, one person being able to reel from 50 to 100 cocoons a day. The reeling is done with a *latai* on the right hand, and with the left hand fibres from 3 to 5 cocoons are twisted on the thigh, while the *latai* is being wound round with the right hand. As 50 to 100 cocoons are reeled and twisted by the same operation per day, this primitive method cannot be regarded as a very ineffective method of preparing the raw material for the loom. Usually the spinning of tussler cocoons is done in the weavers' families, and it is never done by the rearers as it should be. A *kahan* (=1,280) of cocoons produces from  $\frac{1}{4}$  seer to 2 seers of silk according to quality of cocoons used.

#### VII.—THE MULBERRY.

10. The mulberry tree grows wild all along the Himalayas, from Kashmir to Assam, and the mulberry silkworm known as *Theophila*, is found abundantly on these trees. The variety of mulberry found in the Himalayas is very large. From the gigantic *Morus serrata* to the dwarf *Morus indica*, the gradation is slow. Some have soft succulent leaf, others rough, spiny leaf; some have large and abundant supply of fruits, others drop their blossoms and are hardly ever known to fruit. Varieties with large-sized leaves set close to one another on stems, smooth, and thick with gummy sap, and bearing little or no fruits, are the best to choose for silkworms. The *Morus alba*, variety *laevigata*, is one of the best varieties to choose. The mulberries in common use in Bengal and Mysore are the *Morus alba*, varieties *indica* and *sinensis*. The former known as *Pheti* or *Sultani tunt* is the better variety of the two, the gum of the leaf being thicker. It has more palmate leaves, and it requires more manuring and cultivation to keep it in condition. The *Morus sinensis* (the *Kajli* or *Chini tunt*) has thinner and sappier leaves, but it is hardier. It is quite suitable for worms up to their fourth moult, but afterwards, i.e., when the worms are well out of the moult and quite strong, they should be given the stronger *M. indica* leaf. These two varieties do not grow into very large trees, and one of the chief improvements that could be introduced into the Indian industry is the introduction of *M. laevigata* or some other similar superior variety of mulberry, suitable not only for rearing the poor Bengal cocoons, but also the superior *B. mori* cocoons. The tree system of propagation of the mulberry is also more natural and healthy. Trees when once grown up cost little keeping up, while the shrub-mulberry planted  $1\frac{1}{2}$  or 2 feet apart costs about Rs. 75 an acre keeping up.

## VIII.—PROPAGATION OF MULBERRY.

11. Propagation of mulberry may be either from seed, or from cuttings, or from grafts. Trees grown from seed produce leaf

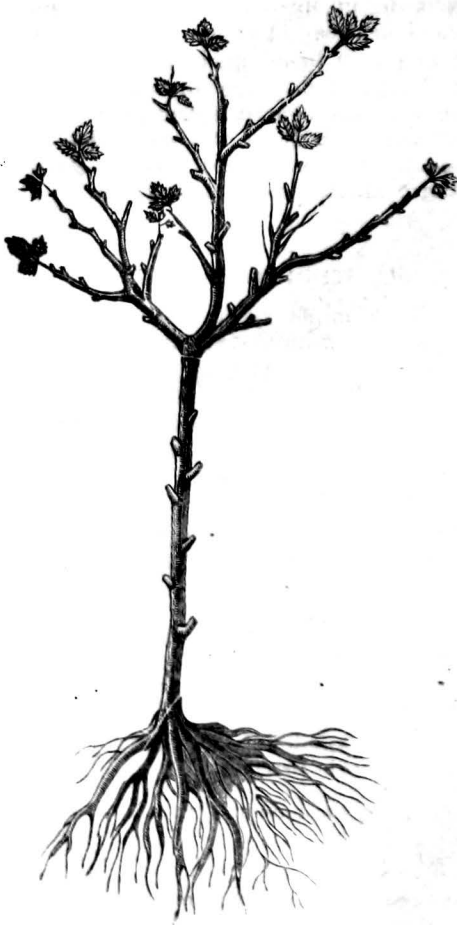


FIG. 17.—MULBERRY TREE PRUNED AND STRIPPED FOR TRANSPLANTING.

which, like *M. indica*, is not quite suitable for rearing worms at the last stage. *Morus laevigata*, *M. Philippinensis*, the European *Morus alba* and other superior varieties of mulberry can be readily grown from cuttings, and propagation is done usually from cuttings only. The best Japanese mulberry, however, does not grow from cuttings, and it is grafted. Though the Japanese mulberry answers to all the requirements of a first-class mulberry, it is no better than some of the best Indian mulberries, and there is no occasion to introduce the Japanese varieties into India. For growing any mulberry from seed, one precaution is necessary. Before sowing the seed, it should be put in camphor water in a stoppered bottle for an hour, and then sown. Germination is otherwise very partial. Mulberry seed is smaller than grains of

mustard, and seed for a large tract of land can be easily sent through post from one country to another. When the seedlings

are grown up, propagation may go on from cuttings, and thus the first cost of setting up a plantation saved very much. When cuttings are available, propagation should be from cuttings. When trees are sought to be propagated, there should be a nursery on high irrigable land, well dug up, manured and cultivated and protected with ditches and fences. The cuttings or seedlings should be planted in the nursery 9 inches apart, and transplanted on to fields, when 8 or 10 ft. high, at a distance of 20 ft. While transplanting, all the full-formed leaves should be nipped off and all branches within 5 ft. of the ground rejected (Fig. 17). Leaf from seedling trees should not be given to worms in their last stage, as it is more sappy.

#### IX.—COST OF PLANTING MULBERRY.

12. The cost of starting a mulberry plantation of the shrub kind is about the same as starting a mulberry nursery for trees. In the former case the cuttings are planted about 1½ ft. apart instead of 9 inches apart, and four or five cuttings planted at each spot instead of one. The cost of establishing a mulberry nursery, one acre in area, for the first two years, is given below :—

	Rs.	A.	P.
(1) Wages of 90 men employed in digging the field with spades in the cold weather, at 3 as. ...	16	14	0
(2) Ditching and fencing (by piece-work) ...	30	0	0
(3) Cost of 12 ploughings, the plough-man with bullocks and ploughs being hired, at 4 as. a day ...	9	0	0
(4) Cost of getting 30 loads (about 30 mds.) of mulberry stalks in September, at 4 as. ...	7	8	0
(5) Wages of 15 men making cuttings, at 3 as. ...	2	13	0
(6) Wages of 15 men making hollows in regular lines ...	2	13	0
(7) Wages of 45 men planting cuttings ...	8	7	0
(8) Hand-hoeing in October by piece-work ...	1	8	0
(9) Cutting away the first shoots in December ...	1	8	0
(10) Ploughing afterwards ...	3	0	0
(11) Cost of putting tank-earth as manure in April ...	15	0	0
(12) Ploughing in May ...	2	4	0
(13) Irrigation (if necessary) in May ...	15	0	0
(14) Weeding in July ...	3	0	0
(15) Cutting away of stumps in August or September ...	1	8	0
(16) Ploughing in September ...	1	8	0
(17) Digging with spades after the November bund ...	7	8	0
(18) Two years' rent ...	12	0	0
	141	3	0

Expenditure in connection with items Nos. (10) to (18) has to be incurred annually, i.e., about Rs. 75.

## X.—OUTTURN.

13. The first crop of leaf, which is ready in November or December when planting is done in September, or in April when planting is done in February, is cut away, as the leaf is very thin and sappy and not very suitable for silk-rearing. The crops *bund* by *bund* that are obtained afterwards are :—

		Value.
24 maunds of leaf (with stalks) in January	...	Rs. 24
36 " " " "	March	" 36
48 " " " "	June	" 24
60 " " " "	August	" 30
45 " " " "	November	" 90
45 " " " "	December	" 45
<hr/>		
Total 258 maunds		Total value Rs. 249

## XI.—PROFITABLENESS OF THE SILK INDUSTRY.

14. An acre of mulberry from the third year, when it is well established, usually yields 300 maunds of leaf with stalks, which is sold as a standing crop, cocoon-rearers buying it up and cutting it away from day to day. The purchase at the above prices is usually on credit, and often the buyers, when they lose their crop of silkworms from diseases, are unable to pay the price of mulberry. The mulberry grower and the silk rearer are therefore both interested in the eradication of diseases. From 300 maunds of leaf 600 seers (1,200 lbs.) of fresh cocoons are obtainable as the maximum result per acre. The value of this quantity of cocoons may be as much as Rs. 600. The profitable-ness of sericulture, when loss from disease, etc., may be kept down, can thus be easily imagined.

## XII.—THE TREE MULBERRY.

15. When rearing is done with leaf from large mulberry trees, the seedling or cuttings planted should not be touched for the first five years as the leaves go to nourish the trees. They should be protected for the first three years at least with gabions, or with a rough envelope of coarse grasses and thorns, that injury from cattle may be avoided. If a couple of seers of whole bones are put underneath each tree once in twenty years, and the soil underneath the trees annually dug up in November, the trees will always remain in condition. Two pluckings are possible annually,

the first in February or March, and the second in October or November, as some leaves must be left to nourish the trees. In the fifth year, when the first picking of leaves takes place, each tree will yield about 10 seers of leaf at each picking, or half a maund in the year. By the tenth year, the yield will gradually increase to a maund per tree. The maximum average yield per tree, may be put down at 2 maunds, which result will be attained after about 20 years. But the divergence in the yield of leaf is great according to the variety grown. The quantities mentioned will be readily yielded by *Morus laevigata*, *Philippinensis* and the ordinary European *Morus alba*, but not by *M. indica* or *sinensis*. Every other year the branches of the trees should be pruned off, so that the new shoots coming on with a more vigorous growth of leaves, can be readily bent, and the leaves picked with the help of a crook without climbing.

### XIII.—REARING OF SILKWORMS.

16. The rearing of mulberry silkworms (Fig. 18), and of *Endi* or *Eri* silkworms indoors on bamboo *dalas*, proceeds on much



FIG. 18.—MULBERRY SILKWORMS IN VARIOUS STAGES (ONE SILKWORM BEING SHOWN WITH A PARASITIC FLY DEPOSITING NITS ON IT).

the same method. Leaves (castor leaves in the case of the Eri silk-worm) are put on the newly-hatched worms, cut up very fine, the worms with the leaves separated from the eggs after three or four hours, and put separately at the lowest shelf of a *machan* (called *gharz* in the silk districts). The eggs hatching the next day are put higher up in the *machan*, and the third day's worms still higher



FIG. 19.—FECUNDATION AND OVIPOSITION OF ENDI MOTHS.

up, after which usually no more notice is taken of the eggs, except in the case of the Barapalu eggs, in which the hatching is much more tardy. The worms up to the last moult are usually fed five times a day at regular intervals. At the last stage, the worms are fed three or four times a day. The worms moult or change their skin four times during this interval, *i.e.*, from hatching to spinning of cocoons. Inside the cocoons the worm moults twice, once in changing into chrysalis and the second time in changing into a moth. Inside the cocoons and as moths they eat nothing. As moths they pair and lay eggs (Fig. 19), and after a few days die off. Strong and healthy moths may live for a fortnight after laying eggs; but a moth dying within a day or two after laying eggs *may be* healthy and their eggs fit for rearing. As leaves are heaped up on *dalas* by repeated feeding, cleaning becomes necessary. Native rearers neglect cleaning at least in the early stages. But neglect in this matter and in the matter of keeping the worms thin, and the room well ventilated (though the worms themselves must always be kept away from a current of air), result in worms dying in large numbers specially at the last stage, though at the last stage one may be very careful. Keeping the worms thin and clean and the room well ventilated (though in even temperature) and free from dust, is necessary from the first. Cleaning and thinning of the worms are facilitated by thread-nets (Fig. 20) of meshes of about half an inch. A net is spread

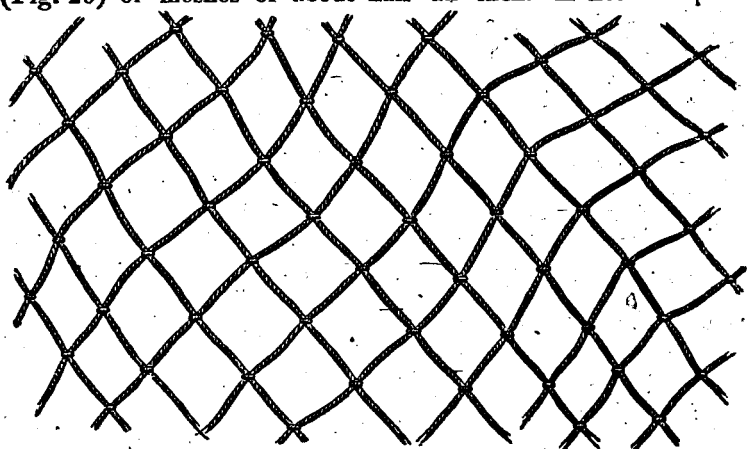


FIG. 20.—THREAD-NET FOR CLEANING AND THINNING SILKWORKS.

over the worms resting on dirty leaves, fresh leaves (cut up fine at the two early stages and whole leaves with stalks



being put from the third stage) scattered over the net, and after half a minute the net may be removed to another *dala*. This has the effect of separating the worms evenly into two lots. Nets are to be used daily for cleaning whether the worms need thinning or not. A *dala* of newly-hatched worms has to be divided up into three *dalas* after the first moult, into nine *dalas* after the second moult, into 27 *dalas* after the third moult, into 81 *dalas* after the fourth moult, and at the last stage the worms occupy twice as much space (*i.e.*, 162 *dalas*) before they make cocoons. Daily the net from a *dala* with the worms and litter are to be lifted at the mid-day feed, removed on to a fresh *dala*, and the older *dala* removed outside and thoroughly cleaned. If, however, worms are found underneath the net, they must be assumed to be moulting. They should not then be disturbed, but kept on a lower shelf on a separate *machan* where no feeding should be done for about 24 hours. The worms on the net removed to a fresh *dala* are to be given a feed and then left without food for about 24 hours. **Great care is necessary at moulting periods. The point to remember is, it does more harm giving food to moulting worms than fasting them for a few hours until the worms are well out of moult which is known by their agility and hungry look.** If on blowing over the worms they move very fast, one knows they are properly out of moult. If, on the contrary, the movement they exhibit is of a dull and listless kind, they are not quite out of their sickness, and they should be still left without food. An extra feed at the time when the worms are going off to moult does not do them much harm; but feeding too early does harm. Experience is needed in this matter.

17. Worms in the same room should be all of the same age, as much as possible. That is why tardy worms are kept high upon *machans*, and early ones lower down, both at hatching and at moulting times. **If worms of different ages are kept in the same room, the late worms suffer more from disease.** Worms when they are ready for spinning become translucent and they constantly spit out silk from their mouth. At this time, in the case of Indian silkworms, they are quickly picked and transferred to a spinning screen (or *Chandraki*, vide Fig. 21) where they get convenient bearings for making cocoons. In the case of the *B. mori*, dry twigs are arched over the worms and ripe worms make their cocoons in these arches. In the hot weather, from hatching to spinning, only about 20 days are spent in the plains of Bengal, and in the coldest weather about 40 days. **But cocoon-rearing is best done when the temperature is about 75° and fairly uniform.** That is why the November bund or crop is the best crop, and the

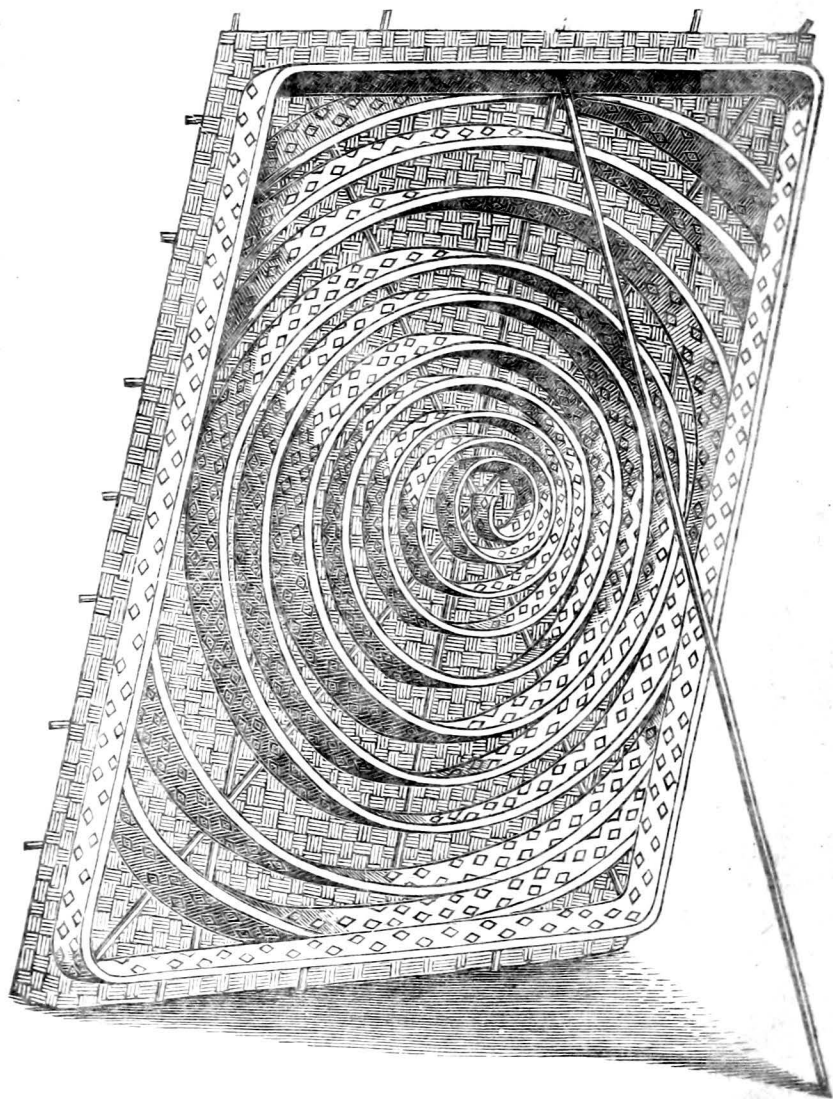


FIG. 21.—CHANDBAKI OR SPINNING SCREEN.

March bund the next best. If large mulberry leaves are used, only these two crops would be taken. But when the shrub mulberry is used, rearing must be done at other seasons also, when, on account of too great heat, or cold, or damp, rearings are more or less unsuccessful. Two good crops of cocoons are better than eight indifferent ones (even the two good crops being subject to infection when four or eight crops are attempted). Indeed, on account of the parasitic fly-pest (Figs. 27 & 18) it is not feasible to take all the eight crops in the year, and this is why rearers take a crop and omit the next and then go for seed to some distant place, and the actual number of crops taken in a village is three or four. When the cocoons are formed, they are gathered from chandrakis on the third day and sold off at once, or killed in a *kulsi* as described in connection with tusser cocoons, or in a basket put over a boiling pan of water, the basket being covered over with a blanket. When there is hot sun, the rays of the sun are sufficient to kill the cocoons in two or three days.

#### XIV.—REELING OF MULBERRY COCOONS.

18. Except in the rainy season, cocoons, however killed, must be steamed in an oven immediately before reeling. Ovened cocoons should be reeled off within 3 or 4 days. Ovened cocoons should not be spread out in the sun to get dry, but should be kept spread out indoors in *machans* and reeled off as fast as possible. For small quantities of cocoons the ovening can be done in a basket over a pan of fire as in the case of killing, a blank space being left in the middle of the basket, so that cocoon about 6" thick may rest on all sides and the top, and the steam work its way from the bottom through the cocoons and out of the blanket. When for 10 minutes the steam is coming out of the blanket, the cocoons may be considered to be properly ovened. When dealing with large quantities of cocoons, special erections are necessary for ovening. In the rainy season the air is naturally steamy and it exercises the same beneficial effect on the cocoons as an artificially produced atmosphere of steam. But cocoons spun in rainy weather do not unravel properly in basins and they are a source of great loss to European factories where even silk is required to be made. Ovened cocoons are reeled off in a basin of water (Fig. 22) which is kept boiled with fire or steam, and passed in two lots to a reel, which as it is wound round and round, the cocoons get worked off. As each cocoon gets worked off, its place is supplied by another, the end of which is kept ready for the purpose by the reeler, and an expert reeler can reel off as many

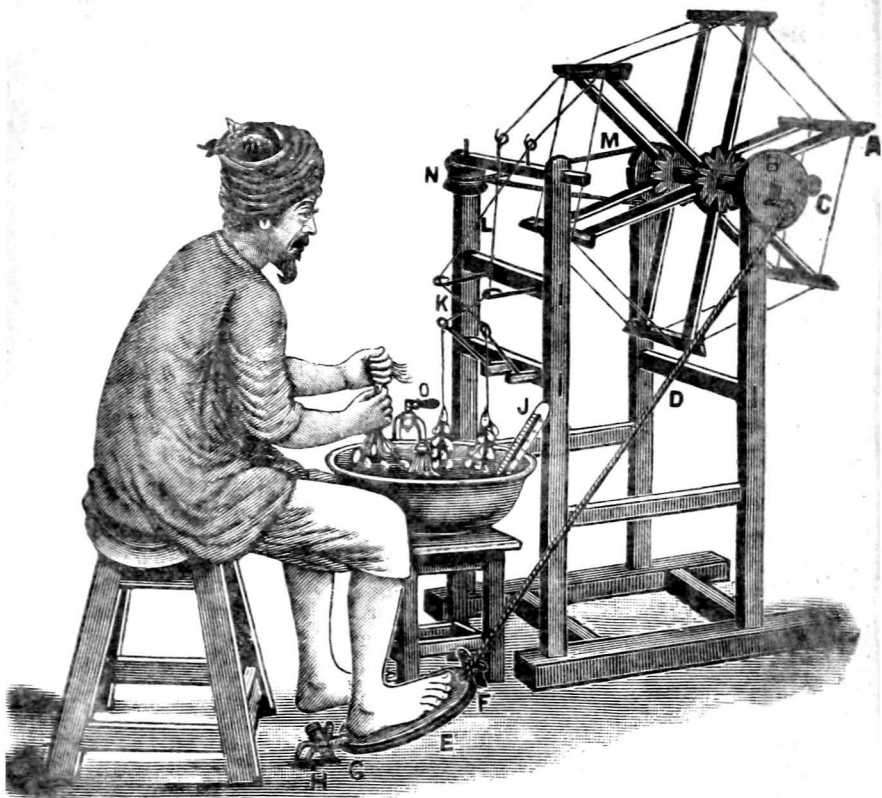


FIG. 22.—A NEW REELING MACHINE WITH PEDAL ARRANGEMENT,  
WORKED BY ONLY ONE MAN.

- A—Reel (2½ feet diameter).
- B—Pulley at right-hand end of the reel (weighted).
- C—Pin or screw on B.
- D—String or wire.
- E—Plank (pedal).
- F—Hole at one end of E for tying string or wire.
- G—Hole at the other end of E for tying the pedal to a pin fixed into the ground with wire rope.
- H—Pin fixed to the ground for keeping the pedal in position.
- J—Thermometer for testing the temperature of water in the basin for boiling and reeling the cocoons.
- K & L—Two croisures.
- M—String giving motion to the eccentric.
- N—Pulley on which the eccentric rests.
- O—Steam-cock.

as four *kahans* of cocoons per day when he has to make the best kind of silk, and ten *kahans* a day when he has to make native *Khangru* silk.

#### XV.—THE SILK-FIBRE.

19. There is no fibre so long, so strong, so fine, so soft, and so smooth, as the silk-fibre. When we talk about the staple of cotton-fibre being long, we only mean that it is  $1\frac{1}{2}$  or  $1\frac{3}{4}$  inches in length; when we talk of jute-fibre being long, we only mean that it is 12 or 13 ft. long, but the tusser cocoon has an uninterrupted fibre 800 yards long and some varieties of mulberry cocoons, one uninterrupted fibre of 900 yards, and yet the fibre is so fine that in the case of the tusser this single fibre from a cocoon is 700 milligrammes and in the case of the mulberry silk it is 250 milligrammes in weight. So fine is the thread, that although there is no difficulty, on account of its strength, to draw the thread out of single cocoons, in practice never fewer than three cocoons in the case of the tusser and never fewer than four or five in the case of the mulberry cocoons, are used simultaneously for drawing out the thread from. It is for the finest silk muslins or silk gauze that thread is made by drawing out the fibre of four or five mulberry cocoons together. So strong is the fibre of mulberry cocoons that it is quite easy to draw out the fibre on to a reel without a single break, though this fibre is so fine that for practical purposes it is never used for making fabrics in these days, though perhaps in olden times the "Koan vests" of the Roman empire were woven out of such single silk-fibre. And yet each single fibre of silk is made of two ultimate fibres agglutinated together with a natural gum which gives the fibre its brilliancy. These two ultimate fibres or *baves* come out of the spinnette at the mouth of the silkworm, and ultimately derived from two glands situated on two sides of the interior of the worm. These two glands are sometimes taken out of the body of the silkworm, put in vinegar and afterwards drawn out in the form of silkworm gut which is used for tying fishing hooks to the line. For its weight and pliancy there is no such strong substance as the silkworm gut.

20. But though the fibre is the strongest, finest and softest fibre of all, one silk-fibre differs from another so much that one is valued at Rs. 10 a seer, while another at Rs. 30 a seer, and a country which habitually deals with a Rs. 10-per-seer fibre can ill compete with a country which habitually produces a Rs. 30-per-seer fibre. The native-made silk of India called *Khangru* or *Ghangru* silk sometimes sell at only Rs. 10 per seer, and Rs. 12

per seer may be taken as the average price of *Khangru* silk. The European filature reeled silk is much better. It sometimes sells for only Rs. 16 or Rs. 17 per seer, but its average price is about Rs. 20. Italian, French, and Japanese silks are still better and they sell for about Rs. 30 a seer.

21. Why is there this difference in price? Let us first see the cause of difference between European filature reeled silk and *Khangru* silk. As much as one seer a day may be reeled by a couple of men on the *Khangru* system, though the average quantity is 9 chhitaks. As much as  $4\frac{1}{2}$  chhitaks per day is sometimes turned out by a pair of operatives in European filatures, but the average may be taken at  $3\frac{1}{2}$  chhitaks. This difference comes of the Europeans looking to quality and the Indians chiefly to quantity. There are three causes which combine to make the European filature reeled silk being so much superior to the country *Khangru* silk :—(1) The European factories of Bengal regulate the number of cocoons reeled more exactly and usually use a smaller number, five or six cocoons, instead of 20 cocoons. (2) The European factories insist on a knot being put whenever there is a break. (3) The European factories cross two adjacent lots of fibre twice on themselves to effect an agglutination of fibres, while the country reelers not giving any crossure and putting no knots, can reel away very fast and get a larger absolute and relative produce.

22. Is it worth while for our country reelers to follow the European system, and produce a smaller quantity of superior fibre? Not at present, when the demand for silk at Rs. 12 a seer in India is very large and very keen. There is practically no demand for the Rs. 20 silk in the Indian market. Ask the large silk-mill-owners of Bombay what silk they want. They will tell you, silk of the value of Rs. 5 or Rs. 6 per pound; and as for hand-loom use, they prefer, as a rule, the cheaper silk. A few *skeins* of what is called by our country weavers "Latin silk," that is, European filature reeled silk, are always used by exceptionally good weavers to meet some special demand, but it is the *Khangru* silk that they are accustomed to handle. The demand from Benares, Lahore, Amritsar, Karachi, Nagpur and other centres of silk-weaving is for the Bengal *Khangru* silk, and this demand is very great. Nearly a crore of Rupees worth of silk is exported to other Provinces of India from Bengal against 50 lakhs of Rupees worth of superior filature reeled silk exported to Europe and America. The demand for the *Khangru* silk shows an upward tendency and the demand for the superior European silk shows a downward tendency. There is therefore no hesitation in what I have recommended. Go in for quantity for the present, and turn out *Khangru* silk for the country.

23. The next question we should turn our attention to, is, why is not the European flature reeled silk of Bengal as good as Italian, French or Japanese silk? In Europe there is demand mainly for high-class silks, as in India there is demand chiefly for low grade and cheap silks; and in India also, as time goes on, the demand for high class silks will increase. If the millers and weavers of India can buy high class silks for Rs. 8 per lb., they will not buy low grade silks for Rs. 5 or Rs. 6 per lb. High class silks are more easily unravelled, and there is less waste in unravelling it, and though labour in India is cheap, the manufacturer finds it pays him to buy high class silk for Rs. 8 a lb. If in Europe also European flature reeled silk can be sold for Rs. 8 a lb., it will sell better, but European manufacturers do not care about using silk which gives so much trouble in unravelling. It is therefore worth while to be prepared for the European market and for the future demand of the Indian market. At present the European silk factors should rewind their raw silk before export.

24. What is the cause of the inferiority of the European flature reeled silk of Bengal as compared to the European and Japanese silks? This is a question which we have not answered yet. From recent experiments I have come to the conclusion that the inferiority comes neither from the inferiority of the workmen nor of the machine, but it is to be attributed mainly to the inferiority of the Bengal cocoon. The Bengal cocoons are the worst in the world, and with no machine is it possible to produce out of these cocoons silk of such quality as can be produced out of the *Bombyx mori* cocoons. The reason is not far to seek. The length of the fibre on a Bengal cocoon is about 200 to 250 yards, while that on a *Bombyx mori* cocoon about 800 yards. The silk made out of *Bombyx mori* cocoons (which are the staple of Europe and Japan) must therefore contain about four times as fewer joinings as the silk made out of *Bombyx Cressi* or *B. fortunatus* cocoons of Bengal. The average length of fibre on a Mysore cocoon is about 300 yards, and the *Bombyx meridionalis* cocoons of Madras therefore produce a little better silk than the silk produced by the same machine in Bengal flatures out of Bengal cocoons.

#### XVI.—INTRODUCTION OF THE *BOMBYX MORI* COCOONS.

25. How to introduce the *Bombyx mori* cocoons into India is therefore the problem before us. I have worked the *Bombyx*

*mori* cocoons, successfully for a number of years in Bengal, and it has been worked in Kashmir and Assam with success also. The difficulty with regard to the rearing of this class of cocoons is in the matter of conservation of seed or eggs. The eggs require a period of intense dry cold, and they must be protected from hot winds at other times. In every part of India the *B. mori* worms can be reared (and in many parts they have been reared), successfully at some time or other from February to June. But the conservation of the eggs from April to next January is possible only in a few places like Kashmir, Dalhousie, &c., where in winter the cold is severe but dry. There is another difficulty with regard to the *B. mori*. The epidemic called Pebrine must be kept suppressed by annual examination of the seed with a microscope. If railway communication is established between Kashmir and the rest of India, and if Kashmir establishes the "system of grainage" as devised by M. Pasteur, she can supply the rest of India with seed. This will give one good crop in the year which will make a Rs. 30-per-seer silk. But a separate organization of having a grainage and hibernating station at Dalhousie may be also tried and this was the subject of my paper in last year's Conference at Benares.

#### XVII.—DISEASES OF SILKWORMS.

26. The greatest obstacle to sericulture is the prevalence of certain diseases among silkworms. In Bengal, Pebrine (Fig. 23),

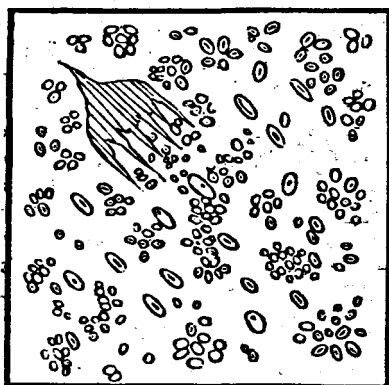


FIG. 23.—MICROSCOPIC APPEARANCE OF PEBRINE (X 600).

Musccardine (Fig. 24), Grasserie, and the fly-pest (*Tricolyya bombycis*) do the greatest amount of damage; while other diseases, such as Flacherie, Court, Gatine and the *Dermestes vulpinus* also do some amount of harm. In Mysore Flacherie (Fig. 25) does the most harm, while other diseases are scarcely known.

27. Pebrine (Bengali *kata*) is caused by a microscopic organism which, when magnified 600 diameters, looks like grains of mung seed. It is a slow-acting

disease, taking 30 days for complete development, so that



when the seed is badly pebrinized, the worms die off at the last stage, all of a sudden. If rearing is completed in less than 30 days, pebrinized worms spin cocoons, though these are poor. When the seed is not very badly pebrinized, some worms, *vz.*, those produced from pebrinized eggs, die off on the 30th day, while others which catch the infection from the pebrinized worms, die later on, or make cocoons and come out as moths, which show pebrine corpuscles, and then die. Some worms from eggs free from pebrine happen to escape infection. These spin cocoons, come out as moths, and show no pebrine corpuscles. The eggs from these moths are safe to rear from. Each moth is made to lay eggs under a separate cover, on

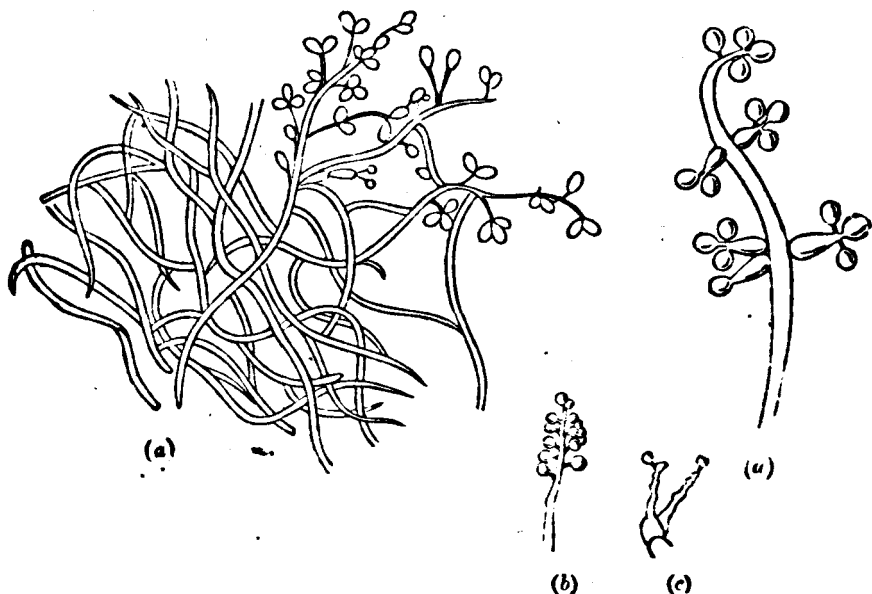


FIG. 24.—MICROSCOPIC APPEARANCE OF MUSCARDINE.

- (a) Hyphae with spores; (b) End of an old branch which is producing spores by abjunction and is thickly covered with spores, the youngest of which are terminal; (c) two sporogenous branches from which all the spores have fallen except the youngest and uppermost (enlarged 500 diameters); (d) young sporiferous hyphae (enlarged 700 diameters).

sheets of paper, and after at least five days, each is examined under a microscope. The eggs of those moths, the blood of which show no pebrine corpuscles, are retained, the rest being burnt. The eggs selected out are then superficially

purified from diseases, by a dip in a sulphate of copper bath ( $\frac{1}{2}\%$  solution), hung up in a cool but airy place to get dry, and then taken inside a rearing room, which with its rearing appliances has been already disinfected (Fig. 26) with sulphate of copper wash and sulphur fumes. The rearing from eggs thus selected and in room thus disinfected cannot fail from pebrine. Where rearing takes place once a year, disinfection of appliances is not necessary for protecting the worms against pebrine alone, provided the seed itself is selected. The germ of pebrine loses its vitality in seven months, and local infection thus dies out before the next annual crop is taken. Natural freedom

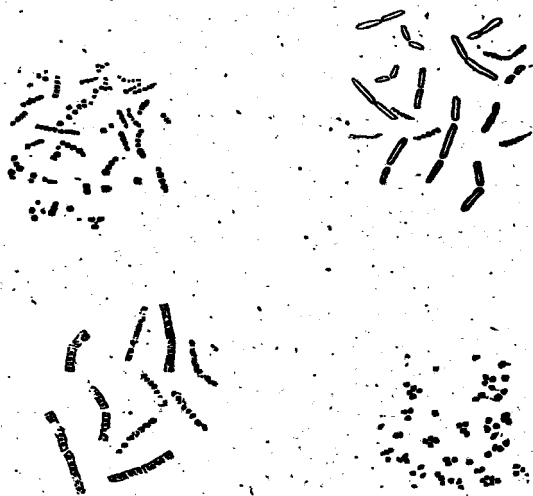


FIG. 25.—MICROBES OF FLACHERIE.

from pebrine is more desirable than freedom secured by microscopic selection. Thus, the *Bombyx meridionalis* silkworm of Mysore is naturally free from pebrine, and microscopic selection is not necessary in rearing, and this variety is giving good result in Bengal. A lot of seed selected out free from pebrine always tends again to get more and more pebrinized from 1 to 5%, from 5 to 20%, and from 20 to 50%, and so on, until in a few generations every moth again is found to be pebrinized. In this case, therefore, microscopic selection is needed at every generation to secure exemption from pebrine. Five per cent. of pebrine in the seed does not affect the result, but 20, 30

or 50% of pebrine left without selection, spoils the result more or less, though even with 80 or 90% of pebrine in the seed, a sort of a crop is obtained in the hot weather, the pebrine not getting time to develop so fully as to kill the worms. It only weakens the worms, so that they either make poor cocoons, or succumb to other diseases. A pebrinized lot of worms thus falls an easier victim to Flacherie, Muscardine, Grasserie and Court, than a lot of worms which is free from pebrine. It is essential to have a number of nurseries in each silk-district in Bengal, where the system of microscopic selection will be rigorously followed and the cocoons obtained from selected eggs sold for seed-purpose, or where a stock naturally free from pebrine is reared. The few nurseries that have been established by cocoon-rearers in Bengal are doing very good work.

28. Muscardine is another epidemic of the silkworm which is due to a higher fungus, quite visible to the naked eye in its fully developed form when it partakes of the nature of a white mould on the bodies of dead worms. The worms which have this mould get like sticks of lime, hence the Bengali name *Chunakati*. This epidemic is also readily controlled by disinfection of eggs and all the appliances used, and rearing the worms in a clean manner. If through neglect of disinfection of the rearing house and the appliances, of the eggs at the commencement, or by the neglect of delitage, Muscardine does break out, it can be stopped, by cleaning the worms with nets, keeping the worms fasting for a few hours and by burning sulphur afterwards in the room thoroughly shutting it up. The cleaning will have to be done daily after this and a little sulphur burnt after the room has been smeared with sulphate of copper solution. Many a rearing was saved from Muscardine in connection with the experiments with which I was entrusted for ten years.



FIG. 26.—USE OF ECLAIR VAPORISER FOR DISINFECTION.

29. Flacherie is an epidemic caused by the fermentation of mulberry leaf inside the stomach of silkworms. Such fermentation may be caused by various microbes, but the microbe which is mainly instrumental in setting up the gastric fermentation is the *Bacillus Megaterium bombycis*. The disease is known in Bengal as Kalsira because the dorsal vessel of the worm gets

black. Putrefaction, however, sets in very rapidly and the whole worm gets black and putrid soon after death. This disease is so common in Mysore, because there the custom prevails of feeding the worms 7 to 9 times a day instead of 3 or 4 times. The organism may be either in the spoilt, dusty or heated mulberry leaf, or in the intestine of the silkworm. Weak worms have greater proclivity to take the epidemic, so that a feed of the same lot of mulberry may give Flacherie to one rearing and none to another. The state of the rearing room also has considerable effect on the disease. A stuffy, close room would give Flacherie to silkworms, while a well-ventilated room gives comparative immunity. Dust, specially dust raised at delitage, aggravates the epidemic. The remedies are : (1) disinfection of eggs, rearing house and appliances with sulphate of copper solution. (2) Feeding of the worms not more than five times during the early stages and not more than four times a day during the last stage. (3) Using of fresh unfermented leaf, without dust, without dew or other moisture, and of leaf that has not been submerged under water or otherwise got under the control of microbes in the field while growing. (4) Keeping the rearing room well ventilated. (5) Cleaning the worms daily and yet raising no dust, by taking the trays out for dusting, and leeping the floor instead of sweeping it.

30. *Gatine* (Bengali *Salpha*) is a form of indigestion which is caused by excess of heat or excess of cold, which takes away the appetite of the worms, and though they are given leaf, they do not eat, or eat only occasionally. The worms look elongated and white. In pebrine also the worms look pale, but they look short and not elongated. The ultimate form which *Gatine* takes is the same as in the case of *Flacherie*. They become black and putrid. *Gatine*, however, is not so fatal, and it does not spread so rapidly as *Flacherie* ; and if the worms are removed from the cold place, or if by *punkha* or other means heat can be lessened, the worms recommence eating and the epidemic is arrested. It is best to avoid rearing in April or May, and in December and January, when the temperature cannot be controlled, and rearing in open places, where the temperature varies very much.

31. *Grasserie* (Bengali *Rasá*) is a disease which is not associated with any microbe. It is caused by a sudden change in the character of food from a less sappy to a more sappy condition. Worms ought to be given stronger and stronger leaf as they get older and older ; but if owing to a heavy shower of rain following protracted drought, or change of field, the consistency of leaf changes into a more sappy condition, *Grasserie* at once breaks out.

The remedy is to use leaf gathered from trees and eschew the use of shrub leaf as much as possible. The recommendation to grow large mulberry trees is very important for this among other reasons. In Europe and in Kashmir where leaf from trees is used, Grasserie is never known in the epidemic form, while in Bengal more loss takes place from Grasserie than from Flacherie. In fact, Grasserie is looked upon by the French peasant as an auspicious sign, as an indication of a full harvest.

32. **Court**, called in Bengali *Láli*, *Ráñgi* or *Kurkutte*, is more an abnormality than a disease. A worm affected with *Court*, turns into chrysalis without making a cocoon or making a very flimsy one. The chrysalis turns into a moth which may lay eggs, and examined under the microscope, it may not show any disease. But the reproduction from such seed gives *Court* in a more exaggerated form in the next generation, and it is, therefore, an abnormality that must be avoided. If worms are fed on *naicha* leaf, that is, on leaf from a new plantation, or from shady places; or given an insufficient supply of leaf at the last stage, this abnormality is noticed, and it is further hereditary.

33. **Double-cocoon** (Beng. *Genthe-koa*) or two worms jointly forming one cocoon, is an abnormality which is not very common in Bengal, but it is very common in Japan and China, and fairly common in Europe. The tendency is hereditary, and as double cocoons cannot be reeled, they are often fraudulently used for obtaining seed for sale. The use of such seed has resulted in breeds that show the abnormal tendency to an exaggerated degree. In Bengal, cocoons being always bought for seed, there is no fear of this abnormality assuming alarming proportions.

34. The **fly-pest** does very great harm to the silk crop in Bengal. The *Tricolyya bombycis* which is a tachinid fly, lays its eggs only on silkworms. The eggs hatch into maggots which penetrate into the body of silkworms, and in time kill the silkworms either before or after they have made cocoons. If a silkworm dies after making its cocoon, instead of a moth, a number of maggots of the fly come out of the cocoon. These infest the rearing room, and it becomes impossible to rear silkworms at the next generation. That is why Bengal rearers give up rearing every other generation, and every time go to some distant place for seed. With the seed-cocoons, however, a few maggots of the parasite always come into the village, and some damage is always done. The remedies are: (1) For all the villagers to seed their cocoons in the distant village where they go to buy them, and bring home only eggs. (2) Never to allow any villager to take two crops in succession, but to make all to stick to the three or four regular crops. (3) If these precautions are impossible to

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adopt and if the fly must be dealt with, the rearing room must be built in a special manner, the windows away from the entrance being fitted up with wire gauze, and outside the windows vessels of water with a few drops of kerosine oil to each being kept at a height of 5 or 6 feet from the ground, while before the entrance, which should be kept shut in daytime as much as possible, cow-dung fire should be always kept, which should evolve smoke. This has the result of the parasitic fly avoiding the entrance, congregating outside the windows and rushing every now and again into the troughs of water and drowning themselves, believing them to be entrances to the rearing room. In Fig. 27 a parasitic fly is shown ready to drown itself in a trough of water outside a ventilator or fly-trap.

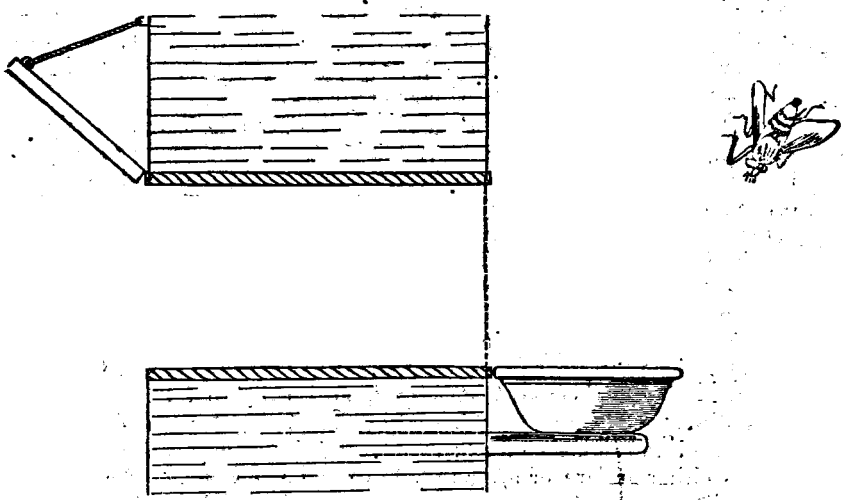


FIG. 27.—FLY-TRAP.

35. The *Dermestes vulpinus* is a beetle which eats up silkworms, chrysalids and moths, both in the larval and imago stages. These also come with the seed-cocoons. They also harbour in cocoon godowns. If seeding is done outside rearing rooms, and if the rearing rooms and appliances are kept scrupulously clean, there is no fear of loss in an epidemic form from this pest. Once only has the author seen the *Dermestes* ruining the rearings in a few villages near Berhampore.



## XVIII.—REARING AND SPINNING ERI SILKWORM.

36. The Eri silkworm is reared in the same way as other Polyvoltine silkworms of Bengal. The cocoons, however, cannot be reeled, and the method of dealing with the cocoons should therefore be described. The moths should be allowed to escape from the cocoons, and as in reeling mulberry or tusser cocoons, the insects should not be allowed to remain in the cocoons. The rearing and spinning, therefore, of the Eri silkworm involves no killing of animals, and for this reason alone Eri silk-rearing is popular among amateurs in this country. The fibre also is strong, and *Endi* cloth is on this account very popular, and the rearing of the Eri silkworm, though less profitable than that of mulberry or tusser silkworm, is not altogether without advantages. The cocoons, after the moths have escaped from them, are boiled with ashes or better still with lye, as in the case of tusser cocoons, and when cool, well kneaded in the warm lye, and then washed by constant kneading in clean water, wrung out and dried in the sun and spun with a spindle (Fig. 28) or a wheel at leisure. Eri rearing and spinning must remain for years to come a cottage industry. But Eri cocoons are carded and combed and spun like cotton or



FIG. 28.—SPINNING OF PIERCED COCOONS.

wool in European mills, and when the industry is established on a large scale anywhere, a *carderie* on European principles may be established.

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**REPORT**  
OF THE  
**WORK OF THE**  
**Indian Industrial Conference**  
1906.

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*Carson Printing Works, Bombay.*

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# REPORT OF INDUSTRIAL CONFERENCE WORK AND GENERAL INDUSTRIAL ACTI- VITY IN THE COUNTRY IN 1906.

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## PART I.

### INDUSTRIAL CONFERENCE WORK.

1. By Resolution VIII. of the First Indian Industrial Conference, held at Benares on the 30th December 1905, Rao Bahadur R. N. Mudholkar was appointed General Secretary of the Conference, and the President, Mr. R. C. Dutt, C.I.E., was empowered to appoint a permanent Assistant Secretary and establishment on suitable pay. Mr. C. Y. Chintamani has been appointed Assistant Secretary on a pay of Rs. 150 a month.

2. The Assistant Secretary, Mr. Chintamani, joined his duties on the 1st February. He worked at headquarters till the 11th of June, during which period he accompanied the General Secretary to Jabalpur, where the Second Central Provinces and Berar Provincial Industrial Conference was held on the 15th April, with Mr. Mudholkar as President; to Poona where an industrial Conversazione was held on the 15th and 16th May under the auspices of the Association for the Promotion of Industrial Education in India, with Mr. Mudholkar as Chairman; and to Bombay on the 2nd June to attend an informal meeting held to consider the future organization and working of the Conference movement. Mr. Chintamani left on a tour on

the 11th June, and returned to Amraoti on the 16th August, having visited Poona and Sholapur in the Bombay Presidency, Calcutta and Cuttack in Bengal, and nineteen centres in the Madras Presidency, including Madras city itself and Tinnevely, where the Madras Provincial Conference was held in the month of June. A Provincial Industrial Conference was held for the first time as an adjunct of the Provincial Conference, and our Assistant Secretary had some share in the inauguration of this Conference. Mr. Chintamani addressed public meetings at nearly all the centres visited by him and had also private discussions with the leading men of the localities, and tried to form industrial associations and committees wherever possible. He was accompanied by Mr. N. Subbarao Pantulu, one of the members of the Madras Committee, in a portion of his tour. After return to Amraoti he was chiefly engaged in the preparation of the "Directory of Indian Goods." He will arrange to visit a few of the important cities of the United Provinces before the end of the year. Mr. Chintamani has submitted a report on his tours which accompanies this Report.

3. The General Secretary submitted the Resolutions of the Benares Conference to the Government of India, the various Provincial Governments and some of the Governments of Indian States with suitable covering letters, and received prompt acknowledgments of the same.

In acknowledging receipt of the letter to the Government of Bengal the Honourable Mr. R. W. Carlyle, Chief Secretary to that Government, sent to the Conference Secretary a copy of an interesting "Memorandum regarding development of Agriculture, and Industrial, Commercial and Technical Education in Bengal." (*Vide Appendix T.*) The Secretary to the Government of Bombay in the Educational Department has sent a memorandum dealing

with the provision for technical education that exists in the Bombay Presidency. (*Vide* Appendix II.)

Later in the year, the full report of the proceedings of the Conference, which includes all the papers laid before it, was submitted to the Supreme and the Provincial Governments.

4. The Government of India as well as the Provincial Governments have expressed their full sympathy with the objects of the Conference. And they have been supplying the office of the General Secretary with their respective official Gazettes and all their publications pertaining to Agriculture, Economics, Finance and Industry. The thanks of the Conference are due to them for this courtesy.

5. With a view to give effect to Resolution VI. of the Benares Conference, by which Provincial Committees were asked to make an industrial survey in their several provinces and to compile useful facts and suggestions for submission to the Second Industrial Conference a circular letter (*Vide* Appendix III.) was sent out early in the year by the General Secretary to the several Provincial Committees of the Conference. Very few replies having been received another circular (*Vide* Appendix IV.) was issued and over a thousand copies of it sent to different persons and bodies. In this the facts which had to be found out and the questions which had to be answered were set out in detail and it was hoped that at least one person from each District would be forthcoming to collect and give the information sought. The Conference office has received till to-day only 20 replies. A synopsis of these is appended (*Vide* Appendix V.) The thanks of the Conference are due to the gentlemen who have kindly supplied this information. Renewed efforts will have to be made to complete this enquiry. It is suggested that the Conference should address the Local and Imperial Governments on this subject and move them to get the facts collected by their officers.

6. A Directory of Indian Goods has been prepared in the office of the General Secretary, and it is in the press. It is expected to be ready about the 10th December. The owners and managers of factories, mills and other industrial establishments were invited to supply the requisite information which was done by some of them. It was incorporated in the Directory along with a good deal of other materials gathered from various sources.

7. The Bengal Provincial Committee met in the month of August and appointed Mr. S. R. Das as Secretary and Messrs. P. Roy Chaudhuri and S. C. Roy as Assistant Secretaries. Several notable names were added to the Committee at that meeting. The arrangements for the Indian Industrial Conference are in the hands of this Committee.

8. The Bombay Provincial Committee met in the month of March, and appointed Mr. Lalubhai Samaldas as Secretary. The Committee resolved that the Director of Public Instruction and the Chairman of the Joint Schools Committee, Bombay, should be addressed on the subject of adding industrial and commercial classes to the existing schools and colleges in that Presidency. It was also resolved that steps should be taken to make inquiries and collect information about the existing industries in the Presidency, and to ascertain the probable scope of their extension as well as the means requisite for the same. The Hon'ble Mr. Vithaldas Damodher Thackersey, one of the members of the Committee, offered to introduce different patterns of hand-looms in one of his mills, and to have their capabilities of turning out the different qualities of cloth tested by an expert weaving master, and to have the results published for general information. The offer was thankfully accepted by the Committee.

9. By a Resolution passed at the First Madras Provincial Industrial Conference, held at Tinnevely on the 22nd and 23rd of June 1906, the Committee of the National Fund and Industrial Association, Madras, a body established in the month of March last, was requested to act as the Madras Provincial Committee of the Indian Industrial Conference. And this Committee at a special meeting held on the 8th of July to confer with our Assistant Secretary on the occasion of his visit to Madras, passed a resolution consenting to do so. The three members of the Madras Committee appointed at the Benares Conference, Mr. N. Subbarao Pantulu, the Hon'ble Dewan Bahadur L. A. Govindaraghava Iyer and Mr. V. Krishnaswami Iyer are all prominent members of the Committee of the Association, Mr. Subbarao Pantulu being one of the Vice-Presidents and Mr. Krishnaswami Iyer one of the Trustees. Dewan Bahadur K. Krishnaswamirao, C. I. E., retired Dewan of Travancore is President, and Messrs. G. Subramania Iyer and D. V. Hanumanta Rao, are Secretaries of the Association.

The Hon'ble Dewan Bahadur Govindaraghava Iyer is interesting himself in the task of collecting information on the industries of the Madras Presidency.

10. The United Provinces Committee met at Allahabad in March and appointed Mr. Ramnath Bhargava, B. A., who has been added to it, its Secretary. The Committee resolved to concentrate its efforts and resources on the carrying out of an industrial survey of the Province, and an *Upadesak* of the Vaisya Conference—of which Rai Bahadur Lala Baij Nath, one of the members of the U. P. Industrial Conference Committee, is General Secretary, and which held its session at Muzaffarnagar in March—has been deputed to visit various centres of the province and collect the requisite information. This person works under the supervision of Rai Bahadur Baij Nath.

11. The Punjab Committee met on the 18th March and elected Lala Mulkraj as its Secretary. The Committee is of opinion that the furtherance of technical education by sending students abroad is the one matter to which it should devote itself. And half a dozen students, were so sent, not by the Committee of the Conference directly, but by almost the same gentlemen who are members of the Committee, acting in other capacities.

12. In the Central Provinces and Berar a Provincial Industrial Conference was held at Jabalpur in April, and an Industrial Exhibition was held at Amraoti in the same month. The newly started Berar Association has the furtherance of industrial development for one of its objects ; while a scheme for the expansion of the Akola Industrial Association so as to become an organisation to serve the whole province of Berar is under the consideration of the leading gentlemen of Berar. Rao Saheb Deorao Vinayak of Akola, who is honourably distinguished for the practical and zealous interest he has always evinced in the industrial movement, has sent the scheme to the General Secretary.

13. Two prizes of Rs. 300 and Rs. 200 each have been offered for being awarded to the best factory and cottage handlooms of improved pattern satisfying certain stated conditions, the working of which will be demonstrated at the forthcoming Exhibition at Calcutta ; and the General Secretary has published an advertisement inviting competition. (Vide Appendix VI.)

14. The Bengal Provincial Committee met in the middle of August, at the instance of our Assistant Secretary who went to Calcutta at the time and commenced arrangements for the next session of the Conference. These are being pushed forward in co-operation with the General Secretary.



15. As mentioned above an informal meeting was held at Bombay on June 2nd to consider the question of the future organisation and working of the Conference. There were present on the occasion Mr. Dutt, Mr. Mudholkar, Mr. Wacha, Mr. Lalubhai Samaldas, Mr. P. L. Nagpurkar and Mr. Chintamani. It was resolved to convene a meeting of the members of the Provincial Committees and a few others interested in the industrial movement, sometime in October, to consider and settle the business to be placed before the Calcutta session of the Conference, the definite proposals for action contained in the papers laid before the Benares Conference, and other cognate matters.

16. The Report of the Benares Conference was issued in the middle of October. The proceedings of the Conference roused such great and widespread public interest that early in the year the proprietors of the *Hindu* and the *Indian Review* of Madras republished the greater number of the papers in pamphlet form and there was a large demand for them. Everywhere the Conference has met with appreciation and encouragement, and the hope is expressed that it will be a potent factor in the ultimate success of the movement for the development of India's industries by Indian capital and by means of Indian agency.

17. The Government of India and the Provincial Governments as well as the Governments of several Native States have evinced sympathetic interest in the Industrial movement and a brief account of the measures adopted by them during the current year in furtherance of it is given in Part II. of this Report.

18. More remarkable, however, than the attitude of the Government is the activity of the people themselves. Not so very long ago the reproach was freely levelled against educated Indians, even by persons the genuineness of whose friendship for Indian aspirations was not ques-

tioned, that they bestowed comparatively little attention on so important a sphere of national activity as the development of the industries of the country. Whatever ground for such criticism there might have been, it must now be admitted that there is a real awakening to the claims of the industrial problem on the thought and activity of educated India. The erection of mills and factories, the formation of Joint Stock Companies, the establishment of banks, the spread of technical education, have all had considerable impetus given to them during the year, while Industrial and Agricultural Exhibitions seem to have become quite the order of the day. The most potent factor in bringing about the remarkable industrial activity which has during the last 12 months and more manifested itself in the different parts of the country is undoubtedly the stimulation of demand for country-made articles in preference to foreign goods and a large number of "Swadeshi Stores" on the co-operative basis has been opened to meet the great and growing demand that has arisen for them. To this new-born enthusiasm for the "Swadeshi Movement" we owe among other things, the revival of the hand-loom industry, the manufacture in the country of many small articles of daily use for which the people were till lately dependent entirely on foreign things, and added prosperity to the Indian Cotton Mills. The account of general industrial activity in the different provinces of British India and in the several Native States, given in Part II. (Section C.) of this Report, the list of new joint Stock Companies (Appendix VII.) the number of new patents taken out (Appendix VIII.) and the review of the brightened prospect of the mill industry due to the "Swadeshi Movement" made by one who evidently writes from personal knowledge (*Vide* Appendix IX.) which are appended to this Report all testify to the success that the people of India seem eventually destined to achieve in their labours for the resuscitation of old and the creation of new industries in this country.

19. It is a matter of great pleasure to us to place on record our high appreciation of the valuable work of Mr. C. Y. Chintamani as Assistant Secretary of the Industrial Conference. His attainments, his culture, his energy, and, above all, his devotion to duty merit the fullest acknowledgment.

20. A Statement of Receipts and Disbursements of the office of the General Secretary of the Conference is published with this Report.

R. C. DUTT,  
President,  
First Indian Industrial Conference.

*Daroda, November 1906.*

R. N. MUDHOLKAR,  
General Secretary,  
Indian Industrial Conference.

*Amraoti, November 1906.*

## Summary of Accounts of the Indian Industrial

## Receipts.

	Ra.	a.	p.
Collections in Baroda through Mr. R. C. Dutt	1,500	0	0
The Honourable Munshi Madho Lal, Benares	500	0	0
The Honourable Rai Bahadur Pandit Sundar Lal, Allahabad	250	0	0
Dayaram Gidumall, Esq., Surat †	250	0	0
Rai Bahadur Lala Baiji Nath, Allahabad ‡	150	0	0
R. C. Dutt, Esq., Baroda	100	0	0
Harkishen Lal, Esq., Lahore	100	0	0
Sir Bhalchandra Krishna, Bombay	100	0	0
Lajpat Rai, Esq., Lahore	100	0	0
The Hon'ble Mr. Justice P. U. Chatterjee, Lahore	100	0	0
R. P. Karandikar, Esq., Satara	100	0	0
Rai Bahadur Lala Ganga Ram, Patiala	100	0	0
N Subbarao, Esq., Rajahmundry	100	0	0
Ramanuj Dyal, Esq., Meerut †	100	0	0
T. Rangachari, Esq., Madras	100	0	0
Dewan Bahadur Ambalal S. Desai, Ahmedabad	50	0	0
The Hon'ble Rai Nihal Chand Bahadur, Muzaffarnagar †	50	0	0
Rai Saheb Lala Kedar Nath, Delhi	50	0	0
Rai Saheb Lala Girdhari Lal, "	50	0	0
Pandit Suudar Lal Pathak, Patiala	50	0	0
Thakurdas Fatehchand, Esq., Karachi	50	0	0
Mathuradas Ramchand, Esq., "	50	0	0
Dr. M. N. Ganguly, Cawnpore	30	0	0
The Himalaya Glass Works, Rajpur	25	0	0
Dr. H. D. Pant, Lucknow	25	0	0
G. A. Natesan, Esq., Madras	25	0	0
Pandit D Gopalachari, Madras	25	0	0
V. M. Mahajani, Esq., Akola	25	0	0
Rao Bahadur G. V. Joshi, Satara	25	0	0
C. R. Tiruvengkatachari, Esq., Madras	25	0	0
Donations of sums below Rs. 25	109	8	0
On "Directory of Indian Goods" Account	21	8	0
Miscellaneous	11	14	0
Total	4,347	14	0

† For Handloom Prizes.

‡ Rs. 50 for Handloom Prizes.

## Conference for the ten months January—October 1906.

Disbursements.		Rs. a. p.
Pay of Assistant Secretary and other Establishment Charges.		1,325 0 0
On "Directory of Indian Goods" Account ... ..		404 6 0
Travelling Charges of Assistant Secretary ... ..		167 4 9
Postage ... ..		67 7 3
Printing ... ..		44 10 0
Books and Papers ... ..		35 15 0
Stationery .. ..		28 9 0
Telegrams .. ..		20 6 0
Sundries ... ..		10 14 0
		2,104 8 0
	Balance ..	2,243 6 0
	Total..	4,347 14 0
Balance on 31st October 1906.		
Rs. a. p.		
1,000 0 0	with Mr. R. C. Dutt.	
743 6 0	with the General Secretary.	
500 0 0	Handloom Prize Account. (with General Secretary).	
2,243 6 0	Total.	

*N.B.*—In addition to the above contributions, the cost of printing the Report of the Conference has been borne by the Honourable Munshi Madholal.

R. C. DUTT,

President, First Indian Industrial Conference.

*Bombay 17th November 1906.*

R. N. MUDHOLKAR,

General Secretary,  
Indian Industrial Conference.

## REPORT BY THE ASSISTANT SECRETARY ON HIS TOURS.

My appointment as Assistant Secretary of the Indian Industrial Conference formally took effect on the 1st of February. But I took advantage of my visit to *Calcutta* early in January to see a number of the local leaders, who met informally at the rooms of the Bengal Landholders' Association, and we there talked over matters generally. The Resolutions passed at the Benares Conference were considered, and it was stated that several of the suggestions contained in them were already being carried out. For instance, weaving schools for teaching the use of improved handlooms were started at several important weaving centres in the province by individuals or committees, and at *Calcutta* by the Committee of the National Fund. The foundation of a College of Technology was under consideration. A fairly large number of young men were sent abroad for receiving technical education in the higher branches. And active steps were set on foot for stimulating and keeping up demand for country-made in preference to imported articles. Besides, the preparation of a Directory of Indian goods was taken in hand.\*

2. I happened to be at *Allahabad* about the end of February, and availed myself of the visit to see the two members of the United Provinces Committee of the Conference who were there at the time and arrange for an early meeting of the Committee to appoint a Secretary and settle their programme of work. A meeting of the Committee was held on the 13th March, at which Babu Ram Nath Bhargava, B.A., Proprietor of the Indian Trading Co., was appointed Secretary. It was resolved at that meeting that the Committee should limit its endeavours to the making of an industrial survey of the Provinces.

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\* This has not been completed and published, but it made considerable progress and the materials collected were utilised for the *Calcutta Congress Exhibition*. Meanwhile the Directory prepared in the office of the Conference at *Amraoti* is about to be published.

3. In the month of April I accompanied the General Secretary to *Jabalpur*, where the Second Central Provinces and Berar Provincial Industrial Conference was held on the 15th idem, with Mr. Mudholkar as President.

4. On the 15th May I similarly went with Mr. Mudholkar to *Poona* to attend the Industrial Conversazione, which was held there on that and the following days under the auspices of the Industrial Association of India.

5. On the 2nd June, again, I went with the General Secretary to *Bombay* for the informal meeting held there to discuss several matters relating to the organization and working of the Conference.

6. It was on the 11th June that I left on my long tour. I was at *Poona* on the 12th and 13th, and saw some local gentlemen with a view to obtain information on the industrial activity of the place. The information is embodied in Appendix V. in another portion of the report.

7. I left *Poona* on the 13th and arrived at *Sholapur* on the 14th. *Sholapur* is an active industrial centre, and with the help of Mr. P. L. Nagpurkar I was able to see a good deal that was interesting and instructive. There are here the Sri Sivaji Metal Works, a Cigar and Cigarette business, Leather works, several Spinning and Weaving Mills, a Swadesi Stores, &c. Very ingenious brass and steel locks are made here.

8. I left *Sholapur* on the 16th June, arrived at *Madras* on the 17th, and left the same evening for *Tinnevely*, where I arrived on the 18th. I spent a week at this place. And it was a busy week, an Industrial Exhibition and an Industrial Conference both being held then in that town. The Exhibition, which was an adjunct of the annual Session of the *Madras Provincial Conference*, was opened on the 20th Idem and continued till the 27th. The First *Madras Provincial Industrial Conference* was held on the 22nd and 23rd of June, with Mr. G. Subramania Iyer as President.

9. *Madura* was the next centre visited. I addressed a public meeting there on "Industrial India," on the 30th June.

The meeting was excellently attended, and Mr. V. Swaminadha Iyer, Subordinate Judge, presided at it. Madura is an active industrial centre. An Industrial Exhibition had been held there in the previous month. There is an Agricultural and Industrial Association, which has opened a sugar-cane crushing factory. A Weaving Factory for working with improved looms was under construction, while another was already at work; and the dyeing industry has of late been considerably developed.

10. I was at *Trichinopoly* on the 1st July. I addressed a public meeting there on "The Industrial Development of India" on the 2nd July. A Committee was appointed at the meeting to form a District Industrial Association. Mr. S. M. Rajaram Rao, Editor of the local *Wednesday Review*, was appointed Secretary of the Committee. There is at Trichinopoly a "National Emporium" with a nominal capital of Rs. 20,000, of which over Rs. 11,000 has been subscribed.

11. From Trichinopoly I went to *Kumbakonam* on the 3rd July. A meeting was held that evening in the Porter Tower Hall with the Venerable Dewan Bahadur R. Ragoonath Rao as Chairman, and I spoke on "The Industrial Situation in India." As at Trichinopoly, so here the Resolutions passed at the Industrial Conference at Tinnevely were adopted by the public meeting.

12. I next went to *Mayavaram*, also in the Tanjore district, and situated in the midst of a large weaving population. The same tale is heard here as elsewhere that the weavers were in a flourishing condition in the past, but that they are now in a decadent state. I addressed a public meeting at Mayavaram on "The Swadeshi Movement." The resolutions of the Tinnevely Conference were unanimously adopted, and a Committee was appointed with Mr. P. Natesa Iyer, Pleader, as Secretary, to take steps for the opening of a co-operative Swadeshi Stores in the locality.

13. I went from Mayavaram to *Conjeeveram*. This place is another active and public-spirited centre. An Industrial Exhibition was held in the beginning of June, at which there was a weaving competition as well. There are



at Conjeeveram a Town Bank and an Urban Co-operative Weavers' Union, both registered under the Co-operative Credit Societies Act. Improved handlooms are being introduced among the local weavers who form an important section of the population. The condition of the local silk weavers is rather sad.

14. I reached *Madras* on the 6th July. A special meeting of the Committee of the National Fund and Industrial Association, to which I was invited, was held on the 8th idem. Dewan Bahadur K. Krishnaswami Rao, C. I. E., President of the Association, presided over the meeting and several leading members were present. It was resolved by the Committee that steps should be taken for securing the addition of industrial and commercial classes to private high schools in the Presidency; to address the local Government as well as themselves to take steps for carrying out an industrial survey of the Presidency, and to depute an agent to stimulate industrial activity in the districts and in particular to secure the formation of District Industrial Associations. There are at Madras a Weaving Factory where about forty improved looms of different patterns are worked under the supervision of Mr. P. Theagoraya Chetty; a new technical institute—the P. T. Lee Chengalva Naicker's Technical Institute, in charge among others of Dewan Bahadur P. Rajaratnam Mudaliar, C. I. E.; the Chrome Tanning department of the School of Arts in charge of Mr. Alfred Chatterton, who has lately been appointed Director of Industries in the Presidency, by the Government of Madras; the Victoria Technical Institute; the Central Agricultural Committee; the South Indian Association with an economic and an Industrial Section, etc.

15. I went to *Salem*, on the 14th July, and addressed a public meeting held to take steps for the formation of a District Industrial Association. Mr. J. H. Robertson, I. C. S., Collector and District Magistrate, presided at the meeting, and among those who took part in the proceedings were officials as well as Europeans. Resolutions were passed adopting the Resolutions of the Tinnevely Industrial Conference and appointing a strong committee for taking steps to form a District Industrial Association. At Salem there is the Government Weaving Institute, in immediate

charge of Mr. N. Subramania Iyer, B.A. About fifty improved looms of different patterns are at work in the Institute. The unquestionable advantages to the weaver individually as well as to the industry itself, of the substitution of the new for the old looms—defective in several respects as the former still are—are clearly demonstrated by the work turned out at the Salem Weaving Institute. An urban Weavers' Union registered under the Co-operative Credit Societies Act has also been formed at Salem—Mr. C. Vijaya Raghava Chariar the well-known leader of this town is taking keen interest in all these movements.

16. Returning to Madras on the 15th July, I left it on the 17th in company with Mr. N. Subbarao Pantulu, well-known as a leading public man of Southern India, who is a member of the Madras Provincial Committee of the Indian Industrial Conference and a Vice-President of the Madras National Fund and Industrial Association. The first place in the Northern districts of the Madras Presidency which we visited was *Nellore*. A public meeting was held here on the evening of the 17th, at which I spoke and Mr. Subbarao Pantulu presided. Resolutions were passed at the meeting adopting the Resolutions of the Tinnevely Industrial Conference and appointing a Committee with a Secretary to take steps for the formation of a District Industrial Association. There is at Nellore a Swadeshi Stores on a small scale. The district is noted for its mica deposits, several of which are worked by Indians.

17. Mr. Subbarao Pantulu and I next visited *Guntur*. We arrived there on the 19th July and both of us spoke at a public meeting the same evening on "The Industrial Development of India." Besides adopting the Resolutions of the Tinnevely Industrial Conference, the meeting appointed a committee of three members to take steps to carry out an Industrial Survey of the Guntur district. The people of Guntur evince considerable enterprise. They have opened a good many rice mills, which are working profitably, and several ginning and pressing factories. A jute mill is in course of erection, and several other concerns are projected.

18. We next went to *Ellore* in the Kistna district. At the meeting held here on the 21st July, Mr. S. P. Rangachari,

Deputy Collector, presided, and a committee was appointed with Mr. S. B. Sankaram as Secretary to carry out an industrial survey of the district. Here as well as at the six other meetings held on subsequent days in the Godavari, Vizagapatam and Ganjam districts, the Resolutions of the Tinnevely Industrial Conference were adopted. A big jute mill was nearing completion at Ellore when we were there.

19. We had a large meeting at *Rajahmundry* on the 22nd July. Mr. Subbarao Pantulu presided. The Rajahmundry Industrial Institute, an association formed last year for furthering industrial activity in the district, has been charged with the duty of making an industrial survey of the district—a duty which has also been imposed on the Godavari District Association by the public meeting held at *Cocanada* on the 24th July. Mr. Subbarao Pantulu has offered to pay Rs. 150 if another Rs. 150 be raised by the Rajahmundry Industrial Institute for employing a person for a few months to go into the interior of the district and collect the requisite information. At *Cocanada* a Swadeshi Store was opened, and it was in contemplation to start a sugar refinery where Mr. Hadi's new process—which was demonstrated at the Benares Exhibition and is explained in his Bulletin on the subject—was to be adopted. It was also proposed to start a Chrome tanning business.

20. At *Anakapalle*, the next place visited, a Pencil Factory will be opened shortly. The buildings are complete and machinery has arrived. I went to *Chodavaram* from *Anakapalle* and addressed a meeting on the Industrial question. I was at *Vizagapatam* on the 27th July and at *Vizianagram* on the 30th. Public meetings were held at the former place on the 28th July, and at the latter place on the 31st July, my subjects being "The Trade of India" and "Indian Industries" respectively. Mr. V. Krishnaswami Iyer, who happened to be at *Vizagapatam* on professional business, presided at the first meeting; Mr. T. C. D. Durell, Private Secretary to the *Rajah* of *Vizianagram*, presided at the latter. A committee with Mr. V. Purnaiya, Pleader, District Court, as Secretary, was appointed at the *Vizagapatam* meeting to form a District Industrial Association; and a Committee, with Messrs. M. Venkanna Pantulu, Teacher, *Maharajah's College*, and O. Ramamurti, Pleader, as Secretaries, was appointed at

the Vizianagram meeting to co-operate with the District Industrial Association in making an industrial survey of the district. Besides the Pencil Factory at Anakapalle, there is another Pencil Factory at Bimlipatam, and there is also a Weaving Company at Rajam, in the same district. A Co-operative Swadeshi Stores was also to be opened at Vizagapatam.

21. *Chicacole* on the 8th August and *Berhampore* on the 9th were the two centres visited in the Ganjam district. At both these places public meetings were held, the Resolutions of the Tinnevely Industrial Conference were adopted, and committees appointed—at Berhampore for bringing into existence a District Industrial Association, whose chief and immediate duty would be the making of an industrial survey of the district; and at Chicacole for co-operating with the District Industrial Association in the carrying out of the survey. Mr. V. V. Jogiah Pantulu, Pleader, is the Secretary of the Berhampore Committee, and Mr. S. Baupirazu, Pleader, of the Chicacole Committee. At Berhampore there are two or three Swadeshi Stores; a small handloom factory started by Mr. Thuthuki Basavaraju; and a small technical school maintained by the American Baptist Mission, where practical instruction is given in weaving, carpentry, &c. The gentleman in charge of the school is the Rev. Mr. Jarreis, who takes a keen interest in the success of the Swadeshi movement. He presided over the meeting at Berhampore, and preached the Gospel of Swadeshism with the fervour of an Indian patriot and the energy of conviction of a sturdy Britisher.

22. At this point, where I conclude the narration of the chief incidents of my tour in the Madras Presidency, I will perhaps be allowed to express my obligations to the many gentlemen who gladly helped me at the many places I visited and to whose willing co-operation I am indebted for what little I was able to achieve in the tour. And if it is permissible to mention any individuals in particular, I will take leave to say how grateful I feel to Mr. N. Subbarao Pantulu, who went to several places with me and laboured for the success of our undertaking in spite of his poor health; to Mr. V. Krishna-swami Iyer, who took an ardent interest in the mission

which took me to the Madras Presidency and helped to facilitate my work in the Southern districts; and to Mr. M. R. Rama Krishna Iyer, of Tinnevely, but for whose enthusiasm for the industrial movement and determination to work, the First Madras Provincial Industrial Conference would not have been held at Tinnevely.

23. To resume the account of my tour where I left it above, I went from Berhampore to Cuttack on the 10th August. Mr. M. S. Das, C. I. E., a leading gentleman of the city, has for years been doing a deal of practical industrial work, and his Orissa Art Works is an important establishment which turns out many interesting and useful articles. Mr. Das has lately opened a Tannery at Cuttack, and it may be expected that the same success will attend this new concern as is the case with the Art Works. I addressed a meeting at Cuttack on the 11th August, at which Mr. Das presided.

24. I reached Calcutta from Cuttack on the 12th August. A meeting of the Bengal Provincial Committee of the Indian Industrial Committee was held on the 13th August, at which the strength of the Committee was considerably added to and Mr. S. R. Das, M. A. (Cantab), Barrister-at-Law, was appointed Secretary, with Messrs. P. Roy Chowdhuri and S. P. Roy as Assistant Secretaries. The Committee resolved at this meeting to set on foot the arrangements for the Second Indian Industrial Conference which would be held in Christmas week at Calcutta.

25. I left Calcutta on the 15th August and arrived at Amraoti the next day. Since then I have been engaged in the office on important work which did not leave me time to go to Northern India as I had earnestly intended to do so. But I am arranging, and hope to be able, to spend a portion of what remains of the year in visiting a few of the more important cities of the United Provinces.

C. Y. CHINTAMANI,  
Assistant Secretary,

Indian Industrial Conference,

*Amraoti, 12th November 1906.*

## **PART II.**

### **BRIEF ACCOUNT OF INDUSTRIAL ACTIVITY IN INDIA IN 1906 JANUARY TO OCTOBER.**

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#### **G E N E R A L .**

##### **SECTION (A).**

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#### **GOVERNMENT AND INDUSTRIAL DEVELOPMENT.**

In this section will be given in brief an indication of the Government's attitude towards the Industrial movement and an account of the measures adopted by it in furtherance thereof.

2. His Excellency the Viceroy referred to the subject in his speech in the Supreme Legislative Council on the 28th March, and said "The Government of India earnestly desire to encourage local enterprise and that they mean to insist that in the case of articles required by Government which can be produced in this country at the same price and of the same quality as imported articles, the preference shall be given to local productions." Lord Minto expressed his recognition of the importance of technical education in the following words : "Technical instruction in other countries is growing apace . . . . Competition has forced it upon us. We must not lag behind. The success of modern industries and the preservation of indigenous industries is becoming every day more and more dependent upon scientific and technical knowledge, and if the resources of India are to be developed by the people of India, such development must depend largely upon local enterprise, upon the investment of Indian money and upon a recognition of the absolute necessity of expert training. There is no lack of opportunity for such native

enterprise, which will well merit the assistance and encouragement the Hon'ble Rai Sri Ram Bahadur has so justly claimed for it." Speaking of the Swadeshi movement, his Excellency said that "if 'Swadeshi' means an earnest endeavour to develop home industries in an open market for the employment and for the supply of the people of India, no one will be more heartily with them (the supporters of Swadeshi) than myself."

3. The Hon'ble Mr. Hewett, Member for Commerce and Industry, made an important speech at the same meeting of the Viceregal Council, and the following passages of it may be cited as notable :—

"The trade of India consists at present mainly of the exchange of natural products for artificial products of European manufacture. The manufactured goods which India obtains are necessarily, in the main, paid for by unmanufactured raw materials; and the goods imported have often been worked up from the materials which she had exported in the raw state. These features represent a primitive stage in the system of international exchange which makes up the trade of the world. It is an assured fact that there is available in India the raw material requisite for almost every form of industry, and the idea that the country ought to be able to produce most of the manufactured articles which it requires is not one which its natural resources render Utopian. People argue—and argue rightly—that these resources should be utilised for the benefit of India itself and not for that of other countries. . . . ."

"The Government of India are, however, in full sympathy with those who are endeavouring to improve the state in which our indigenous industries are at present. Much information bearing on this subject has been collected in the Census Reports, and in monographs which have been prepared on the different industries; but the material is scattered, there is no co-ordination of results, the subject is in general treated from the artistic point of view, rather than from a business standpoint, and the information is in many cases neither sufficiently detailed nor sufficiently exact to be of much practical use. The Madras Government have recently

taken the lead in establishing what is practically a Government agency for the fostering and improving of Indian industries. The success which has been attained in developing the aluminium industry and the chrome leather industry by Mr. Chatterton is a good augury for further development in the improvement of industries in the South of India. We hope that other Local Governments will now make a survey of the state of indigenous industries within the areas of their jurisdiction, with a view to ascertaining the exact state of the various industries and handicrafts, the amount of the earnings and the present condition of the artisans respectively employed in them, the precise manner in which the different industries have been affected by competition with imported articles, the practicability of creating new markets, or of developing markets which already exist, and the possibility of giving a new lease of life to these industries either by means of special instruction, or by the improvement of the appliances in use. It is not too much to hope that something tangible may be done to improve their efficiency and increase their scope by reorganising them on modern lines.

The Government of India welcome the awakening of interest in this very important question which was evident in the discussions at the recent Industrial Conference at Benares.

"With reference to what I have previously said upon the desirability of encouraging local industries on European methods, I may mention that the most important matter which the Commerce and Industry Department has recently had to consider is that of the establishment of an iron and steel industry on a scientific basis. The scheme owes its inception to the far-sighted views of the late Mr. J. N. Tata who was undoubtedly the pioneer among Indians in the scientific organization of Industries, and whose name will be associated for all time with the establishment of the Tata Institute for Research. The Government of India have taken the liveliest interest in the late Mr. Tata's project, and they have determined to encourage it, by making certain concessions which were asked for by Messrs. Tata and Sons. . . . The establishment of an iron and steel industry on a large scale will not only enable the Government and the public to purchase many steel articles of local manufacture which are



now imported, but will also help to develop subsidiary industries, particularly those for the production of coal-tar and sulphate of ammonia, for both of which a ready market can be found in India. I think I may claim that the Government have, in the assistance they have promised to give to this very important project, given a practical proof of their desire to encourage local enterprise; and I may also point to the recent Resolution issued on the appointment of the Stores Committee as evidence of our wish to give every encouragement to products of local manufacture. We have expressed our recognition of the fact that local industries must frequently lean, in the first instance, on the support of Government, and it is our intention to insist that whenever an article required by Government can be produced in this country of the same quality and at the same price as the imported article can be laid down in India, the preference shall be given to the locally produced article."

4. The Government of India have provided what the Finance Member called "a small sum of Rs. 5 lakhs a year" for education, of which approximately one-half is applied to technical education. The grant for technical education is allotted as follows:—

				Rs.
Bombay	...	...	...	1,67,000
Bengal...	...	...	...	35,000
United Provinces	...	...	...	30,000
Central Provinces	...	...	...	22,000

"The grant to be given to Bombay (says the Financial Statement) is intended primarily to develop and increase the efficiency of the three central institutions, *viz.*, the College of Science, the Victoria Jubilee Technical Institute and the Sir Jamsetji Jijibhai School of Arts, Bombay; to provide adequate inspection for ordinary technical schools and schools of weaving and the textile industry, and for the elementary drawing in all kinds of institutions; for the creation and maintenance of three new special technical schools and for the development and improvement of a certain number of approved technical schools by increased grants; and for scholarships in all classes of approved technical institutions.

" In the case of Bengal the grant will provide for the establishment and maintenance of a central weaving school at Serampore, at which instruction in the best and latest methods of hand weaving will be imparted.

" The grant for the United Provinces is intended to assist in the proposed expansion of the mechanical apprentice class at the Roorkee College, with the object of giving a sound practical training in the principles of mechanics, steam, and electricity.

" The grant to be assigned to the Central Provinces is for the establishment at Nagpur of an elementary school for handicrafts. It includes an initial grant of Rs. 10,000 for buildings."

5. Early in the year the Government of India appointed a Committee "to ascertain definitely the procedure which in practice is adopted at present for the purchase of stores" for Government departments. The Committee was asked to report, among other things, on the question "of affording greater encouragement to local industries;" on "the advisability of prescribing strict rules requiring Government officers to purchase locally manufactured articles in all cases where such articles are available and of calling upon them for explanations in cases where these rules are transgressed;" and on "the possibility of devising a system under which all departments of Government will be informed of the adoption of a local, in place of an imported, product in any part of India." The Committee is understood to have submitted its Report to the Government of India, but it is not yet made available to the public, pending the consideration of its recommendations by the Government of India and the Secretary of State.

6. The Government of India have also had under consideration the question of competition between jail industries and private enterprise; and Provincial Governments have been asked to make this matter the subject of detailed reports.

7. The question of the reorganisation of the Geological Survey Department was before the Government of India

recently, and the sanction of the Secretary of State has been obtained for "a considerable addition to the strength of the existing establishment. The rapid expansion of the economic side of the work is a new feature," say the Government of India,<sup>6</sup> "and it is regarded as vitally important that all possible facilities should be given to assist the development upon a sound basis of mining industries in India." It was felt, the Government proceed, "that the Geological Survey Department could not, with its existing strength, undertake the scientific work for the performance of which it was primarily constituted, and at the same time devote that amount of attention which the interests of India now demand to purely economic enquiries." Accordingly, (1) two short term appointments of Mining specialists have been abolished, and two new appointments have been added to the graded list in their place; (2) three new appointments have been added to the cadre to increase the strength of the department and to provide a reserve for leave vacancies, and (3) a new post to be held by a trained Chemist has been created.

This addition to the strength of the Geological Survey Department is to be welcomed. The department is doing very useful work, as the paper read by Mr. Holland, the present able and esteemed head of the department, at last year's Industrial Conference amply testifies. Mr. Holland pointed out there that "the assurance that we possess the natural elements essential for the restoration of our decayed metallurgical and chemical industries" led him to divert the energies of his colleagues, and to commence "the expenditure of public money for the investigation of our resources in minerals which are essential to industries now maintained entirely by imports, for which we have not only to pay heavy bills to other countries, but to exist always in a state of absolute dependence for articles that are no longer mere luxuries." And he further stated "that the Geological Survey Department will willingly determine minerals free of charge for any amateur who is willing to give the precise locality from

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<sup>6</sup> Resolution in the Department of Commerce and Industry, 7th September 1906.

which each specimen is obtained." But as Rao Bahadur G. V. Joshi remarked in his paper at the same place, the arrangement obtaining till now was altogether unsatisfactory, as it was the scientific part of the work that received the special attention of the department while investigation was relegated to temporarily engaged outsiders. Mr. Joshi urged "that the temporary employment of such men should cease, and that there should be a special staff of experts under the Director of the Survey, charged with the duty of economic inquiry." The reorganization of the department renders this possible.

8. Correspondence between the Government of Bombay and the Director of Public Instruction, together with the detailed proposals of the authorities of the Victoria Jubilee Technical Institute and the Sir Jamsetji Jijibhai School of Art in regard to the extension of technical education in the Bombay Presidency, was published in the *Bombay Government Gazette* of the 26th September last. We learn from this how the annual grant of Rs. 1,67,000 made by the Government of India for five years is to be utilised in this period. The College of Science, Poona, gets Rs. 49,000 for non-recurring expenditure, and Rs. 36,000 for recurring expenditure; the improvements to be introduced being the provision of new boilers and engine, of new building and plant for the Normal Class and the appointment of a Special Instructor for it, of residential quarters for workshop students, of electric fittings, and of six scholarships of Rs. 50 per mensem each and six of Rs. 25 per mensem each. The Victoria Jubilee Technical Institute, Bombay, gets Rs. 85,000 for non-recurring and Rs. 55,000 for recurring expenditure; the objects on which these sums are to be extended being Mechanical Engineering Workshops, Textile Manufacture, Electrical Engineering, Technical Chemistry, and quarters for students. The Sir Jamsetji Jijibhai School of Art gets Rs. 1,20,000 on non-recurring and Rs. 99,000 on recurring expenditure; the improvements to which these sums are to be devoted being the addition of a Laboratory and Pottery building, Textile School, Metal Workers' Class, Wood-working class, kilns, and students' quarters, and the appointment of a Superintendent of Pottery, an Instructor of

Textiles, and Instructors in Metal-working and Wood-work. The Ahmednagar Weaving School gets Rs. 22,000 for Buildings and Hostel. The Parekh School of Industry, Surat, Rs. 22,000 for Buildings and Equipment. The Ranchhodlal Chhotatal Textile Institute, Ahmedabad, Rs. 38,000 for non-recurring and Rs. 8,000 for recurring expenditure, the former for buildings. Rupees 2,13,000 are allotted for Scholarships and Grants-in-aid, Rs. 11,000 for Inspection, and Rs. 44,000 for Miscellaneous Grants.

9. It is understood that the Government of Bengal are contemplating the establishment of a College of Technology in Bengal in collaboration with the Association for the Advancement of Scientific and Industrial Education of Indians.

Mining classes have been added to the Sibpur College of Engineering during the year, and several students have joined those classes.

10. The Hon'ble Mr. Shurfuddin has, by means of an interpellation in the Provincial Legislative Council, drawn the attention of the Government of Bengal to the necessity of making an industrial survey of the province. But it is to be regretted that, notwithstanding the Hon'ble Mr. Hewett's pronouncement in favour of such a survey,\* the Government of Bengal has declined to move in the matter. It is to be hoped that the matter will not be allowed to rest here and that the leaders of Bengal will draw the attention of the Local Government to the important declaration of the Hon'ble the Member for Commerce and Industries.

11. The Government of Madras, alone among Provincial Governments, have acted on the recommendation of the Clibborn Committee on Industrial Education, and appointed Mr. Alfred Chatterton as Director of Industries in that Presidency. Mr. Chatterton's enthusiasm for his work is well-known. He worked hard for the introduction of the Aluminium industry till he proved it to be commercially profitable, and the Government have transferred the Aluminium work

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\* See above para 3.

to a private concern. He next took up the Chrome Tanning industry, and has been trying his best to make it commercially profitable. Tanning was an important industry in the Southern Presidency till a few years ago, when the invention of Chrome Tanning in the United States and the difficulties placed in the way of exports of finished articles by the United States Government led to an increasingly large export of untanned hides and skins. Mr. Chatterton introduced Chrome Tanning into the Government School of Art and has achieved a fair measure of success in the industry. It has, however, not yet become commercially profitable.

12. The Weaving industry, too, did not escape the attention of Mr. Chatterton. He had made special inquiries into the subject, and submitted a Note to the Government of Madras stating the results of those inquiries. This has borne fruit in the shape of the Government Weaving Institute at Salem. This was started in the month of March. The primary object of the Institute is stated to be to test the commercial value of the fly-shuttle apparatus and the other improvements recently effected in the handloom. And "Just as the Aluminium and Chrome Tanning industries were undertaken for the purpose of preliminary investigation and experiment with a view to their final transfer on a basis of ascertained and established commercial value to private agencies, it is intended to transfer the Institute with all the improved methods and machinery adopted therein to a properly constituted company of capitalists, if, as is expected, it is found possible to work the Institute as a factory constituted on business principles."

13. In a Notification, dated 23rd January 1906, the Government of Madras invited attention to the scheme of technical scholarships instituted by the Government of India. Information was furnished regarding the object of the scholarships and the conditions under which they would be offered, and it was stated that the first scholarships would be assigned in connection with the study of industrial chemistry in one or more of its branches and in connection with the tanning industry. Applications were accordingly invited from candidates desirous of prosecuting the scientific study of

these subjects. It would seem, however, from a supplementary Notification of that Government, dated 26th September, that no candidates possessing qualifications considered suitable by their advisers were forthcoming; and in the result, the Scholarships have not yet been actually awarded.

14. In answer to an interpellation in the Provincial Legislative Council, the Government of Madras stated that proposals had been submitted to the Government of India regarding the system of technical and industrial education to be introduced into that Presidency, but that the Supreme Government have not accorded their sanction to the character of the scheme under consideration, and further expressed their inability to take any action in regard to the spread of technical education in any branch until the orders of the Government of India on their proposals were received. It would appear that the Madras Government proposed that Technical Education should be separated from General Education, but that, though this was in conformity with the recommendation of the Clibborn Committee on Industrial Education, the Supreme Government disapproved of it. The appointment of a special Director of Technical and Industrial Enquiries for a period of five years has, however, been sanctioned.

15. A Resolution of the United Provinces Government notifies an important expansion of the scope of the Thomason Engineering College at Roorkee. It is stated that the growth of small factories, the development of electric light and power installations, and the extended use of motor-cars, have created a demand for men who have not only received a practical training in a mechanical workshop, but who have sufficient general education to qualify them for positions of responsibility, such as supervisors, foremen or managers of factories where machinery is employed. Funds being now available, it was intended to open a "Technical Class" at the Roorkee College in the month of October. This

course of instruction will extend over three years, and while there will be no cut and dried curriculum an endeavour will be made to give to each student that instruction which will best fit him for the employment he proposes to seek on leaving College. For the present the class will be limited to thirty students, who will be nominated by District Boards. Students must have passed the Entrance of School Final examination; they will be supplied with books, instruments, instruction, and quarters free of charge, but must have sufficient means to support themselves, the District Boards being permitted to grant maintenance scholarships when it is considered necessary. The scheme is to be carried out thoroughly, the estimated cost of new laboratories, enlarged workshops, power tools, electric installation and model machines being well over two lakhs of rupees.

16. In the Central Provinces, besides the contribution of Rs. 30,000 towards the initial expenditure and of Rs. 11,500 to the recurring expenditure of the Victoria Technical Institute at Amraoti and of Rs. 1,78,000\* and Rs. 30,800 respectively to the Victoria Memorial Institute at Nagpur, the Government proposed to make contributory grants, initial and recurring, towards the establishment of an Industrial School at Nagpur, to which the people are also asked to contribute.

17. During the year under review the status of the Forest School at Dehra Dun has been raised to that of Imperial Forest Research Institute and College. Among the new officers appointed are an Imperial Silviculturist, who will make Silviculture his special study; an Imperial Forest Zoologist, whose chief duty will be to investigate the damage

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\* The office of the Commissioner of Settlement and Agriculture and the classes of the Government Agricultural School are also to be located in the building.



caused by insects and other pests, and to suggest remedial measures ; an Imperial Forest Botanist, who will study the botany of forest plants, the diseases of trees, and the distribution of species ; an Imperial Forest Chemist, who will investigate the chemical properties of the soils and of the produce of forests ; and an Imperial Forest Economist, who will make a special study of the best methods of rendering forest produce of all kinds available at the smallest cost to consumers, and who will keep in touch with the commerce of India with the view of fostering and meeting the demand for forest products.

18. The Gass Forest Museum at Coimbatore in the Madras Presidency, has been removed to a new building specially provided for it. In this museum could be seen, among other things, specimens of rubber in its various stages of refinement ; specimens of different kinds of wood ; economic products, such as fruits, seeds, gums and resins, oils, etc., entomological, geological and botanical specimens ; several articles and models of articles made of bamboos, and tanning barks, edible roots and some of the leaf types. There is besides a small library of technical books.

19. The Governments of the several provinces have generally rendered valuable aid to Industrial Exhibitions ; the most prominent instance of it being in connection with the next Congress Exhibition in Calcutta, which will be opened on the 15th December by His Excellency the Viceroy.

20. Government's activity in the department of agriculture has, as might be expected, been much more than in the case of manufacturing industries. The reorganization of the Agricultural Departments in the several provinces has been steadily proceeded with ; work on the Pusa Agricultural Research Institute and College is progressing apace ; steps are being taken for the establishment of Provincial Agricultural

Colleges; the growing of improved varieties of cotton has been given attention to; Co-operative Credit Societies, Agricultural Associations, Agricultural Exhibitions and Cattle Shows are being encouraged, promoted and supported. The Board of Agriculture held its second sitting at Pusa in the earlier part of the year; and an important and interesting Agricultural Conference, in which representatives of the public were invited to take part, was held at Bombay under the presidency of the Hon'ble Mr. J. W. P. Muir-Mackenzie, I. C. S., Member of Council in Bombay.

21. The Government of India have in the course of the year started two periodical publications—the *Indian Trade Journal*, issued once a week by the Director-General of Commercial Intelligence; and the *Journal of Agriculture*, a quarterly publication issued on behalf of the Pusa Board of Agriculture by the Inspector-General of Agriculture.

## PART II.

### SECTION (B).

#### THE GOVERNMENTS OF NATIVE STATES AND INDUSTRIAL DEVELOPMENTS.

##### HYDERABAD.

1. An exhibition of Arts and Industries, as well as of the natural products, Mineral and Agricultural, of the Hyderabad State, was held at Hyderabad towards the end of January to commemorate His Highness the Nizam's fortieth birthday. Special efforts were directed to the encouragement of the ancient indigenous arts of His Highness the Nizam's Dominions. There was among other sections, a "Mills Gallery," which comprised "specimens of cotton in various stages of preparation and models of some of the machinery employed and specimens of goods manufactured." And there was an "Artizan's Gallery." We are told that special efforts were made to bring together a representative gathering of craftsmen from all parts of the Nizam's Dominions: "the Kinkhab weavers, the Carpet manufacturers, the Potala Silk dyers, Bandona dyers, the Calico printers, the Gold and Silver embroiderers, makers of Silk Brocades and Bidri wares, the lace-manufacturers, the Wax Cloth decorators, the Wood and Ivory carvers, the Gold and Silversmiths, the Copper and Brass workers, the Potters, the Lapidary workers; practically every craft in His Highness the Nizam's Dominions."

##### BARODA.

2. Improvement in cotton cultivation, channel irrigation, and well-sinking in the department of Agriculture, and the improvement and expansion of the weaving industry, the spread of technical education, sericulture, the manufacture of cigarettes and matches, have received attention in the State of Baroda. Mr. R. C. Dutt, Revenue Minister in Baroda, contributed to the *Indian World* of Calcutta an account of the

weaving industry of Baroda and the steps that are taken by His Highness Sir Sayaji Rao's Government to improve its condition. Rao Bahadur Raoji Bhai Patel, the Director of Industries and Agriculture in the State, has taken a patent for the improvements effected by him in the country handloom, and the "Sayaji Cottage Loom," as the improved loom is called, is in considerable demand in all parts of the country. And students from many places go to Baroda to obtain instruction in several branches of technical knowledge.

3. Mr. N. G. Mukerjee, Assistant Director of Agriculture in Bengal, was engaged by the Baroda Government a short time ago to investigate the possibilities of the introduction of a silk industry into that State. This step was taken in consequence of the success which attended certain small experiments in sericulture carried on in the Gaekwar's dominions, and Mr. Mukerjee's report encourages the hopes built upon those results. Mr. Mukerjee considers that the climatic conditions of some parts in the south of the State are eminently suitable for the growth of mulberry and for the rearing of silkworms. He has drawn up a scheme which includes the establishment of two schools at Vyara and Songadh—where students will be taught the methods of both silkworm rearing and silk reeling—the starting of mulberry plantations, the publication in Gujarati of a manual of practical instruction, and ultimately the foundation of a reeling factory on a large scale.

4. A set of questions relating to the possible development of industries in India was sent out from the office of the Revenue Minister of Baroda on the 1st May.\*

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\*DEVELOPMENT OF INDUSTRIES.

SIR,

I am directed by Mr. R. C. Dutt, C.I.E., Revenue Minister of Baroda, to send you a set of questions relating to the possible development of industries in India. The Government of Baroda will deem it a favour if you will kindly give them your careful consideration, and send replies at your early convenience.

Yours faithfully,

Superintendent,  
Revenue Minister's Office.

Baroda, May 1, 1906.

## MYSORE.

5. An Arts and Industrial Exhibition was held in Mysore early in the year in honour of the visit of Their Royal Highnesses the Prince and Princess of Wales, and on all hands the Exhibition was pronounced a great success.

6. With a view to encourage and promote scientific research and technical education among the people of Mysore H. H. the Maharajah has sanctioned two scholarships, which will be paid from four-fifths of the annual proceeds of the Damodar Das Charities Funds. The scholarships, which will be assigned annually for two years, will be tenable only by natives of Mysore who have graduated from a College in the Mysore State.

### QUESTIONS.

#### A.

##### *Existing Industries.*

1. Name the existing Indian industries which can be developed to the best advantage.
2. State clearly the difficulties in the way of the development of such industries.
3. Suggest the measures you would adopt to remove the difficulties.

#### B.

##### *New Industries.*

1. Name the new industries that can be profitably introduced into this country, grouping them as under:—
  - (a) Those in which the raw materials required are the natural products of this country.
  - (b) Those in which some of the raw materials are to be imported.
  - (c) Those in which all the raw materials are to be imported.
2. Take each of the above industries separately, and state with regard to each:—
  - (a) The place in India best suited for locating factories.
  - (b) The raw materials.
  - (c) The places from which the raw materials can be most profitably obtained.
  - (d) The places from which the necessary machinery, tools, and appliances can be obtained to the best advantage.
  - (e) The power that can be most economically employed to work the factory, if other than manual labour is necessary for its successful working, (i.e., whether Steam Engine, Gas Engine, Oil Engine, Turbine, &c.)
  - (f) The smallest capital that would be required to be employed in order to make the factory a successful concern.
  - (g) The difficulties in the way of organising and starting the factory.
  - (h) The steps to be taken to remove the difficulties.

The Industrial School at Mysore has had its scope enlarged and better financial provision has been made for its efficient up-keep. It is also housed in new buildings. It is now named after His Highness the late Maharajah Sir Chama Rajendra Wodeyar Bahadur. The munificent help the Mysore Government has offered to the Tata Institute of Science, which is to be located at Bangalore, and will, it is hoped, be an accomplished fact without much further delay, need not be dwelt upon here at any length.

7. Handloom weaving seems to be making satisfactory progress in Mysore with the enlightened support of the State. Schools have been established in several industrial centres, and they are doing good work. "Fly-shuttle looms are used in weaving, and the Superintendent (of the Hole-Narsipur School) is able to report from experience that with less expenditure of physical labour and less fatigue, three times more cloth can be woven by means of the fly-shuttle than by means of the throw-shuttle in a given time, though

#### C.

##### *Scientific, Technical and Industrial Education.*

1. Which of the industries mentioned by you under A and B, will require the opening and maintaining of technical and industrial schools, with a view to supplying skilled labour able engineers, superintendents and managers?

2. It is necessary to send young men abroad to receive scientific, technical and industrial education with a view to enable them, on their return to this country,—

(a) to take up scientific research work ;

(b) to organise and conduct Technical and Industrial Schools ;

(c) to organise and conduct factories either as Directors and Managers or as Supervisors and Superintendents.

3. If so, please name the subjects of studies you will advise these young men to take up, and the places abroad best suited for such studies.

4. Take separately each subjects or group of subjects to be studied abroad, and state, with regard to each, the previous qualification required in the student, and the information he should obtain in this country prior to his departure to a foreign country with a view that he may be fitted for the kind of work he is expected to do here on his return.

5. What arrangements should be made to give these young men the best education when abroad ?

6. What arrangements should be made to help the students on their return to this country to make the best use of the training received by them abroad ?

#### D.

##### *General.*

1. Is it necessary to hold Industrial Exhibitions with a view to promote the growth of trade and manufactures.

2. State the difficulties in the way of the extension of trade and manufactures, and state how these difficulties may be removed.

greater care, intelligence and skill are demanded for working with the fly-shuttle." "The influence of the Institute on the local weaving industry has begun to be felt . . . . Finer cloths, which used to be imported before, have been woven at Hole-Narsipur in large quantities in recent years, since the Institute showed the way." We are told that a small society of twelve weaver boys, who have learnt weaving in the above school, has been formed to work regularly on fly-shuttle looms during stated hours, to weave the finer cloths that used to be imported, to avoid running into the debt of *sowcars*, and to share the profits equally. The Superintendent has continued to make mechanical improvements in labour-saving machines suitable for small factories. His sizing machine has been still further improved, though it is said that the results of its working have yet to be fully ascertained. A new winding machine has also been prepared, "which enables a boy of ten years to wind four times more thread and with fewer breakages than by the hand in a given time." Further, he has formed a laboratory, constructed a dyeing house, and made experiments in dyeing, according to the methods he learnt during his stay in Bombay. The Hole-Narsipur School receives from Government an annual grant of Rs. 720. This year special grants of Rs. 150 for looms and of 200 rupees for dyeing experiments have also been sanctioned. The boys in the carpentry class attached to the Doddaballapur Weaving School make among other things fly-shuttle handlooms.

In the weaving school at Molkalmuru, silk-bordered cloths, *saris*, lace-bordered turbans, and lace-bordered *dhotis* are woven with fly-shuttle looms, which are made locally with the help of the carpentry maistry.

Mr. M. A. Sampath Iyengar, Superintendent of the Weaving School, has given his attention to loom construction, sizing, winding, warping, weaving, bleaching, dyeing and co-operative labour. A fly-shuttle stay is made for handlooms at from Rs. 5 to Rs. 10 and sold on deferred payment, and the moistening of the air about a handloom is now the subject of experiments. Already fine goods that were previously imported are now made in the weaving schools of Mysore, and as the pupils pass out of the schools, they carry the industry to

their own homes. "This system of instruction," remarks the *Indian Textile Journal*, "is based on a careful study of the needs of the people; it is carried on with the smallest outlay, in buildings of the very cheapest kind, and its success is already demonstrated."

## KASHMIR.

8. A few students have been sent abroad from Kashmir for receiving technical education. And the Kashmir Electric scheme which when completed is calculated considerably to help in the development of Kashmir industries, is making progress. The silk industry, for which Kashmir enjoys exceptional facilities, has had the earnest attention of the State bestowed on it during recent years.

## TRAVANCORE.

9. An Industrial Exhibition has been organized in Travancore through the exertions of Mr. N. Subramania Iyer, Dewan Peishcar, and with the support of the Government of the State. A Technical Institute was also opened, and technical scholarships have been awarded to students. A scheme of technical education, sanctioned in 1901, is in force in the State, and provision exists for technical schools, branches of instruction in which shall be Civil Engineering, Mechanical Engineering, Agriculture, Drawing, Geology (including Mineralogy), Glass and Pottery, Textile Fabrics, Leather-work, Wood-work and Metal-work, and Printing, Book-binding and Type-founding.

## KOLHAPORE.

10. A new cotton mill has been started in Kolhapore under the name and title of "Shri Shahu Chhatrapati Spinning, Weaving and Manufacturing Co., Ltd.," with a total capital of Rs. 15,00,000, divided into 15,000 shares of Rs. 100 each, of which 10,000 shares aggregating Rs. 10,00,000 were issued first. The mill starts with 20,000 spindles, to be increased later on to 25,000. The mill is primarily the result of private enterprise, but the Durbar has given it substantial help. The concessions given are:—"A



free grant of nearly 50 acres of land for the mill premises in a most eligible situation; a large water tank for the use of the mill; a three-inch pipe from the State water-works for the use of the mill in times of scarcity; the exclusive monopoly for 30 years of running the mill in the State of Kolhapore; the option of acquiring land under the Land Acquisition Act for a railway siding up to the mill premises; exemption from State tax on all articles imported or exported in connection with the mill." The ceremony of laying the foundation stone of the mill was performed by His Highness the Maharajah on the 27th September last.

## SIROHI.

11. His Highness Sri Sir Kesari Singhji Bahadur, Maharajah of Sirohi, has extended his patronage to the Kesar Native Sugar Manufacturing Co., Ahmedabad, to which reference will be made in the next section when we come to deal with the new industrial enterprises of the Bombay Presidency. The factory of the Company will be at Abu Road (Station). His Highness has made several concessions to the Company, chief among which is fuel at a special cheap rate from his jungles. In recognition of the help received from His Highness, the Company is named after him.

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## PART II.

### SECTION (C).

#### GENERAL INDUSTRIAL ACTIVITY OF THE PEOPLE DURING THE YEAR.

##### (A) GENERAL.

1. Among the criticisms, favourable and otherwise, which the Swadeshi movement has called forth, special notice may be taken of one. Mr. Prevost Battersby, a talented British publicist who came out to India with His Royal Highness the Prince of Wales as special correspondent of the *Morning Post*, the organ of Tory aristocracy, has distinguished himself by the acuteness of his observation and the power of discrimination and sympathetic imagination he has shown himself possess to. Writing of the Swadeshi movement in one of his now famous letters, he delivered himself as follows:— "Consider how far British benevolence would support a ministrations to the unemployed which involved the paying extra for almost every necessary of existence and the getting thereby an inferior article, and then laugh, if you can, at a movement which is not only doing that, but is trying to enmesh all India in a network of organisation which shall discover the needs, supply the deficiencies and promote the training of those village workers who still remain, a labour which, in the truest and most essential interests of the country, should have been undertaken years ago by the Government of India, as doubtless it would have been but for the deterrent fear of our British manufacturer. This chance of proving our disinterested concern for our Indian subjects has, however, been lost, and it is left to the chance product of an agitation to take our place with a determination which is, in its small, vexatious way, little short of heroic."

2. The Mining and Geological Institute of India was formed in January, with His Honour the Lieutenant-Governor of Bengal as Patron and the Director of the Geological Survey of India as President. As its name implies, the institute will attempt to blend the science of Geology with the art of Mining: and its objects "shall be the promotion of the study of all branches of mining methods and of mineral occurrences in India, with a view to disseminating the information obtained for facilitating the economic development of the mineral industries in the country." "The institute will consist of ordinary members, who will be elected in accordance with their professional qualifications, and will be senior to Associate members who are also to be professional men. The Associates, however, will be purely gentlemen interested in the Institute, and who wish to keep in touch with the proceedings and to be able to attend the meetings, without necessarily being professional men." The Honorary Secretary is Mr. W. H. Pickering, Chief Inspector of Mines, Calcutta.

3. There are at present about fifty Indian students in Japan, out of whom Bengal contributes 31, Bombay seven, Madras five, the Punjab two, and the United Provinces one. The branches of study they have taken up extend over a pretty wide range. Ceramics, Applied Chemistry, Weaving, Mining, Engineering, the manufacture of Soaps, the making of Pencils, handles and metal pieces of various sorts, Spinning, Knitting of kinds, Lacquerware, the manufacture of Sulphuric acid, Wire-drawing, Pin and Needle Manufacture, Electrical Engineering, Paper-making and Glass-production—these at present make up the list of subjects that our students are devoting themselves to. As regards the institutions the most resorted to seem to be the Imperial University of Tokio, the Pharmaceutical Institute and the Agricultural College in the same city, as well as the Higher Technological School located there. There is a single student in the Imperial Institute of Fine Arts.

## (B) BENGAL.

1. A working mill—the Luxmi Tulsī Cotton Mills at Serampore—was taken over by a Bengali Syndicate and re-started under the title of "The Bengal Luxmi Cotton Mills,

Limited." The concern, when purchased, had 23,000 spindles and 200 looms ; but this number has been added to by the new company. The capital of the company is Rs. 12,00,000.

Messrs. Andrew, Yule & Co., and Messrs. Kettlewell, Bullen & Co., have started two new weaving companies. The Desi Cloth Mill Co., the one promoted and managed by the former, has a capital of Rs. 6,00,000 in ten rupee shares. In the allotment of shares preference was given to Indian applicants for shares, and it is understood that most of the shares have been taken up by Indians. A fourth mill is the Indian Spinning and Weaving Co., Ltd., with a capital of Rs. 12,00,000, divided into 12,000 shares of Rs. 100 each. This company has acquired the Cotton Mills equipped with plant, machinery and accessories, situate at Chandernagore and owned and worked by Babu Butto Kristo Ghose. The company is to close its share list on the 30th November.

5. The Association for the advancement of Scientific and Industrial Education of Indians, was established on the 22nd March, 1904, and has done very good work during the short period of its existence. Seventeen students were sent by the Association early in 1905 to Glasgow, Edinburgh, Leeds, and Paisley in Great Britain, and to the United States and Japan to receive instruction in such branches of technical knowledge as Electric Engineering, Industrial Chemistry, Mechanical Engineering, Dyeing, Tanning, Scientific Agriculture, Ceramics, Manufacture of Matches, Pencils and Soap, and Sericulture. Satisfactory accounts have been received of the progress of their studies. In the current year so many as 44 students were sent by the Association to learn hardware, sugar refining, the making of essences and pomades, hosiery buttons and horn combs, weaving and spinning, glass-making, enamelling, candle-making, the making of clocks and watches, tin works and lacquer works, and homœopathic pharmacy, in addition to the subjects named above. They are receiving their training—some in Great Britain, some in America, others in Japan, France and Germany. Both last year and this year the Lieutenant-Governor of Bengal was present at the send-off given to them. The Association has started a school for teaching languages. At present French, German and Japanese are being taught under the best professors available in the city of Calcutta,

The Association has been making strenuous efforts to start a Bank in Calcutta on a large scale.

A member of Association is making experiments at Serampore with the best kind of hand-looms, and the Association has been advised by its committee of experts to await the results of such experiments before taking any steps in the direction of hand-looms.

The committee of experts of the Association have recommended the starting of the following industries:— (1) Safety and friction matches; (2) small hardware including pins, needles, spades, Karas, umbrella sticks, knives and scissors; (3) soaps; (4) buttons and horn combs; (5) churries; (6) glassware; (7) enamel; (8) porcelain; (9) pencil; (10) leather; (11) paints (12) acids. To carry on some or all of these industries, a limited liability company to be called the Small Industries Development Company, is proposed to be started with a capital of two lakhs. Not more than three industries would be taken up first, more being taken up only if these turn out to be profitable.

As has been mentioned elsewhere, a scheme for establishing a College of Technology in Bengal jointly by the Government of Bengal and the Association is under consideration.

A most interesting enterprise of the Association is the Agricultural Settlement in Behanga near Deoghur with 45,000 bighas of land on the co-operative system. The property is in charge of trustees, the value of each share being 500 rupees. It is proposed, as soon as enough settlers have built their houses, to start boys' and girls' schools, and, if necessary, colleges with boarding arrangements. Those of the students sent abroad under the auspices of the Association who qualify themselves in Agriculture, Farming, Forestry, and the like, or even Mining, would find in the settlement a ready-made field for reducing their knowledge to practice. A model farm, a fruit plantation and a dairy have already been started and await the arrival of experts.

6. Very important steps in the direction of advancement of education have been taken this year in Bengal by the

foundation of the National Council of Education and the Bengal Technical Institute. There is a technical side of the former in the Primary and Secondary grades. The Primary grade is designed for the training of the senses by instruction in drawing and the like, and the Secondary grade for preparing the student for his intended career in life. Among the subjects taught are paper-cutting, clay-moulding, simple mechanics, shorthand and typewriting, commercial arithmetic and commercial geography for those who intend to prepare early for a commercial career; elementary botany including vegetable physiology and chemistry for those who intend to prepare early for an agricultural career; practical mechanics, etc., for those who intend to prepare early for a manufacturing career.

The Bengal Technical Institute was opened in July—thanks principally to the liberality of Mr. T. Palit. The cost of maintenance of the Institute in a properly equipped condition will be about rupees four thousand per month in addition to an initial expenditure of over a lakh of rupees. Donations of about Rs. 50,000 and monthly subscriptions of over Rs. 2,000 have been promised. The Institute has three Departments—Primary, Intermediate and Secondary. In the Primary Department, which is intended for training skilled labourers and artisans, each candidate has to select one of the following courses:—(1) Hardware, (2) Smithery, (3) Carpentry, (4) Electro-plating and Gilding, (5) Bamboo and Cane-work, (6) Sheet-metal and Foundry-work, (7) Turning and fitting, (8) Cutlery, (9) Lock and Key-work, (10) Shell and bone-work, (11) Tanning, (12) Earthenware and Pottery work, (13) Dyeing and Bleaching, (14) Plumbing, (15) Electric Fitting, (16) Tailoring, (17) Leather work, (18) Glass-blowing, (19) Lace-making, (20) Knitting, (21) Confectionery and Baking, (22) Carpet and Rug-making, (23) Dairy work, (24) Weaving and Spinning (Jute, Cotton, Silk and Wool). Intermediate Department is intended for training skilled operatives and assistants to foremen, engine-drivers, fitters, and mechanical draftsmen. Every student in this department will be trained in Smithery, Carpentry and Practical Mechanics and shall select one of the following special courses:—(1) Electric Fitting and Installation, (2) Sheet-metal and Foundry-work, (3) Cutlery, (4) Lock and Key-work, (5) Turning and Fitting, (6) Smithery

(7) Carpentry, (8) Earthenware and Pottery work, (9) Electroplating and Gilding, (10) Soap-making, (11) Tanning, (12) Pharmacy work, (13) Enamelling, (14) Dyeing and Bleaching, (15) Spinning and Weaving, (Jute, Cotton, Silk and Wool), (16) Photography, (17) Dairy Work. In the Secondary department, which is intended to turn out trained foremen who will be able to take charge of small industrial factories, the following courses of instruction are in contemplation:—(1) Mechanical Engineering, (2) Electrical Engineering, (3) Sheet-metal working and Foundry-work, (4) Textile Manufacture, (5) Technological Chemistry with one of the following special subjects:—(a) Pharmacy, (b) Ceramics, (c) Tanning, (d) Paint, Polish and Varnish making, (e) Dyeing and Bleaching, (f) Soap, Candle, Oil and Perfume-making, (g) Preparation of Matches, (6) Commercial Course, (7) Economic Geology and Mineralogy:

18. The Bengal National Fund, which was started on October 16, 1905, is "devoted to the promotion and development of industries and industrial education with a view to the provision of skilled labour in sufficient quantity so as to pave the way for the general employment of improved hand-tools and machine-tools in the workshops." A sum of about Rs. 80,000 has been realised for the Fund and Rs. 25,000 more promised. Funds have been allotted out of this for the following purposes:—

*I.—Particular purposes to which funds have already been allotted.*

(1). A sum of Rupees ten thousand has been allotted to the establishment of a Weaving School which was founded on the 15th December 1905 with 60 Students on its roll at 209, Cornwallis Street (Indian Sangit Samaj Premises). There are about 500 applicants for admission and immediate steps are being taken to provide suitable accommodation for about 250 students. The School is at present equipped with 21 Fly-Shuttle looms and a number of other looms including those of Khurja, Japanese and Hattersly makes. It has also been resolved to obtain a loom of the French pattern and also some of the improved looms which were exhibited at the last Benares Exhibition and elsewhere. They are also trying to

secure the services of experts trained in weaving at the Baroda Technical School and the Victoria Technical School, Bombay. The services of an experienced Madras weaver as also that of a young man who had a training in mechanical engineering in the Shibpur College and who has had besides sufficient practical experience in weaving have been secured. (2). A sum of Rupees five thousand has been allotted for making advances of small sums on proper securities to poor weavers specially in the Mofussil. (3). A sum of Rupees one thousand has been advanced as a loan on proper security to a body of student volunteers for hawking Swadeshi goods from house to house. (4). A sum of Rupees eight hundred has been sanctioned for the establishment of a Weaving School at Kishoregunj in the District of Mymensingh. (5). A course of lectures on Aniline Dyeing was organized and delivered at the School premises by Mr. W. Menke, the German Expert. It has been decided to send one or two M. A.'s in Chemistry to Bombay to learn the art of dyeing in aniline colours and a sum of not exceeding Rs. 300 has been sanctioned for the expenses of the intending student, who will have to give an undertaking that they will, after their return, become teachers of the proposed Dyeing School for at least one year on the remuneration to be fixed by the Committee.

Further purposes for which funds are proposed to be appropriated are as follows:—(1) Starting Weaving Schools in different districts and sub-divisions; (2) to introduce the weaving of woollen and silk fabrics as also to introduce knitting machines in the Weaving Schools already existing and to be started; (3) to encourage the invention and manufacture of improved looms; (4) to introduce such industries as could be started with a small capital and to teach such industries, e.g. the manufacture of knives and scissors, locks, keys and padlocks, steel-trunks, despatch boxes, nibs, buttons, etc., to proper persons, (5) to found occasional scholarships for training up energetic youngmen in useful arts and manufactures to become teachers of the School on proper remuneration.

9. A newly issued programme of the Indian Industrial Association, Calcutta, setting out the details of the work for the current year, shows that it has entered upon a sphere of extended usefulness.



The programme is issued in the name of Mr. T. N. Mukharji, who is well known for his interest in and knowledge of industrial questions, and a brief summary of it is given below :—

(a) Delivery of lectures on Products and Manufactures, the course of lectures under this head comprising Mineral Products, Food Substances, Fodder or Cattle Food, Spices and Condiments including Tea and Coffee, Oils and Oil-seeds, Fibrous substances, Dyeing and Tanning substances, and Animal Products; (b) Investigation into Primary Manufactures, such as what are called "oilman's stores" including rice, starch, corn meal, condensed milk, vinegar, pickles, which are now imported in large quantities from Europe, though the raw materials for their manufacture abound in this country; (c) Investigation into the manufacture of a single important article, such as led, through the efforts of the Madras School of Art, to the successful starting of the manufacture of aluminium ware and the preparation of chrome-leather, (d) Organization of the Swadeshi movement by establishing communication with the different local bodies scattered all over the country and disseminating information through them; (e) Experiment with fodder crops; (f) Exhibition of Products and Manufactures; (g) Preparation of a Handbook on Indian Products and Manufactures.

10. The National Spinning and Weaving Company, Limited, has been started this year with a capital of Rs. 20,000; the Calcutta Weaving Co., with a capital of Rs. 30,000; the Goabagan Spinning and Weaving Co., Ltd., with a capital of Rs. 50,000; the Oriental Match Factory, Ltd., with a capital of Rs. 1,00,000 and the Oriental Soap Factory with a capital of Rs. 30,000. Messrs Janaki Nath Ray and Brothers have started the "Eastern Bengal Steamer Service" with a capital of Rs. 4,00,000, and the Bengal Steam Navigation Co., Ltd., have added two new steamers to their line. Besides these have been started the National Soap Factory, the Lotus Soap Factory, the Bool-bool Soap Factory, the Globe Cigarette Co., the Bengal Pencil Factory, and the Tarpur Sugar Works; while new works costing Rs. 2,00,000 have been added to the Bengal Chemical and Pharmaceutical Works.

11. The handloom industry has received a considerable impetus. According to a special report of the Bengal Landholders' Association, weaving schools have been started in several zemindaries, and systematic instruction is being imparted. "Thousands of weavers have returned to work, and country dhoties are readily available. Some youths undergoing instruction in weaving are graduates."

The Tagore Weaving Institution at Kushtea is the first of its kind to come out with its results. The institution was started towards the end of last year, and the students having shown a proficiency in the art, an examination was held and eight students came out successful. The successful students belong to different districts, and they have gone each to his own district to teach to others the art of weaving cloths of finer counts with the fly-shuttle handloom. The celebrated Robindra Nath Tagore is the founder of this institution, and its rapid success is to no small extent due to his untiring efforts.

12. The Calcutta Pottery Works has already achieved a name for its manufactures of Chinaware, tea cups and saucers, toys of different sorts, etc., etc. The proprietors were encouraged by the success that attended their efforts to start a regular porcelain factory in Calcutta. Mr. Satya Sundar Deb, who received his training in Japan and returned to India towards the end of last year, has been placed in charge of the works since December last. The experiments conducted by him in making porcelain with purely indigenous raw materials, have proved a success, and there is every prospect of the enlarged works turning out profitable. The capital of the works is Rs. 2,00,000.

13. Innumerable shops—"Swadeshi Stores" as they are generally called having been opened during the year all over Bengal, and there seems to be room even for more: so extensive is the demand for articles of indigenous manufacture. It was the Indian Stores, Limited,—the direct and immediate outcome of the first of the Annual Congress Exhibitions, held at Calcutta in December 1901—which led the way for other concerns of the kind. And it is satisfactory to know that, thanks chiefly to the exertions of the founder, the Honorable Mr. J. Chaudhuri, the Stores are in a sound financial position. About half of the nominal capital which is five lakhs of rupees, has been offered to and subscribed by the public, and it is proposed to issue the remainder to the full extent. An idea of the growth of demand for "Swadeshi" articles may be formed from the fact that the sales effected by the Indian Stores last year were three lakhs more in value than in the preceding year.

The United Bengal Stores, the United Bengal Co., and the Laxmir Bhandar are other important Swadeshi Stores in Calcutta. The Managing Agents of this last are the well-known Messrs. K. B. Sen and Co., and the capital is one lakh of rupees.

14. An Industrial and Agricultural Exhibition was held at Midnapur in February. The notable point about this show was that several articles made by students, such as nibs and shoe-blacking, were exhibited.

15. Mr. Radha Nath Das, Personal Assistant to General Pudma Jung Rana Bahadur of Nepal, has published a "brief statement of facts" regarding his investigation into the mineral resources of the Chota Nagpur Division and the South Behar districts. He refers to the reports of experts on the existence of iron ores of superior quality and limestone of fair-strength and percentage in close proximity to the coal fields of the Palaman and Daltongunj districts of Chota Nagpur, and says that the existence of coal, iron ore and limestone being a rare combination of things to a manufacturer of iron, this mineral wealth is eminently worth developing. His "statement of facts," which can be had from the writer at 185, Salalabag Road, Allahabad, contains interesting information.

16. One other fact remains to be noticed before we leave Bengal. Messrs. S. K. Dhar and Brothers, Chutiabazar, Hughli, have constructed Astronomical Telescopes, entirely by indigenous labour. "The instruments are of the reflecting form, and, as such, are free from colour defect. The mirrors and lenses have all been carefully ground, polished and figured" by Messrs. Dhar, and they "give very satisfactory views of sunspots, lunar features, Jupiter's belts and satellites, Saturn's ring, phases of Venus and Mercury, nebulae in Orion, and other nebulae, star-clusters, double stars, etc."

### (C) BOMBAY.

17. The Swadeshi movement, old as it is, had a second birth, as it were last year in Bengal, and consequently Bengal has loomed largest in the public eye as the home of Swadeshi agitation. But for the biggest enterprises tending to the ultimate success of the Swadeshi movement, one has to look to Bombay, which for years, if not for generations has been the pioneer of industrial development. Here we move in a spacious atmosphere. It comes as a surprise to no one, therefore, that during the year under review it is in Bombay that the most important steps in advance have been taken, as will be clear from the account of them given below.

18. The Tata Iron and Steel Co., although the field of work lies in another part of the country, is nothing if not a Bombay enterprise, the late Mr. Tata and his sons after him having laid out near four

lakhs on the preliminary investigations alone. The capital of the Company is one crore and fifty lakhs. It is a pity that this could not all be raised in India and that Messrs. Tata have been obliged to seek the assistance of English financiers with the inevitable consequence that the Directorate will be in England. The works will be located at Sini. The Government of India have been pleased to make some substantial concessions to the Company, and all knowing people predict unqualified success for this large enterprise.

19. Another big scheme to whose initiation, too, the country is indebted to the genius of the late Mr. Tata, is the Bombay Hydro-Electric Scheme. The intention is to utilise the immense water-fall in the Ghats for generating power to be brought down to and utilised in Bombay. Power will be supplied to the many mills in Bombay, thus diminishing the cost of production. The scheme has been matured completely, and application for license has been made. This is now under consideration. If, as is hoped, Messrs. Tata will obtain the license, the benefits that the Hydro-Electric Scheme will confer on the industries planted in Bombay city will undoubtedly be immense.

20. It is news to no one that the organisation of capital is in a very defective State in India, relatively and absolutely. But industry is limited by capital, and no assured success awaits large industrial enterprises in India so long as the operations of banking are so very limited in scope, and compared to the need for their expansion so minute, as they are at present. This truth has for some time been increasingly recognised, and it is no wonder that a few large developments have taken place in Bombay, during the year. The Bank of India, Ltd., has been successfully floated with a capital of no less than one crore of rupees, and the Bank of Western India with a capital of 25 lakhs. It never rains but pours, and not content with these two, a third bank—the Indian Specie Bank—has been started with a capital of two crores of rupees. And those who know the organizing capacity and resources of the Honourable Mr. Vithaldas Damodher Thackersey, who is responsible for the last, will have no difficulty in concluding that the scheme of the Indian Specie Bank is destined to be as successfully carried out as the Bank of India and the Bank of Western India.

21. Insurance is allied to banking, and Bombay has been equally to the fore in this department of activity. A Fire Insurance Co. for all India—"All India United Insurance Company, Limited"—with the splendid capital of fifty lakhs has been floated in Bombay, and it is a pleasure to note that Bombay's premier citizen, the Honourable

Sir P. M. Mehta, who has laboured hard for the success of the Victoria Jubilee Technical Institute of Bombay, is the Chairman of the Board of Directors of this company. Sir Pheroze Shah was before this, Chairman of the Empire of India Life Insurance Co., and piloted it successfully in its first few years. And it is no vain hope that under his sagacious guidance the new Fire Insurance Co. has a fortunate future before it.

22. We have recorded six large schemes which have been successfully started on their career, or are likely to become accomplished facts in a short time. Bombay claims credit for more. The business of the Bombay Steam Navigation Co., which has existed for more than forty years, has been acquired by a limited liability company started with a capital of 60 lakhs of rupees. The Steamers and other boats taken over by the Company consist of nine steamers for both passengers and cargo, and nine steamers for passengers only. The new Company continues the services performed by the steamers under the old management, which are as follows :—A service twice a week to and from Bhoznagar; a service twice a week to and from Karachi calling at all Kathiawar Ports; a service twice a week to and from Mangalore calling at Marmugoa and other ports; a weekly service to and from the Gulf of Cutch, and a fast weekly service between Bombay and Cutch Mandvi touching at Porebunder and Dwarka, *en route*. In addition to the above, the Passenger Steamers are used for Ferry Services, which have four regular daily sailings from Mody Bay.

23. It does not need to be told that many times more than the usual number of additions have been made to the Spinning and Weaving Mills in Bombay City and Presidency, during this year of industrial activity. The review of the prospects of the Indian Mills, to which reference has been made, as well as the list of new joint stock companies, tell a pleasing tale of the effect of the popular industrial awakening on the growth of the mill industry. It will not be out of place to make mention here of a few of the new Mills. The Broach Industrial Cotton Spinning and Weaving Co., Ltd., started with a capital of seven lakhs, has been formed for the purpose of Spinning Cotton and Weaving cloth, silk, linen, fibres, etc. A feature of this concern is that students will be admitted for receiving practical instruction, and arrangements are to be made for the students, lodging, education, etc. The Agents, whose commission and remuneration have been fixed much below the usual rates in Bombay and who, besides, forego to the extent of one-third of their commission if the shareholders paid to realise a profit of 6 per cent, have resolved to

pay a further two annas in the rupee from their commission on profits payable them by the principal Company, towards the maintenance of the Industrial School attached to the mill.

The new Spinning, Weaving and Manufacturing Company of Sholapur, Limited, starts with a capital of ten lakhs. The prospectus refers in the following terms to the increased demand for country-made cloth:—"The demand for country-made cloth has considerably increased of late and will go on increasing still in this country. The home demand is so great that little or no attention is being paid to foreign markets where the field is large and capable of great development. With these prospects in view Spinning Mills in Sholapur afford a valuable and secure investment for investors. With the increase in the consumption of Indian cloth in this country and China, and with the consequent increase in the demand, India can compete favourably with imported goods to a very large extent."

The Pratap Spinning and Weaving Mill and Manufacturing Co. has been started by some enterprising merchants of Chopda and Amalner, with a capital of ten lakhs. The mill is the first of its kind in Khandesh, which is a district rich in cotton. "The organisers of the mill are ambitious of weaving finer stuff than is usually turned out by most Mills, and will thus have in requisition most of the cotton of the better quality that is produced not only in Khandesh but in the country around."

Then we have the Barsi Spinning and Weaving Mills, Ltd, with a capital of ten lakhs, "with power to increase." The mill starts with 15,000 spindles and 300 looms which will be increased in course of time to 25,000 spindles and 500 looms.

The Poona Swadeshi Weaving Co., Ltd., has a capital of Ra. 2,50,000 "with power to increase." The Company has for its object the weaving of finer yarn into cloth. It starts with 200 power-looms.

Messrs. Finlay Muir Co. have started a new mill with a capital of twenty lakhs; and the Bhaskar Techno-cotton Mills, Cambay, have a capital of ten lakhs. The Krishna Dyeing, Trading and Weaving Co., Wai, in the Satara district is started with a capital of Ra. 50,000.

24. The Kesar Sugar Manufacturing Co. is started at Ahmedabad with a capital of Rs. 5,00,000, divided into 2,000 shares of Rs. 250 each. The prospectus of the Company gives the following information :—

“ There are, at present, seventeen factories working by steam power in Bengal, Upper and Southern India. Six or seven more are being added to the number this year. On enquiring it is fairly estimated that the majority of them earn profits available for dividend to Shareholders of more than 20 per cent. on the capital. The statement is strongly supported by the balance-sheets of the Cawnpore sugar works Ltd. for 3 years (1902-03-04), which is situated near the place proposed for the factory of this company and which show large profits. The said company, with the capital of Rs. 600,000 had in balance nett profits of Rs. 1,21,393-6-0, and was able to reserve the considerable sums in the years 1903-1904, after paying a clear dividend of 12% to Shareholders. These profits vary from 30 to 45 per cent.”

25. “ The Alembic Chemical Works ” is the latest fruit of the scientific knowledge combined with business enterprise of Professor T. K. Gajjar. Mr. Gajjar first distinguished himself as principal of the Kala Bhuwan of Baroda, and then by his work in the Techno-Chemical Laboratory at Bombay. The Alembic Chemical Works have been started “ with the object not only of supplying the public with drugs, chemicals, essential oils, etc., but also of manufacturing from indigenous raw products as many of these as can practically be manufactured here.” “ The chemical work of the factory is carried on under the guidance of Professor Gajjar, and amongst the chemical staff of the Works are analytical and manufacturing chemists like Mr. Kotibhaskar who are specialists in their own branches, and have devoted considerable time and spent many years in laboratory work and whose chief aim is to properly utilise indigenous raw products.” The “ Alembic Chemical Works ” is almost the first effort of the kind in Western India, in that “ whereas most of the chemical firms in our country manufacture their tinctures and extracts from foreign alcohol, in our factory we prepare our own alcohol for this and other manufacturing purposes. For this purpose a special factory called

the Baroda Distilling Works has been opened at Baroda. Secondly most of the chemical firms are only dealers in drugs, chemicals, etc., and the few that are manufacturers manufacture chiefly tinctures, extracts and certain proprietary medicines. In our factory, however, we manufacture even chemicals and drugs and to extend this kind of manufacture is the special aim of the Proprietors."

26. The "Sholapur Industrial Financing Fund," with a capital of two lakhs, has been started with the object of financing the Cigar and Cigarette, and the Lock-making business now in the hands of a private individual, who has shown considerable ingenuity in the manufacture of the above articles, but who has not the wherewithal to develop the business on a commercial scale. It may be expected now that the financial difficulty which so far stood in his way promises to disappear, that the business will be adequately expanded.

27. The Gujarath Islam Match Manufacturing Company of Ahmedabad was started about eight years ago and worked profitably for four years when it felt the need of enlarging the scope of its operations. The original capital of a lakh of rupees proved insufficient for the purpose, and the Company accordingly went in for a loan. But the loan could not be obtained except at a high rate of interest with the result that the annual amount of interest has eaten up all the profits and more than the profits. The Company has, therefore, issued this year debentures of a lakh and a quarter at six per cent., and when these are taken up the factory will be permanently established on a sound financial basis. A large portion of these debentures has already been subscribed for.

27. (a) The Holy Soap Manufacturing Co., of Bombay, which in view of "the tremendous run" on its Soaps in the Bombay Market found it necessary of late to convert itself into a Joint Stock Company with a capital of Rs. 1,50,000 divided into 6,000 shares of Rs. 25 each, has further extended the area of its operations and opened a branch factory at Calcutta.

28. The Western Manufacturing Co., Bombay, makes buttons. The button manufacturing plant is now in full working order and the workmen are now fully trained. "The average daily production



is not only regular but of good quality." The Directors of the Company suggest that the machinery of the button factory may safely be doubled, with an almost proportionate increase in the profits. The Directors appeal to the public to support the Company, so that the concern may be placed on a stable financial bases and "implant in India a perfectly new and modern industry of great utility to every one.

29. A notable step in advance has been taken in the direction of supplying the growing demand for indigenous articles by the starting of the Bombay Swadeshi Co-operative Stores Co., Ltd., with a capital of Rs. 2,50,000. It is rightly said in support of the foundation of the Stores, that "if all kinds of Swadeshi goods are collected together by the help of experienced merchants in a large Swadeshi Co-operative Stores in a city like Bombay, mofussil customers and dealers will have no difficulty in finding out where and how to get the reliable Swadeshi articles or where they can be purchased." "Another advantage to be derived from such Co-operative Stores of Swadeshi goods is that persons desirous of establishing Swadeshi shops in the mofussil, if they are willing to invest a part of their capital in the shares of this Company, can easily obtain the required goods from (it) at special concession rates. "It is the object of the Company that smaller shops on the co-operative principle should be started in the mofussil in connection with it." This Stores will fill in Bombay the place of the Indian Stores of Calcutta.

30. Other new concerns which may be mentioned are the following:—The Indian Goods Depot, Ahmedabad, capital one lakh; Patankar & Co., Bombay, capital one lakh; Match Manufacturing Co., Bombay, capital one lakh; Oil and Flour Mills, Sholapur, capital Rs. 50,000; the Indian Co-operative Society, Bombay, capital one lakh; the Sayaji Sugar Works, Gamadevi, capital Rs. 2,50,000; Swadeshi Bank Limited, Bombay, capital one lakh; Handloom Weaving Company, Sholapur, capital Rs. 15,000, Loom and Industrial Machine Works, Belgaum; Dattatraya Oil Mills, Shirpur, Khandesh; Deccan Brass Works, Satara; Bbarat Bhabhan Cigarette Factory, Malegaon; N. B. & Co., Swadeshi Nib Manufacturers, Sion, Bombay; the Deccan Banking and Trading Syndicate, Ltd., Kolhapur and Bombay.

31. At the Surat Mahajan Home for Destitute Children, instruction is given in Gardening and Farming, Coir work of all sorts, Durry and tape work, Carpet-making in cotton, Wool and Silk, Elementary Photography and Drawing. The girls are taught needlework and embroidery. The industrial work of the boys and girls in embroidery, needlework, carpets, etc., secured medals and certificates at the Ahmedabad, Bombay and Benares Exhibitions.

32. The Trustees of the Hindu Foreign Education Fund, Bombay, have resolved to send during the year one student for the study of Scientific Agriculture in America and one to Germany for the study of Industrial Chemistry. The Trustees opened in October 1905 as an experiment, evening classes to teach the French and Japanese languages on moderate terms. "It is hoped that these classes will materially help Indians desirous of proceeding to Europe and Japan for educational purposes. If the experiment succeeds, the Trustees propose to make arrangements to teach German and other foreign languages."

33. Exhibitions were held during the year at Broach and at Pandharpur.

The articles exhibited at the former have found a place in the Directory prepared in the office of the Conference. The latter was held about the end of October. The Chief of Miraj presided at its opening ceremony, which was a grand function attended as it was by many leaders of public opinion of Western India.

A "Swadeshi Bazar" was held for the first time this year in connection with the Shivaji festival at Poona. We learn that about 60 shops were represented at it. The Bazar was open for three days, and we read "that it amply fulfilled the purpose of its organisers, viz. to bring the traders in Swadeshi articles and their customers together; and while helping to push on the Swadeshi trade to enable the people to see for themselves, and realise that it was not altogether a vain boast that the Swadeshi movement did prove fruitful in the production of many an article of every day use for which we had so long to depend upon foreign manufacturers."

34. The first annual general meeting of the Bombay Society for the Encouragement of Indian Arts and Industries was held at Bombay on the 17th September 1906. The Society was founded on the 16th August 1905 with the object of promoting the Swadeshi movement. Among other measures taken by the Society to propagate the gospel of "Swadeshism" are stated to be the following :—" It has spread far and wide lists for people to sign a vow thereon to use only "Swadeshi" goods. It gave three prizes to writers of three best essays on "Why should the 'Swadeshi' goods be used." It gave a prize through the "Ganesh Mandal" to the best "Melā," in point of its "Swadeshi" made attire during the last Ganapati festival. It brought about lectures of well-known speakers at different places during the last Ganapati festival. It sent its representatives to encourage the agitation of "Swadeshism" in such places as Pen, Agashi, Bhaindar, Vellaa, Pandharpur, Mangalvede, Sangli, &c. It held a number of public meetings in Bombay in 1905 and 1906, accompanied by fairs and exhibitions."

During the year Industrial Associations have been started at Ahmedabad, Satara and Broach, and have done fairly good work.

35. An "Industrial Conversazione" was held at Poona on the 15th and 16th May under the auspices of the Association for the Promotion of Industrial Education in India. Representatives from Poona, Nasik, Ahmednagar, Satara and Sholapur were present at the meeting. A Resolution was passed that a Provincial Industrial Conference should be held along with the Bombay Provincial Conference. This last, it is now settled, should meet in March 1907 at Surat. Another Resolution was passed at the Conversazione by which the Conference was recommended to consider the advisability of sending abroad a commission of experts to study what small industries could profitably be introduced in India.

36. An account of industrial activity in the Bombay Presidency would not be complete without mention of what has been called "an industrial oasis" near Bombay. It is a small manufactory at Juvem, of toys and other articles, finding employment for some twenty-five persons and offering "an admirable example of a technical school which seems to be closely adapted to the needs and character of its pupils." It includes—as the *Times of India*

points out—"Several workshops and a small museum, all so lightly and cheaply built that one wonders how they have withstood the monsoon storms. They stand, a model of good construction and a credit to their proprietor, Mr. K. R. Rane, Naturalist, Artist and Medallist, as his business card informs us. . . . In the show room are examples of the products of the factory, gracefully turned vases, platters, and models of fruit in wood, the latter painted in close imitation of nature, fans of Chinese pattern, the silk being perfectly stretched, and painted in floral designs of excellent taste, ornamental wall 'chicks' with well-drawn Indian designs, paper weights cast in lead composition from the bodies of crabs, frogs, lizards and other models, crucifixes and figures of Saints cast in the same material and painted. The manufacture of fire-works is carried on in a separate shed, and in the museum, the various processes of this art are illustrated."

#### (D.) MADRAS

37. The "National Fund and Industrial Association" was established at Madras in the month of March to serve as the Industrial Association for the entire Madras Presidency, and as stated earlier in this Report, several influential leaders of South Indian public opinion are actively connected with it. The following are the objects of the Association:—

(1) The fostering and improving of indigenous industries; (2) Promotion of Technical and Scientific Education and diffusion of knowledge on industrial matters among the people by means of demonstrations, lectures, leaflets and the like; (3) The provision of Scholarships for the study of industries in India or in any foreign country; (4) The helping of students trained as above in the starting of industries; (5) The establishment of a bureau of information relating to the industries, trade and commerce of India, and (6) The adoption of such other steps as may be calculated to advance the industrial condition of the country. The Association proposes to carry out the above objects in co-operation, as far as practicable, with similar Associations in the Mofussil. There are to be two Committees of the Managing Board, called (a) the Bureau of Information and (b) the Committee of the National Fund. The

duties of the former are (a) to collect information on all matters pertaining to Indian industries, trade and commerce; (b) to collect and maintain a library of literature bearing upon the industries, trade and commerce of the country; (c) to send for journals relating to the same including publications by Government; (d) to hold correspondence with experts in India and other parts of the world; (e) to answer inquiries on Industrial and Commercial matters; (f) to publish periodical information relating to the same; (g) to organise lectures. The duty of the Committee of the National Fund is to collect money for the Fund. About Rs. 12,000 was collected last year and this year, but as ill-luck would have it, Rs. 8,000 of this was lost in the Arbuthnot crash.

38. The First Madras Provincial Industrial Conference was held at Tinnevely on the 22nd and 23rd June. Five or six papers of interest were read at the Conference on subjects of importance by persons competent to handle them, and Resolutions were passed urging the need of establishing District Industrial Associations, of making an Industrial Survey of the Presidency, of promoting technical education in all its grades, and of carrying out the recommendations of the Committee on Industrial Education. The Committee of the Madras Industrial Association has been empowered to act as the Madras Provincial Committee of the Indian Industrial Conference. It has also been authorized to arrange for future annual Sessions of the Madras Provincial Industrial Conference.

39. Industrial Exhibitions were held in the course of the year at Tinnevely and Tanjore, Madura and Conjeeveram, and they were all more or less successful. Special attention was given to practical demonstrations of the working of improved handlooms at the Tinnevely and Conjeeveram Exhibitions, prizes being awarded to the best looms. Another important feature of the Exhibitions was the delivery of lectures on industrial subjects by competent persons who were specially invited for the purpose.

40. There are some new industrial enterprises to bring on record. It is true that they cannot compare in importance or magnitude with some of the magnificent concerns brought into existence in opulent Bombay, and go-a-head as Madras is comparative-

ly a poorer province, and the people down South are more or less new to such matters unlike their countrymen of Bombay where the Members of several communities breathe an industrial and commercial atmosphere as it were. But such as it is the progress is noteworthy and is evidence of the enthusiasm for industrial development created by the Swadeshi movement. The dye-works at Madura are in process of continual development, and so is the weaving industry. A new handloom factory is about to raise its head there. One word may be said of the last. The people of Madura had expected the location of the Government Weaving Institute in their city, and were disappointed at finding Salem favoured instead. Presently they raised money from among themselves and the new Weaving Factory is the substantial outcome of their self-reliant patriotism. The example was catching and the town-people of Coimbatore—a considerable weaving centre—have followed suit with a Weaving Factory in their locality. Yet another weaving factory was started by a public-spirited private citizen at Tellicherry in the Malabar district and another at Arni in the North Arcot district; while Mr. P. Theagaraya Chetty's factory at Tondiarpet, Madras, is an altogether larger affair, which can almost be compared to the Government weaving institute at Salem. Weaving factories on a smaller scale are to be found at several other centres. The chief object of all these is to test the comparative value and introduce the use of improved handlooms of different patterns. There are also weaving companies such as the one at Rajam in Vizagapatam district, formed with the object of supplying yarn and advancing money to local weavers and buying up the cloth turned out by them for retail sale in the neighbouring places. This method of increasing the supply of country-made cloth and diverting large bodies of weavers from the occupation of agricultural labourers to their ancient craft, bids fair to bear good fruit in the not distant future.

41. But weaving is not the only business on which attention has been bestowed. Two Jute Mills are nearing completion at Ellore and Guntur; pencil factories have either been actually started or are on the point of commencing work at Bimlipatam and Anakapalle; rice factories have been started in large numbers at Guntur, Rajahmundry and other places; cotton gins and presses

are being rapidly multiplied in number ; a Candle and Soap Manufacturing Co. has been floated in the Godavari district ; chrome tanning has been taken up by a private company at Madras, at the same time that work in it is continued in the Government School of Art ; insurance companies have been started at Madras and at Vizagapatam ; and the Co-operative Credit Societies Act has been taken advantage of to start a few urban industrial banks.

42. The Swadeshi Steam Navigation Co., Ltd., which works between Tuticorin and Colombo, deserves separate mention. Grave and long continued indeed were the difficulties the promoter of this enterprise had to face, but given the determination, difficulties arise only to be confronted successfully ; and it must be said to the credit of those responsible for the idea of starting a Swadeshi Steamer Service that they were not daunted by the obstacles in their way. The line was registered on October 16, under the Indian Companies' Act with a capital of ten lakhs of rupees divided into 40,000 shares of Rs. 25 each "to be held exclusively by Asiatics." Sriman Pandit Thorasami Thevar, Zemindar of Palavantham, is the Chairman of the Board of Directors, which consists, besides him of a millionaire, and thirteen respectable bankers and merchants. Fifteen thousand shares had been purchased before October 16, and "applications for shares have been pouring in" since then. Purchases of two steamers and two launches have been negotiated, and a chartered steamer is plying now.

43. The application of the co-operative principle to matters other than agriculture is an encouraging sign of the times. We have already referred to the urban industrial banks that are started here and there under the Co-operative Credit Societies Act. Thanks to liberal interpretation of the scope of the Act on the part of Mr. P. Rajagopalachari, Registrar of Co-operative Credit Societies in the Madras Presidency, the Swadeshi Co-operative Stores of Triplicane, Madras, have been registered under the Act. A still more interesting and useful application of the Act is in the case of the Co-operative Weavers' Unions at Conjeeveram and Salem. The object of the former is to finance the weaving industry in Big Conjeeveram. "For the purpose of attaining the above object, it shall be competent to the Union to borrow money on the joint and several responsibility of all its members, to purchase wholesale the

raw material required for the weaving industry and retail the same either for cash or for credit to its members, to make ready money advances to the members, to purchase and hold in common improved appliances connected with the handloom industry and to sell or let on hire such appliances to the members, to purchase from the members the finished products of their industry and to sell the same to the best advantage and to do such other acts as may be conducive to the attainment of the general object of the Union." To start with the maximum number of members of the Union is fixed at fifty and the maximum number of looms to be financed 100. "Every weaver member of the Union shall, on admission, pay an entrance fee of 8 annas per loom held by him. Members who are not professional weavers, shall pay an entrance fee of Rs. 2 each." "The Panchayat shall purchase such raw material as they may find necessary and on such terms as may appear to them reasonable." "The Panchayat shall be competent to make ready money advances for weaving purposes to members; provided however, that such advances shall not ordinarily exceed Rs. 5 per loom and provided also that arrangements shall be made for the adjustment of these advances when the finished products are delivered." "It shall be competent to the Panchayat to lend money to the weaver members to pay off their prior debts; provide, however, firstly, that the total amount so lent shall not at any time exceed Rs. 500; secondly, that the total amount lent to a single member for this purpose shall not exceed Rs. 50; and thirdly, that arrangements shall be made for the repayment, within a period not exceeding two years, by monthly instalments, of the money advanced to a member to enable him to pay off his prior debt." "Every member shall sell his finished products to the Union at such rates as may be prescribed from time to time by the Panchayat." "It shall be the duty of all the members to deliver their finished products from day to day to the Panchayat, accounts being adjusted at the end of every month. A member who sells his finished product otherwise than to the Panchayat shall be liable to a fine not exceeding Rs. 5 for each offence; and if he persists in a breach of this rule, it shall be competent to the Panchayat to expel him summarily."

44. The provision that exists in the Madras Presidency for the technical education is very inadequate; much more so than in



Bombay, perhaps than in Bengal, too. This year the Trustees of Pachaiyappa's Charities have organised, in connection with P. T. Lee Chengalvaraya Naicker's Charities, a Technical and Industrial Institute "Somewhat on the model of the Madras School of Arts." There was already an Orphanage maintained out of this estate, and the object of the Institute is to train the Orphan boys and also Day students who might seek admission, in Mechanical Engineering (including turner's, fitter's, etc., work), smithy and metal work, carpet and other handloom weaving, carpentry and other handicrafts. A workshop has been constructed at a cost of Rs. 6,000 and is fitted up with an oil and steam engine, a lathe, drilling machine, and other accessories. Carpet and other looms have been purchased at a cost of Rs. 10,000.

A "National Technical Institute" was started at Palgha some months back. Classes have been opened in the Union Workshops, Tanjore, for instruction in technical subjects such as cabinet-making, smithy, upholstery, and pupils belonging to the artizan classes are admitted free of cost. Weaving and other technical classes are attached to the Kalyanasundaram High School, Tanjore.

The Committee of the Madras Industrial Association have lately addressed the authorities of private schools in the Presidency suggesting the addition of commercial and industrial classes as was recommended by the Benares and Tennerelly Industrial Conferences.

45. Stores for the sale exclusively of country-made articles are now in existence at many centres, but they may all be said to be on a comparatively small scale. As one goes about the country and sees how many articles of daily use are produced by Indian workmen, one is led to wonder why they are not consumed in larger quantities in preference to similar articles imported from abroad; though it may be said with confidence that there is hardly any Indian who is not anxious to support the products of home industry in the first instance. One has to seek for the reasons, firstly in the fact that the articles themselves are produced on a small scale and the manufacturers do not know to find a market outside their narrow local limits; and secondly in this that the great majority

of those who open Swadeshi Stores take no steps to find out what articles are made and are available in what places outside their own provinces. The latter observation certainly applies to almost all, if not all, the Swadeshi Stores in the Madras Presidency, not excepting the Indian Industrial Company, Limited, which was started in December 1905 by some leading public men of Madras. It may, however, be hoped that the expansion of these concerns is only a matter of time. Not very long ago there was almost no shop in that part of the country for storing and selling indigenous articles, while we have many to-day dotted over the Presidency and these will doubtless be increased in number as well as enlarged in scope in the near future.

46. The South Indian Association and the Ranade Library of Madras ought to be mentioned in this place. The Association is divided into sections, among which are the Industrial and Economic Sections. "The Industrial Section will take in the study of all the conditions, natural and artificial, that affect the development of our industries and manufactures, and concern itself not only with the scientific basis of the various processes involved, but with the means of finding markets and conquering them. Perhaps the most important section is the economic. In general terms it is to regulate the adaptation to the special needs and conditions of India of the general principles of economics in so far as they may be said to have been ascertained." The latest of the valuable papers read before the Association was on Sugar Industry by Mr. H. Venkoba Rao.

47. Mr. G. Subramania Iyer, who needs no introduction to the Indian public, made an extensive and prolonged tour in the Southern districts of the presidency on behalf of the Madras Industrial Association and National Fund, visiting many small towns and villages. And Mr. N. Subbarao Pantulu did the same to a smaller extent, in the Northern Districts. He was accompanied by the Assistant Secretary of the Indian Industrial Conference in his tour, except to one place, Masulipatam, where he went alone and succeeded in getting a Committee established for making an Industrial Survey of the District.

**(E) THE UNITED PROVINCES.**

48. Maharajah Deb Shamsheer, Rana Bahadur, brother of the Prime Minister of Nepal, has decided to establish a glass factory at Rajpur, Dehra Dun, which is already noted for the Himalaya Glass works which made such a successful display of their wares at the Benares Exhibition. The Maharajah is reputed to be a special student of the Physical Sciences, and to keep himself always abreast of the times in acquainting himself with the latest inventions and discoveries of science. His intention is to found a large and well-equipped manufactory for turning out all kinds of articles made of glass. He has got out all the necessary plant and is arranging for the supply of electric power to work the machinery.

49. Steps have been taken during the year at several important places in the province to discourage the use of imported sugar and to increase the supply of the indigenous article. And factories have been started at Rampur, Unao, Oawnpur and Shahajanpur to produce refined sugar.

50. At Allahabad, Lucknow, Benares and many other places arrangements have been made for storing and selling countrymade articles.

51. The Benares Silk Weavers Co-operative Association, working with a capital of Rs. 45,000, promises to be a successful effort at rehabilitating the famous silk weaving industry of Benares. The lines on which it conducts its business are more or less the same as in the case of the Conjeeveram Weavers Union, particulars of which have been given in a foregoing paragraph.

52. An Industrial School was opened at Benares early in the year. Attention is primarily given to instruction in the use of improved handlooms.

The authorities of the Christian College, Allahabad, have opened an Electrical Engineering Department in connection with their College. Practical training in Mechanical Engineering and workshop practice form part of the course of the new Department. The services of a competent specialist, Mr. H. T. Avey, B. M. E., of the Town

State, U.S.A., have been retained, and he has been placed in charge of the Electrical Engineering Department of the College. The course of study in this Department comprises a three years' course in which Science, Mathematics and English will be taught in addition to the special subjects, viz., Drawing, Surveying, Machine Design, Dynamo-Electric Machinery, Pattern-making, Metal-working, Power plant and Electrical Installations and other connected and subsidiary subjects.

53. An Exhibition of the Products, Industries and Arts of the United Provinces was held towards the last quarter of the year and its opening ceremony was performed by Rai Bahadur Lala Baij Nath.

### (F) THE PUNJAB.

54. The Ambala Glass factory—the "Upper India Glass Work"—is a concern working with India's capital and under Indian management, and turns out an excellent variety of articles. From the 1st November the proprietor has made arrangements for training two apprentices in the works. They will be admitted to a two years' course, during the first eighteen months of which they will be taught the technics of the industry, such as preparation of clay for and making of crucibles, mixing of raw materials and preparation recipes; melting, blowing, pressing, annealing etc., of glass, finishing and polishing of manufactured glass articles, etc.; and during the remaining six months they will be given commercial education to fit them for business.

Mr. Muhammad Sbaqi announced in June last his intention to open a technical school at Lyallpore for teaching Porcelain-making, Pencil-making, Match-making, Enamelling, Weaving, Dyeing and Calico-printing.

One student has been sent to learn Tanning in America, another to learn Mining, two have been sent to Manchester to receive instruction in Spinning, one for Banking, and so on.

55. The scheme of an Industrial Bureau outlined by the Hon'ble Mr. Daji Abaji Khare in a paper laid before the Benares

Conference suggested to some persons in Lahore the formation of a society called "The Fraternity" of which we have the following particulars from the Secretary.

Its objects chiefly are :—

- (1) To collect information of Swadeshi articles ;
- (2) To beat down the sellers of Swadeshi articles taking undue advantage of the movement ;
- (3) To have a show room to exhibit Swadeshi goods ;
- (4) To give information (to those who require) as to where a Swadeshi thing can be had and of whom it can be had. Gentlemen desirous of promoting the Swadeshi cannot do better than taking advantage of its (Fraternity's) service.

Manufacturers and merchants should send samples of their goods with wholesale and retail prices. Those samples will be put up in a show room and prices told to those who enquire.

All correspondence should be addressed to the Secretary, the Fraternity, Lahore.

The Manufacturers are requested to give the names of the maker or seller of the goods.

The goods mean Swadeshi goods and no others.

56. A Spinning and Weaving Mill has been started at Lahore with a capital of Rs. 2,00,000 ; the Pioneer Handloom Weaving Co. has been started at Jullundur with a capital of Rs. 50,000 ; the Indian National Trust Association at Lahore with a capital of Rs. 5,00,000 ; the Industrial Bank at Ludhiana with a capital of Rs. 5,00,000 ; a Swadeshi Store Company has been formed at Wazirabad ; the Panjab and Kashmir Trading Co., Lahore, has opened special warehouses at Lahore and Srinagar for storing and selling a variety of country-made articles ; the Oriental Co-operative Stores, Ltd., has been opened at Rawalpindi with a capital

of Rs. 1,00,000, and a joint stock company has been started at Amritsar with a capital of Rs. 50,000 to manufacture woollen cloth by means of Japanese handlooms.

## (G) CENTRAL PROVINCES AND BERAR.

57. The Second Central Provinces and Berar Provincial Industrial Conference was held at Jubbulpore on the 15th April 1906. Resolutions were passed at it in regard to Technical Education, the establishment of Joint Stock Companies for carrying on industries on legitimate commercial and sound basis, the establishment of a Bank, and the Mining industry. Committees have been appointed to take the requisite action in respect of these several matters.

58. An Agricultural and Industrial Exhibition was held at Amraoti in the month of April, and those who witnessed it were unanimous in pronouncing it a success. While there were exhibits from other provinces, the Exhibition was specially noteworthy as revealing the industrial possibilities of Berar. Thanks to the courtesy of Mr. R. R. Abhayanker, L. C. E., the energetic Secretary of the Exhibition, we have been able to include the articles shown at the Amraoti Exhibition in the Directory of Indian goods prepared in the Conference office.

59. The Akola and Central India Spinning and Weaving Mill, Akola, has been started with a capital of Rs. 7,50,000. The Akola Native Cotton Ginning, Pressing, Spinning and Weaving Co. is extending its Spinning establishment and adding looms. The Akola Cotton and Oil Manufacturing Company is putting up a number of looms also. A number of Ginning and Pressing factories have been opened during the year both in the Central Provinces and Berar. The number of oil mills at Akola has been added to this year by Rao Bahadur D. V. Bhagawat's Oil Mills. A match factory-driven by steam power has been started at Ellichpur with a capital of one lakh of rupees. It is working satisfactorily. Another match factory worked by manual labour is projected at Telhara.

60. Technical education is slowly making progress, thanks to joint action on the part of the Government and the people. The Nagpur and Amraoti Technical Institutes are the result of the initiative taken by the leaders of public opinion in Berar and the Central Provinces, who were anxious that the memorial to the late Queen-Empress should take the form of such objects of public utility, and of the liberal support Government was pleased to render to them. Technical classes have been added to the school started at Amraoti by the Berar Education Society.

## (H) THE NATIVE STATES.

61. An Industrial Education Society was formed at Hyderabad (Deccan), with the aim of collecting funds to send students to Japan or elsewhere to learn some industry which could be started with a small capital.

62. An Industrial and Agricultural Association for the State of Mysore was started at Bangalore. Its functions seem to be mainly of an educative character. A Reading Room for technical periodicals and publications has been opened in connection with the Association, and a series of lectures are organised.

63. The Swadeshi movement is said to have given a great impetus to the trade in Kashmir woollen goods. The demand for them has greatly increased, and prices have risen in consequence. The trade is now in private hands, but suggestions have been made for organising a joint stock company to stimulate production in view to meet the growing demand.

64. Kathiawar has not been left unaffected by the Swadeshi enthusiasm. There, too, the rush for indigenous articles has been very great. And "in all the principal cities of the province shares are being subscribed for opening Swadeshi Stores;" over a lakh of rupees having been so subscribed.

65! It is recognised that there must be large gaps in the above record; but it has not been possible to obtain information from all places and about all things. Such as it is, however, it leaves no room for doubt in one's mind that a year's substantial work has been done, and, if the achievements are still very meagre compared with the needs of the situation, our future is in our own hands if we but continue with a steadfast determination of purpose, which no difficulty can daunt and no obstacle thwart the good work which has been so well begun.

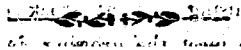
**R. C. DUTT,**

President,  
First Indian Industrial Conference,

*Baroda, India*  
*November 1906.*

**R. N. MUDHOLKAR,**  
General Secretary,  
Indian Industrial Conference.

*Amraoti, India*  
*November 1906.*





## APPENDIX I.

### Memorandum regarding development of Agriculture, and Industrial, Commercial and Technical Education in Bengal.

#### A.—AGRICULTURE DEPARTMENT.

##### ESTABLISHMENT OF SEPARATE DEPARTMENT.

THE Government of Bengal has established a separate Department of Agriculture, with a Director and a complete staff of peripatetic experts.

##### AGRICULTURAL COLLEGE.

2. A Provincial Agricultural College with a staff of European and Indian Professors will be established to provide agricultural education for the sons of a limited number of landholders, as well as to train men to supply the staff required for other agricultural institutions in the Province and for a graded Agricultural Service.

##### EXPERIMENT AND SEED FARMS.

3. Large farms will be established in five or six typical localities that will serve both as experiment stations and seed farms. Land is already being acquired for two of these farms.

##### DEMONSTRATION FARMS.

4. In these areas numerous demonstration farms will subsequently be opened to acquaint the cultivating classes with established results.

##### SEED, IMPLEMENT AND MANURE STORE.

5. A central seed and implement store has been opened in Calcutta to assist the public in obtaining improved varieties of seed and implements as well as approved kinds of artificial manures.

##### DISTRIBUTION OF AGRICULTURAL LITERATURE.

6. Special measures are being taken towards the systematic publication and distribution of agricultural information both in English and in the vernaculars.

##### AGRICULTURAL AND INDUSTRIAL SHOWS.

7. Agricultural and Industrial shows are being liberally assisted both by financial aid and by the loan of machinery and implements and the deputation of experts to advise, demonstrate and lecture. Government has largely increased the provision for the encouragement of these shows.

## DEPUTATION OF OFFICERS.

8. Provision has been made for the deputation of experienced officers for special enquiries. Mr. N. G. Mukherji has recently published an interesting account of enquiry and experiment in the *tasar* silk-producing districts of the Central Provinces and Chota Nagpur.

## TASAR SILK FARMS.

9. Orders have issued for the establishment of a model *tasar*-rearing nursery at an initial cost of Rs. 10,000 each, and an annual charge of Rs. 4,000.

## SILK-REELING.

10. Mr. Mukerji was deputed to Kashmir and Mysore to enquire into an alleged improved method of reeling, and his report on this enquiry is now in the press.

## WELL-IRRIGATION.

11. Mr. N. N. Banerji, another experienced officer of the Agricultural Department, has lately been deputed to make special enquires regarding the methods of well-irrigation in the United Provinces and Bihar.

## PUBLICATION OF MONOGRAPHS.

12. The following monographs on important industries of the Province have been published by the Department:—

- (1) Monograph on Dyes and Dyeing, by Mr. N. N. Banerji, 1896
- (2) Monograph on Cotton Fabrics, by Mr. N. N. Banerji, 1898.
- (3) Monograph on Woollen Fabrics, by Mr. N. N. Banerji, 1899.
- (4) Monograph on Ivory Carving, Bengal, by Mr. G. C. Dutt, 1901.
- (5) Monograph on Silk Fabrics of Bengal, by Mr. N. G. Mukerji, 1903.
- (6) Tanning and Working in Leather, Bengal, by Mr. Rowland, N. L. Chandra, 1904.
- (7) Monograph on Gold and Silver Works by Mr. D. N. Mukerji, 1905.

## DEPUTATION OF STUDENTS FOR TRAINING IN AMERICA.

13. In accordance with the scheme drawn up by this Government, four Indian students who have passed the agricultural course at the Sibpur College have been deputed during the current year to America to undergo a higher training in agriculture at the Cornell University. The annual charge on account of such deputation is estimated at Rs. 12,000.

## JUTE.

14. Last season special experiments were carried out in Faridpur, Jalpaiguri, Rangpur and Mymensingh in the cultiva-

tion of jute with a view to the collection of selected seed for distribution. This seed has been widely distributed. During the current season farms are being opened at Berhampore, Purnea, Krishnagar and Chinsura, as the districts named above have been transferred to the new province. Important experiments are also being conducted at Burdwan. A jute expert was also employed by Government with a view to special enquiry into the cultivation of jute and its alleged deterioration.

#### COTTON.

15. A special grant of Rs. 5,000 has been provided for the selection and distribution of the best varieties of cotton. Experiments have also been made with Egyptian and American varieties.

#### SUGARCANE.

16. Selected varieties of sugarcane have been indented for from the Mauritius, the West Indies and from other parts of India, and it is proposed to encourage improvement in cultivation by the offer of prizes in the shape of approved cane presses.

#### INDIGO.

17. Scientific investigation is being made into the cultivation of indigo. A research station has been established at Sirsa in the Muzaffarpur district, and an annual grant of Rs. 50,000 has been provided to the Bihar Indigo Planters' Association in this connection. An account of the important research work carried out at the expense of this Government on behalf of this industry was issued in 1905.

#### TEA.

18. Since 1899 this Government has been giving financial aid towards research work in connection with the cultivation and manufacture of tea. The grant was increased from Rs. 5,000 to Rs. 7,000 in 1903.

#### SILK.

19. For some years this Government has been making a grant of Rs. 6,000 to the Bengal Silk Committee to stimulate the industry by promoting the rearing of healthy worms and extending mulberry plantation. The grant has been increased to Rs. 15,000 with effect from the ensuing financial year. Financial aid has also been given to the Rampur Boalia Sericultural School.

#### AGRICULTURAL ASSOCIATION.

20. A Central Provincial Agricultural Association was established in August 1904, and an annual grant of Rs. 6,000 is being made to meet the expenditure of the association. A special officer of the overseer class has been employed for

work in connection with jute and a large reference library is being collected.

21. Divisional Agricultural Associations have been established in the Burdwan, Presidency, Orissa, Chota Nagpur and Patna Divisions, and District Agricultural Associations in nearly all the districts. Financial aid is being given to the Divisional Associations, and it is proposed to supply each with a small stock of standard books on Agriculture. Trained agricultural Inspectors are being deputed as they become available to assist the Divisional Associations.

#### LEAFLETS.

22. Leaflets are issued by the Department for the guidance of the agricultural classes in the cultivation of the principal crops.

## B.—INDUSTRIAL, TECHNICAL AND COMMERCIAL EDUCATION.

### INDUSTRIAL AND TECHNICAL EDUCATION.

The principal technical institutions under Government management in Bengal are the Civil Engineering College, Sibpur, the Government School of Art, Calcutta, and the Bihar School of Engineering at Bankipore; the Cuttack Survey School and the Ranchi Industrial School are Government Institutions of minor importance. Special technical classes have also been opened in connection with selected high schools under Government management. Up till the year 1900 the course of instruction in such schools was a purely literary one leading up to the Entrance Examination of the Calcutta University. In that year sanction was given to the introduction of a scheme for the bifurcation of studies and for the development of education on modern lines. It was decided that, in addition to the arrangements already made for teaching general subjects, provision should be made for the instruction of students of the first two classes in such subjects as would enable them to follow engineering, industries or commerce as their future career. In accordance with the new scheme, B or technical and C or Commercial Classes were opened in selected Government Schools, in 1901. A final examination on leaving school was instituted to test boys who had passed the modern side of a zilla or high school, and it was decided that certificates should be granted to those who passed the examination. Government has for the present retained the control of the examination. The higher instruction of those students who pass the B course examination is provided for at the Civil Engineering College, Sibpur.

### COMMERCIAL EDUCATION.

2. In 1903 special Commercial Classes were opened at the Presidency College for the advanced instruction of students who might pass the "C" or Commercial Course examination. The scheme did not, however, prove successful, and the subject was accordingly referred to the consideration of a Committee of practical men, consisting of representatives of the Bengal Chamber of Commerce, the Bengal National Chamber of Commerce, the Calcutta Trades Association and the Education Department, besides other gentlemen interested in Commercial Education. The recommendations made by the Committee were generally approved, and new classes were opened in the Presidency College in 1905. Arrangements have been made for the instruction and examination of students in two different courses of studies, one being a complete day course and the other consisting of evening courses of lectures on a number of optional subjects. The day course will extend over a period of two years. Students passing the examinations will receive from the Education Department certificates which will require endorsement by the Secretary to the Bengal Chamber of Commerce, and lists of successful candidates will be published by that Chamber and the Bengal National Chamber of Commerce. It has been decided that grants will be made to other Colleges and high schools to introduce schemes of education on the lines laid down in the case of the Presidency College. It is also in contemplation to open Commercial Classes at the Victoria Boys' School for European and Eurasian boys at Kurseong.

### INSTRUCTION OF WEAVERS.

3. In 1890 Mr. E. W. Collin, I.C.S., submitted a report on the existing Arts and Industries in Bengal, in which he referred to a flourishing colony of hand-loom weavers at Serampore who used an improved native loom. Mr. Havell, the Principal of the Government School of Art, Calcutta, was deputed to investigate the methods of these weavers with a view to their improvement and extension. He suggested that some of the Serampore weavers might be usefully employed as teachers in other weaving centres throughout the province. As the weavers, however, were unwilling to leave their homes, Government arranged for the opening of a teaching establishment at Serampore for the instruction of weavers and carpenters in the use and construction of the fly-shuttle loom. District Boards in Bengal were also asked to take measures with a view to making known in the districts the advantages to be derived by the weaving industry from the Serampore fly-shuttle loom and to instruct the local weavers in its use; efforts were made in that direction by 25 Boards during the year 1903-04. In most cases two weavers and a carpenter were sent to be trained at Serampore, where they were provided with free

quarters by Government, and were taught how to use the fly-shuttle and to construct the looms adapted to it. These men, after receiving a course of instruction, returned to their districts, where they were employed on training the local weavers and carpenters. In Chittagong, the experiment proved a success, and the improved loom was appreciated by the people. It was reported from the district of Darbhanga that the difficulty as to the high price of the improved fly-shuttle loom was overcome by adapting the fly-shuttle to the ordinary country loom, and that the outturn of those modified looms was almost equal to that of the framed fly-shuttle loom, *i.e.*, nearly three times that of the ordinary looms in vogue in the district. The cost of altering a country loom in this way was reported to be less than Rs. 7 a piece. Copies of the report on the subject received from Darbhanga will be circulated to other District Boards with a view to the experiment being tried in other districts. Some weavers in various parts of the district of Midnapore are reported to have adopted the fly-shuttle loom, but only for coarser kinds of cloth.

#### TECHNICAL EDUCATION. WEAVING SCHOOLS.

4. In connection with the recommendations made by the Educational Conference which met at Simla in 1901 on the subject of industrial education, a Committee was appointed in 1904, with the Hon'ble Mr. Hare as President, to consider a scheme for the development of industrial education in Bengal. As a result of their recommendations, proposals were submitted to the Government of India to open a school for the teaching of improved methods of hand-weaving in silk, cotton and wool at Serampore, with a higher class for the instruction of men of the type of the apprentices at the Civil Engineering College, Sibpur, who would become teachers, assistants to manufacturers, or manufacturers, and a lower class for the instruction for weavers of the neighbourhood and their sons. It was proposed that an expert Inspector should have charge of the school at Serampore, and that he should be assisted by a Head-master and a master of drawing and designing. It was also proposed that a course of instruction less ambitious than that to be given to the lower class at Serampore should be imparted to weavers and sons of weavers at five selected centres, which should be under the general superintendence of the Inspector, aided by a teacher of each centre; that the general education of the junior students both at Serampore and the outlying centres should receive careful attention, but that such education should not go beyond the Primary standard; that special attention should be paid to the teaching of drawing and designing at all the schools; that subject to well-defined exceptions, admission to the schools should be limited to pupils whose caste occu-

pation is weaving; that scholarships should for the present be given to all students at the school; and that when students leave the schools, they should be provided with advances for the purpose of purchasing appliances, such as would enable them to put their acquired knowledge to account. The Government of India have approved of these proposals generally, and this Government is now considering the question of funds.

In Manbhum a weaving school has been started at Raghunathpur, where the use of the fly-shuttle loom is taught. A grant of Rs. 1,000 has been made by Government to provide for a building and for the purchase of looms and accessories for the opening of a weaving class at Pakhuria. Experiments will be made with the adapted country loom, the ordinary fly-shuttle loom and the Japanese fly-shuttle loom.

#### EXHIBITIONS.

5. It was proposed to hold an exhibition and practical demonstration of improved warping apparatus at Calcutta, Pabna and Cuttack during January, February and March of this year (1906) at which the old Indian loom and weaving apparatus, the Serampore fly-shuttle loom and warping apparatus and the Japanese foot-loom and warping apparatus were to be shown, and weavers were to be instructed in the use of looms. It has, however, been decided to postpone the proposed exhibition till next cold weather. Possibly, owing to the efforts to introduce improvements in the Serampore loom, a new model can be introduced to supersede the present type. A new and improved model of the Japanese loom is also expected.

6. Grants are given for efficient industrial instruction in schools under private management.

#### MINING SCHOLARSHIPS.

7. The Government of India have instituted State Technical Scholarships to enable natives of India to pursue a course of study in Great Britain or other Western Countries. In the year 1904 four scholars were sent from Bengal to the Birmingham University to undergo a course of training in the management of Mines. In 1905 two scholars were sent to the same University for a similar course of training. Each scholar is provided with a second class passage to London by sea and gets a scholarship of the value of £150 a year exclusive of the fees paid at the University. Each scholarship is tenable for two years subject to an extension for a third year in the case of scholars who produce evidence of satisfactory progress during the course of their training.

#### MINING.

8. Arrangements have been made to open mining classes at the Sibpur Engineering College. The necessary teaching staff has been secured from England.

## APPENDIX - II.

### TECHNICAL EDUCATION IN BOMBAY.

No. 1475 of 1906.

EDUCATIONAL DEPARTMENT:

BOMBAY CASTLE, 13th August, 1906.

FROM THE SECRETARY TO GOVERNMENT,  
TO THE GENERAL SECRETARY,

INDIAN INDUSTRIAL CONFERENCE,

*Amraoti.*

SIR,—With reference to paragraph 2 of the letter addressed to you from the General Department No. 4472, dated the 28th ultimo, I am directed to inform you that there are three principal institutions in this Presidency in which Technical and Industrial education is imparted: viz. (1) The College of Science, Poona, (2) The Sir J. J. School of Art, Bombay, and (3) The Victoria Jubilee Technical Institute, Bombay.

2. The College of Science affords instruction in Civil Engineering, Science and Agriculture, and has also classes for Sub-overseers, Mechanical Engineers and Electrical Engineers attached to it; it is a Government institution affiliated to the University of Bombay, and prepares students for degrees in Engineering, Science and Agriculture, for which examinations are held annually by the University of Bombay.

3. The Sir J. J. School of Art, Bombay, is also a Government institution which, besides teaching drawing, painting, design, architectural drawing and modelling, trains drawing masters for schools and colleges throughout the Presidency. The School has also workshops attached to it where instruction is given in carpet weaving, ornamental copper and brass work, enamelling, house decoration and painting, gold and silver work, pottery, wood carving and joinery, stone carving and wrought-iron work.

4. The Victoria Jubilee Technical Institute is an aided institution where instruction is imparted in Technical Chemistry, Mechanical Engineering, Textile Manufacture, Electrical Engineering, Sheet Metal Working, Enamelling and Practical Locomotive Work. In addition to these, the Institute has



Science classes in connection with which students attend courses of machine drawing, lectures in theoretical and applied mechanics, and steam, sound, light, heat and magnetism, with physical laboratory practice. The Engineering students attend also lectures on tools, while the students in cotton manufacture receive instruction in the theory of spinning and weaving.

5. In connection with the subject of commercial education, I am to state that the annual examination for the London

**SENIOR CERTIFICATE EXAMINATION.**

Book-keeping.  
 Methods and Machinery of Business.  
 Commercial and Industrial Law.  
 Banking and Currency.  
 Commercial History and Geography.  
 Political Economy.  
 Freehand Drawing, Group I.  
 Mathematics (optional).  
 Typewriting.  
 Short-hand.  
 Chemistry.

**JUNIOR CERTIFICATE EXAMINATION.**

Commercial Arithmetic. Typewriting.  
 Book-keeping. Short-hand.

Chamber of Commerce Certificate is held in Bombay, Ahmedabad and Karachi, and that the subjects in which candidates are examined are generally those mentioned in the margin. The Institutions which prepare candidates for the examination are shown in the statement appended to this letter.

6. With reference to your request for rules regulating the grant of Foreign Technical Scholarships, I am to invite your attention to the Government Notifications mentioned below:—

Notification No. 157, dated the 26th January 1904, published at pages 132-136 of the *Bombay Government Gazette* of the 28th idem, Part I;

Notification No. 2101, dated the 10th November 1904, published at page 1550 of the *Bombay Government Gazette* of the 17th idem, Part I; and

Notification No. 571, dated the 29th March 1905, published at page 411 of the *Bombay Government Gazette* of the 30th idem, Part I.

I have the honour to be,

Sir,

Your most obedient Servant,

R. E. ENTHOVEN,

Acting Secretary to Government.

ACCOMPANIMENT TO GOVERNMENT LETTER to the General Secretary, Indian Industrial Conference, Amraoti, No. ~~dated the~~ August 1906.

Statement showing the number of Institutions presenting candidates for the London Chamber of Commerce Certificate Examination.

No.	Name of Institution.
1	Accountancy Institution, Bombay.
2	Adenvala's Book-keeping Classes, Bombay.
3	English Typewriting Company, Bombay.
4	Commercial Training Institution, Bombay.
5	University Training Classes, Bombay.
6	Kalbadevi Short-hand and Book-keeping Class, Bombay.
7	Commercial Educational Institute, Bombay.
8	India Typewriting Company, Bombay.
9	Aiyar's School of Commerce, Bombay.
10	B. J. College of Commerce, Bombay.
11	The Techno-Accountancy Institution, Bombay.
12	St. Xavier's High School, Bombay.
13	St. Mary's Institution, Bombay.
14	Mercantile Training Institution, Ahmedabad.
15	Commercial Training Studio, Ahmedabad.
16	Navalrai Hiranand Academy, Hyderabad (Sind).
17	Private Tuition.

## APPENDIX III.

## GENERAL SECRETARY'S CIRCULAR No. I.

OFFICE OF THE GENERAL SECRETARY,

*Amraoti, Dated 31st January 1906.*

To

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 .....  
 .....

DEAR SIR,—I send herewith for your consideration and such action as may appear suitable to you, a copy of the resolutions passed at the Industrial Conference held at Benares on the 30th of last month. For the purpose of giving effect to the recommendations made and the course of action laid down in these resolutions Provincial Committees have been constituted for Bengal, Bombay, Madras, the United Provinces, the Punjab and the Central Provinces and Berar. You and the gentlemen mentioned on the margin form the Provincial Committee for..... You and the gentlemen mentioned are given the power to add others to your committee and to establish sub-committees wherever it may be considered desirable to do so. I beg your committee will kindly let me know what steps have been or are proposed to be taken in the matter. I would further suggest that your committee will select a Secretary and communicate his name to me in order to facilitate communication and obviate unnecessary correspondence.

The work before the Provincial Committees is so vast that they cannot be expected to undertake the whole of it at once. With a view to secure systematic efforts and concerted action I would beg to know in what direction and on what lines your Committee proposes to commence immediate work and in what order it considers that the other recommendations of the Conference should be given effect to. The views of your committee will be communicated to the other Provincial Committees whose views will be sent on to you.

I might be permitted to point out what work should be taken in hand by our Provincial Committees. The extension of scientific and technical instruction and the increase in the supply of articles of indigenous manufacture which are turned out at present should claim our first attention.

## (A.) SCIENTIFIC AND TECHNICAL EDUCATION.

In regard to scientific and technical education it is hoped that the Government of India will be pleased to make before long substantial grants to the Local Governments and administrations for the establishment of technical colleges and schools within their respective jurisdictions and to establish at least one Polytechnic Institute and academy of research for the country. In the Resolution which the Government of India issued two years ago on the report of the Committee on Industrial Education, they say:—"Such a scheme as has been sketched above both for larger industrial enterprises and for smaller handicrafts must, the Governor-General in Council thinks, in the main depend upon Government and not upon private management." The different Provincial Committees should, it is suggested, approach their respective Governments and move them to take action in the matter and to give effect to the direction contained in the aforesaid resolution. But it is possible that some time may elapse before Government decide what course to follow and it would obviously be undesirable to wait till Government take action or to depend entirely upon Government initiative and support. Bengal it seems will have before long at least one scientific and technological college established and maintained by private donations and subscriptions, and it is to be hoped that the other Provinces will make similar efforts to supply their deficiencies. To enable the Provincial Committees to determine their course of action I would mention some facts.

Bombay has got two institutions of the status of colleges where technical instruction is given—the Victoria Jubilee Technical Institute of Bombay and the College of Science at Poona. In the former provision is made for teaching mechanical and electrical engineering and textile manufacture; in the latter there is fairly due provision for mechanical engineering. There are also at Ahmedabad, Surat, Poona and Sholapur technical schools where what might be called elementary and secondary instruction is given. I ought not to omit the Kalabhuvan at Baroda, which in addition to mechanical engineering gives instruction in some industries also. In Berar there will be started soon the Victoria Memorial Technical Institute at Amraoti, where instruction will be given in mechanical engineering, carpentry, smithy, turnery and general fitter's work. In the secondary private school opened a few months ago at Amraoti by the Berar Education Society, it is proposed to add a weaving class in addition to the provision for general manual training and to have also classes for carpentry, smithy and turnery training. I mention all these things for this reason, that as the resources of our people are very limited, we should husband them properly, and first direct their application in those directions where no provision exists at present. For

instruction in mechanical and electrical engineering and manufacture of cotton or other textiles there is no facility in the three great presidencies of Bengal, the United Provinces and the Punjab, while the circumstances of our country require that attention must preferentially be bestowed on these. The Victoria Technical Institute of Bombay has applied itself mainly to these three courses. There was for some years provision made for teaching enamelling; but this course had to be abandoned owing to certain difficulties. The capital expenditure for establishing an institute like the Bombay one—and it is not very lavishly or sumptuously equipped—would not fall below 8½ lakhs. The maintenance and the recurring charges would not be less than Rs. 50,000 a year. Even an institution like the Amraoti Victoria Institute, which aims only at giving instruction in the mechanical engineering course in the higher school and in the courses of carpentry, smithy, turnery and fitter's work in the lower school, will require one lakh of rupees for capital expenditure and Rs. 14,000 a year for recurring charges. Twenty-five lakhs of rupees would be required before a technical college which goes no further than the Bombay Institute can be established. Instead, therefore, of spending funds on small schools in different localities the most suitable course to adopt at present would be to have one fully equipped Technical College for Northern India and two secondary colleges or high schools at Allahabad and Lahore. In the first college, in addition to the three courses mentioned above, there should be provision for teaching at least two more:—(I) Mining and Metallurgy, and (II) Industrial Chemistry.

The requirements of Southern India are similar to those of Upper India. The matter for the Madras Committee to consider is whether the leaders of the educated community should not personally appeal to the rulers of the great states of Hyderabad, Mysore and Travancore, and obtain their help to the establishment of a fully equipped science and technological college. It would be well to have in addition to such college at least two secondary technical schools, one in the northern part of the presidency and the other in the southern.

As distinguished from general technical schools and colleges, stand the crafts schools. There are several so-called industrial schools; but the majority of them are failures. A few of them are doing good work; but in regard to the majority the Government of India have pointed out how very defective they are. Efforts should be made to have the course of instruction in these placed on a sound basis. The lines on which these schools should be conducted, how they are to combine effective practice in workshops with instruction in the principles on which a craft or industry is based, is shown in the resolution of the Government of India.

Educational institutions in India are still conducted on methods which were prevalent in England till the other day. Those methods are found defective; and as in England facilities should be provided for the training of the eye and the hand, the development of the faculties of observation and experiment, and to bring the pupils of our schools more in contact with nature. The introduction of object-lessons and the incorporation of drawing and manual training in the school curriculum claim our close attention. For manual training in general schools the course laid down in the hand-book of Drs. Thomson and Alexander (Collège of Science, Poona) might be followed with great advantage.

#### (B.) DEVELOPMENT OF EXISTING INDIGENOUS INDUSTRIES.

In the absence of the long asked for industrial survey the only way for carrying out this object is to employ such agencies as our people possess, for collecting information from the different parts of the country regarding the main industries (besides agriculture) which give employment to any considerable body of persons. It is necessary to know what articles are prepared or manufactured, their quality, the approximate number of people employed thereon, the present state of the industries and their capability of improvement and expansion. If such information is obtained from the different Districts, I and the assistant secretary Mr. Chintamani will work in collating it and issue half-yearly or yearly directories based thereon. I beg you will kindly give all the information you can in regard to these matters and request such of your friends and acquaintances as are qualified to help the object of the Conference, to give us the benefit of their knowledge and experience. There are several industries which will be in a far more thriving condition than now if their products are consumed in larger quantities. So far as the restricted consumption of Indian articles retards the development of an industry the information collected is calculated to further such development.

#### (C.) ORGANISATION OF CAPITAL.

The third matter which deserves immediate consideration is what steps should be taken for raising the capital which is required for the creation of new industries and the improvement and development of old ones. So far as individual initiative and local organisations are supplying this want no action is called for just now from the Provincial Committees of the Conference. But there are important industries like the Mining industry for example, in which Indian capitalists have hardly ventured to put forth any efforts, but which have assumed or are assuming an importance which makes it incumbent upon us to take serious counsel and to devise ways and means to obtain a due share for our people in these valuable industries. To take the instance of the Mining industry, it is

not to be expected that Government will permit the mineral resources of India to be undeveloped, because our people have not taken care to equip themselves with the requisite knowledge and experience, and cannot raise the necessary funds either through lack of means or want of enterprise. Foreign companies, possessing all these requisites, have already taken the field, and if we do not stir ourselves betimes we shall see the Mining industry of the country passing into the hands of the foreign capitalists. The amount of capital required for this purpose will have to be very large; and this can be raised only if an united effort is made by the leading people of all the provinces. A Central Association in which such persons are combined and evince their practical interest by taking shares, will generate confidence and attract the help of the monied classes and the co-operation, according to their means, of the middle classes. Such an association will further have the advantage of possessing an influence which will further the grant of concessions by Government, and it will enjoy a credit which would enable it to obtain loans on easy terms either in this country or from abroad whenever any occasion arises for the same. I beg your Committee will discuss this matter with the leading men in your province and discover whether the suggestion made meets with their approbation and support.

I do not here make any reference to the textile industry, because I consider that Indian capital has already commenced to flow in that direction and further development may be left to the operation of natural causes. I regard the Mining industry as deserving of immediate attention and I therefore give prominence to it.

I am, Dear Sir, yours faithfully,

R. N. MUDHOLKAR,

General Secretary.

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## APPENDIX IV.

OFFICE OF THE GENERAL SECRETARY.

CIRCULAR LETTER NO. II OF 1906.

*Amraoti, 3rd August, 1906.*

To

DEAR SIR,—In continuation of the enquiries made and information requested in my printed Circular of January last issued to the Members of the Industrial Provincial Committees and printed in several papers, for general information, I send herewith a set of questions framed for the purpose of collecting the information which it is essential that the Industrial Conference should have to deal in a methodical, satisfactory and effective manner with the work with which it has charged itself. I trust that you will be so good as to give early attention to this matter and send your reply at as early a date as possible, so that the information so collected might be compiled, classified and assorted before the beginning of October next. If the information sought for is received within the period mentioned it is proposed to issue the classified compilation to the several Provincial Committees in time to enable the members to make specific proposals and recommendations based on it.

—Yours faithfully,

R. N. MUDHOLKAR,

General Secretary,

Indian Industrial Conference.

## QUESTIONS TO BE ANSWERED.

## A.—AGRICULTURE.

1. What is the condition of the agricultural industry in your district ?
2. Has the whole or the greater portion of the culturable area been brought under cultivation ?
3. What is the general quality of the soil ?



4. What is the general condition of the land-owning and cultivating classes ?

5. To what extent are the lands held on a proprietary tenure by the cultivators themselves, to what extent by privileged tenants, and to what extent by mere tenants at will ?

6. What steps are being taken in your district for the improvement of agriculture by—

- (a) Supply of cheap capital ;
- (b) Extension of scientific and practical instruction ;
- (c) Employment of improved appliances ;
- (d) Resort to recuperative processes like manure, etc.

7. To what extent has advantage been taken of the village co-operative credit system, and what amelioration has it effected in the condition of the peasantry ?

#### B.—MANUFACTURING INDUSTRIES.

8. Name the existing manufacturing industries in the different towns and villages of your district under the following heads :—

- (1) Textile fabrics—Cotton, Wool, Silk, and Jute.
- (2) Vegetable and animal products.
- (3) Leather, horn and paper.
- (4) Pottery, porcelain and glass.
- (5) Metals.
- (6) Chemical industries.
- (7) Furniture and decorations.
- (8) Materials used in construction.

9. What is their present condition ?

10. What was their condition in the *past* ?

11. What is the approximate number of people employed in and dependent on them severally ?

12. What is the approximate amount of capital employed in them severally ?

13. State how far they have been affected by competition with imported articles.

14. What are the markets for the products of these industries, *i.e.*, do they supply only a local demand, or are they sent to other markets in noticeable quantities ?

15. What facilities exist to increase their supply if an increased demand arose ?

16. How far, in your opinion, are the existing industries capable of expansion,—

- (a) by making advances to the artisans at low rates of interest ;

- (b) by the improvement of the appliances in use ;
- (c) by the imparting of special instruction, and
- (d) by the employment of power machinery ?

17. What industries existed in your district formerly but have since decayed ?

18. What are the causes of their decay ?

19. Is it practicable to revive any of them profitably ?

20. If so, suggest measures to bring about their revival.

#### C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. Name the mineral and other natural products of your district which are or can be manufactured into finished articles of consumption and use.

22. Which of these are manufactured in your district ?

23. Which, if any, of these are sent to other parts of the country for manufacture ?

24. Which of them are exported to foreign countries in their raw state, and re-imported as finished articles ?

#### D.—CAPITAL.

25. What banking facilities are there for the support of the industries in your district ?

26. Have any urban industrial banks been started in any town of your district under the provisions of the Co-operative Credit Societies Act ?

27. If so, give particulars in regard to their organization, the capital employed, the conditions of lending and borrowing, etc.

#### E.—TECHNICAL EDUCATION.

28. What facilities are there for training young men in the various industries that exists in your district ?

29. If there are any special schools for the purpose, give particulars in regard to their curricula.

30. Is instruction given both in the practice of and the principles which underlie an industry, or is it theoretical merely or merely empirical ?

31. What success has attended these schools ?

32. Are industrial and commercial classes attached to any of the schools in your district ?

33. If so, give full particulars in regard to them.

34. Have any students been sent abroad from your district to acquire technical, industrial or commercial education.

35. What are their qualifications and were they tested ?

36. Who, or what agency, has sent them, and under what conditions, if any?

37. In what countries are they being trained?

38. What arrangements are made to utilise their special technical knowledge by the supply of capital or otherwise, to start or develop the industries in which they receive special training?

39. Are there at present in your district any persons who have received special training in any industry? If so, what are the industries in which they have been trained?

40. How are they employed at present?

41. If their knowledge is not being utilised, what steps can be, or are proposed to be taken, to utilize it?

#### F.—INDUSTRIAL ASSOCIATIONS.

42. Is there any industrial association in your district? If so, give particulars in regard to its objects, rules, funds, past work and present activity?

## APPENDIX V.

## Synopsis of the Statements received by the General Secretary in reply to his Circular No. II.

(1) THE HON'BLE BABU JOGENDRA CHANDRA GHOSE, *Calcutta.*

We are publishing a book on the existing industries of which a copy shall be sent to you when ready. As regards technical schools, there are some District Technical Schools which are all but useless. The Government has promised to start a great technical school in co-operation with the Association for the Advancement of Scientific and Industrial Education of Indians. A scheme framed by the Association has already been adopted by the Government. We hope to get a Technical College fully equipped and maintained at a cost of a lakh of rupees a year by the Government to be established in Bengal in the course of next year as a Model College for all India.

(2) KRISHNA RAO DESHMUKH, Esq., *Wardha (C. P.)*

1. (c) Sugar cane cultivation has disappeared almost, there being about 65 acres of land under Sugar cane cultivation in the District.

6. (a) Nothing is yet done for supply of cheap capital.

(b) Extension of Scientific and Practical Instruction:—

(1) There is an Agricultural and Industrial Association at Wardha, and there are branch Associations at each Tahsil.

(2) There is an Agricultural Library containing several books on scientific agriculture and books are issued to the members, who are required to read them. An Agricultural Gazette is published every month at Nagpur to which some Malgusars and tenants of this district subscribe.

(3) There are some private experimental farms on a small scale.

(4) Exhibition of Agricultural products, specially of different varieties of cotton and of agricultural cattle and of improvements was held at Kotteshwar and Wardha during the last year. A son of a Malgusar is sent this year to the Malgusar Agricultural School at Nagpur.

(c) Swedish ploughs, fodder cutting machines are produced by some well-to-do classes, but for want of trained persons for repairs of these machines, they are of very little use.

(d) In Arvi Tahsil the Malgusars have got good stock of cows and cattle, and lands are richly manured. But in the Wardha and Hinganghat Tahsils, the people have not realised the importance of manure.

One Malgusar purchased Kainate (artificial manure). But its utility is not yet determined for the cotton crops.

7. No Co-operative Credit Society has been started in this district.

#### D.—CAPITAL.

No facilities for the support of industries. No Bank has been started.

#### E.—TECHNICAL EDUCATION.

One student belonging to this district has been sent abroad for receiving technical education. He is a Teli by caste. He is the first candidate from these Provinces who has been awarded a State Technical Scholarship. He left India six months ago to study Mining at the School of Mines attached to the Birmingham University. He studied up to the Entrance and then worked in the Warora Colliery.

(f) We have got one Industrial and Agricultural Association consisting of official and non-official members. The Deputy Commissioner is the *ex-officio* President. In order to have an Industrial Association fully and completely non-official in its character, we have started a district Industrial Association which is working not in opposition but as complementary to the Agricultural Association.

### (3) R. P. KARANDIKAR, Esq., Satara.

#### A.—AGRICULTURE.

6. (a) None.

(b) No scientific instruction is given; but it is intended to open a Model Farm soon in the District where scientific and practical instruction will be given.

(c) Some improved appliances are tried at Vita and Karad.

7. The District has been excluded from the Government scheme, but steps are being discussed by the people with a view to form Co-operative Credit Societies for the District.

#### B.—MANUFACTURING INDUSTRIES.

8. (1) Cotton:—Handloom industry in Satara and Wai talookas.

*Wool.*—Blankets in the eastern parts of the District in Satara.

*Silk.*—Dyeing, in Satara and Wai.

*Jute.*—Nil.

(2) *Vegetable products.*—Greatly exported from Wai, Lenit, Mahableswar and Satara.

*Animal products.*—Eggs exported in large quantities from all big towns and villages in the district.

(2) *Leather Industry* at Satara. Boots, shoes, bags, cases etc., are made.

(4) *Pottery*—at Satara.

(5) Brass and copper pots are made at Satara, brass lamps at Shirala. An oil engine press has lately been opened in Satara to produce sheets of copper and brass out of the old utensils.

(6) *Match factory* at Dhām. Soap at Satara. Extraction of tinctures from local herbs.

7. Furniture is made at Satara.

9. The industries are not in a flourishing condition. Some are lingering and some are in an embryonic state.

(4) SURENDRANATH TAGORE, Esq., *Calcutta*,

(Information supplied relative to his estate near Kushtea.)

A. 6. We have started an Agriculturists' Loan Bank,

(7) The Village Co-operative Credit System is not in vogue here.

B. 8. Cotton textile fabrics are manufactured in Kushtea and in some villages in the estate and these are sent to different markets in the province and are used as shirting and coating and reported to be of good quality. This industry is now in a tolerably flourishing condition and supports at least three thousand families in the Perganah.

16—20. Improved fly-shuttle looms have been introduced in some places, but this industry is capable of much expansion by the introduction of better appliances, imparting of special instruction and erection of small factories with power machinery.

C. Sugarcane and Jute are the chief natural products of the Perganah and these can be manufactured into finished articles of consumption and use. If a sugar factory and another of jute be established, they may prove profitable. Jute is exported in large quantity in raw state and re-imported as gunny bags, etc.

E. A Weaving School has been started for training young men and the institution has proved successful as it has trained many young men who have taken to weaving as their livelihood, and some of them have been taken as teachers in many weaving schools lately established in different parts of the province.

(5) AKSHOY KUMAR CHATTERJEE, Esq., Calcutta.

The information given below relates to the Districts of Khulna and Burdwan.

A. 6. Absolutely nothing is being done for the improvement of Agriculture. Supply of cheap capital is very necessary. Scientific and practical instruction are not required, as the knowledge which the tenants already possess is at present sufficient for their work. The ryots are too poor to pay for costly manures. All they use is scavengings from their kitchens and cowsheds. Some who can afford to pay for mustard cakes use them.

B. 8. Coarse cotton, tassar, and silk cloths; lac, *amchoor* from green and *amsatta* from ripe mangoes, mustard oil, indigo; earthen vessels; brass, copper and *Kansa* utensils, rough iron instruments, knives, padlocks, and bricks are made in Burdwan district.

And in Khulna district are made earthen vessels, *gur*, jaggery and treacles, mustard oil, and coarse cotton cloths.

9, 13, 15. Excepting improved knives and padlocks all other industries have declined greatly and miserably, mostly on account of competition with imported articles which are generally of finer finish and nicer appearance with cheaper prices. Things made in this country are coarse, rough, uncouth.

16. The existing industries are capable of expansion by placing them in the hands of intelligent, business-like capitalists, using improved appliances, by special instruction and by employing power machinery.

17—20. Indigo and sugar industries existed formerly in Burdwan, and sugar and salt in Khulna, but they have gone under owing to foreign competition. Sugar can be revived, as also rearing of silk-worms and manufacture of silk. This can only be done by educated and intelligent land-holders living in the mofussil and by the work being carried on in accordance with modern scientific principles.

D. There are no banking facilities in either district.

E. There is one technical school at Burdwan, but it is practically useless as none of the above-mentioned industries are taught in it.

(6) LALA SUKHBIR SINHA, *Musafarnagar.*

A. 6. Virtually no steps are taken to improve the condition of the agricultural industry.

B. Woollen blankets of different colours and patterns are made in large quantities and exported to other districts. They are very durable and much liked by the people. And large purchases of the same are made by the Military Department of the Government.

Sesamum wood is much in use in the construction of buildings.

E. This year the District Board has sent one student to study in the Roorkee Engineering College.

(7) N. K. RAMSWAMI IYAH, Esq., *Tanjore.*

A. Co-operative Credit Societies have been formed at Melattur, Mannargudi and Needamangalam.

B. *Cotton fabrics* are woven at about a dozen places in the district; silk fabrics at Kumbakonam and two other places; all kinds of metal work are turned out at Kumbakonam and Mannargudi. Panganadu is noted for its brass work, Pisana-thur and Nachiarkovil for bell-metal work, and Negapatam for its steel trunks; and there are besides, Tanjore pith-work and metal carving.

The weaving industry has decayed most. It was most flourishing in the beginning of the nineteenth century and even down to the end of the first quarter thereof. The number of persons now employed in that industry may be said to be roughly only one-fourth of their former number.

The cotton fabrics of Tanjore district, besides supplying a local demand, find a market in other Tamil districts, Rangoon and the Straits Settlements. And if sufficient encouragement be forthcoming the number of weavers now pursuing their ancestral vocation can easily be quadrupled.

D. A co-operative urban bank has been started at Tanjore under the name of Nicholson Town Bank.

E. There is a weaving school at Ayyampet. And Weaving and Commercial classes are attached to the Kalyanasundaram High School of Tanjore.

(8) T. KOTHANDARAMA IYENGAR, Esq., *Tanjore.*

The Tanjore National Co-operative Emporium is the only Industrial association at present existing in the Tanjore district. It was started on the 15th November 1905.



as a direct outcome of the Swadeshi movement. Its objects are:—(1) to advertise and popularise all Indian manufactures by procuring the same and selling them to the members; (2) to induce the members to use only Indian goods as far as possible, and thus create a larger demand for them than at present exists; (3) to start or revive indigenous industries. The paid-up capital of the Emporium is Rs. 10,000 in shares of Rs. 10 each. Shares are not allowed to be withdrawn but they are transferable. The Emporium will be shortly registered as a limited liability company. The business of the Emporium is for the present limited to the storing and selling to the members of country-made articles, including in this term only those articles which are native Indian. So soon as funds permit it is intended to open a weaving factory fitted with improved handlooms.

(9) K. S. NARAIN RAO, Esq., *Anakapalle (Visagapatam District)*.

B. 8. The principal centres of weaving industry in the district are Pondur, Rajam, Anakapalle and Jammi. There is a Jute factory at Chittiralasa owned by Arbuthnots Industrials, Limited. There are tanneries at Vizianagram, where Mahomedans work according to the old methods. Horn, sandalwood and ivory work of high class is turned out at Vizagapatam. There are oil mills at Vizianagram and Bimlipatam. Goglets of Kaotin are made at Vizianagram, toys at Nakkapilli and Srungavarapukota, and brick and tile works at Anakapalle.

The salwood of Jeypore and blackwood of Agisa are very popular as building materials. A weaving company has been formed at Rajam, and Pencil Factories are to be opened at Bimlipatam and Anakapalle.

14. The Chittivalasa factory supplies gunny bags to other provinces of India as well as carries on an export trade in them, while Orissa and Rangoon are markets for cloth made in this district.

15. There is any amount of the finest raw material for expansion of the jute manufacturing business.

16. If steps be taken to improve the condition of the weaving industry by supply of improved ready-made warps to the weavers, by the imparting to them of special instruction suited to their calling, etc., the large number of weavers who have become agricultural labourers on account of difficulty in finding a market for the products of their industry, will revert to their ancient calling.

17-20. Lacquered and turned toys industry of Nakkapilli, which is on the grand trunk road, is steadily decaying. The people now use the railway and do not go by the trunk road, and there is consequently an increasingly less demand for them. The industry can be resuscitated by bringing down those workmen to a central place, where they may be employed on the salary system. At one time the Nakkapilli toys were more popular than Benares or Nasik toys, and if the industry be revived they may again find an extensive market. The Nakkapilli workmen also make shirt buttons and studs which are cheap and beautiful.

C. 21. *Manganese, plumbago, copper, iron, sappharine and kaoline* are among the mineral and other natural products of the district. Kaoline may be used as *porcelain*. Manganese and iron will give *Manganese steel* for which there is a steadily growing demand. There is scope for *copper manufacture* and the subsidiary industries. *Crucibles, lubricants and pencils* can be made of plumbago. There are manganese mines at Garividi, Kodur and Garbham which are worked by the Vizianagram Mining Co., Ltd. A Syndicate called the Eastern Ghats Syndicate is formed in Germany for prospecting for copper, iron and gold in the Kumpam estate, on which a Bengali mining expert Mr. S. C. Rudra, reported favourably some years since.

There is any amount of lac in *lakhamalua* over a forest area of several miles, and this can be turned into *sealing wax, varnishes* etc.

*Resin and varnishes* are made from salwood.

*Palm jaggery* can be made out of palm juice as there is a large number of palm trees in the district.

*Oil Seeds*—til seed, castor seed, niger seed,—are grown in considerable quantities, and there is therefore a good field for oil mills.

23. Ralli Brothers purchase large quantities of oil seeds for export, Jaggery is purchased at Anakapalli for Messrs. Parry & Co.'s Sugar Cane Factory at Samalkot in the Godavari district. The approximate annual crop is 50,000 candies. About ten lakhs rupees worth of raw jute is annually exported from the district.

24. Jaggery is also exported to the United Kingdom. So is til seed. So are other raw materials.

D. There are no special banking facilities for financing the trade and industries of this district.

E. 28-31. There are no facilities for training young men in the various industries of the district.

32. Carpentry classes are attached to Mrs A.-V. N.'s College at Vizagapatam. Boys join those classes, if with no other motive, at least as they serve as gymnastic avoiding classes. The artisans who have learnt carpentry in these classes have turned out skilled workmen.

34 and 40. Two persons were sent from this district to learn soap-making and peppermint-making under Dr. S. R. Gokhale at Satara. They have come back, and one is practising as a second-grade pleader and the other is serving as a clerk.

42. There is no Industrial Association in the district,

(10) W. V. CHANDEKAR Esq. *Malkapur (Berar)*.

A.—AGRICULTURE.

1. The condition of the agricultural industry in the Malkapur Taluq is very flourishing and thriving. The land along the "Purna" to the north of the railway is very rich and fertile, so is the soil in other tracts of the Taluq. The land of Nimgaon and Nandoora is noted for its superior quality, not easily affected by too much or too little rain.

2. The whole portion of the culturable area has been brought under cultivation. Some 50 acres of land abandoned at the last Famine was lying uncultivated, but that too has been taken up at high price.

3. The general quality of the soil is black. It can stand both rain and drought for a considerable length of time.

4. The land-owning and cultivating classes may be divided as under:—

- (1) Kunabies and Malies.
- (2) Mahamedans and Rajputs.
- (3) Pandharpeshes and Marwaries.

The bulk of the Kunabies and Malies are both owners as well as cultivators of the lands. Although some of them have grown so rich that they employ labourers to carry on their cultivation, yet the bulk of the cultivators work themselves. Generally speaking the condition of these classes is good.

Among the Kunabies is a class called "Pajanes." They are industrious and frugal, and hence free from indebtedness. If the other Kunabies would take a leaf from the life of these men their condition too is likely to improve.

Agricultural labour has of late become very dear. A common cooly earns four annas a day in the ordinary times and double of that in the busy season. It is feared that if this state of things continues the lands will cease to be profitable to non-cultivating land-owners.

The condition of the Rajput and Mahamedan cultivating classes is also very fair.

The Pandharpeshes and Marwaries do not earn that share of agricultural profits which they would if they carried on the agricultural operations themselves. Nearly half the land is in possession of these people and it is a question how long they will be able to retain it under the present circumstances and prospects that the labour is likely to become dearer.

5. The entire land in the Taluq is held on proprietary tenure. Nearly more than one-third of the land is held by the cultivators on a proprietary tenure. The rest is let out by the proprietors to the tenants at will.

(a.)

6. No steps are taken in the Taluq for the improvement of agriculture by supply of cheap capital. The agriculturists resort to the "Local Saokars" for a loan when they want it.

(b)

Since last year an attempt has been made to give scientific and practical instructions, but it is still in a very crude form.

(c)

The Department of Land Records and Agriculture has been sending seeds, and improved machinery, for being experimented upon. The working of the English and American ploughs has been exhibited in the Taluq and their utility has been demonstrated but apparently not much impression seems to have been made on the agricultural classes. There are some practical difficulties in the adoption of this machinery, the chief of which is that if anything goes wrong with the machine there is none who could repair it in the village, and unless this difficulty is met the free adoption of the improved machinery is beset with impracticable difficulty.

One or two big land-holders have, I understand, been using to an extent, the English ploughs. Their experience is that better work is turned out with a saving of time and money. These implements are out of reach of small cultivators and are not likely to be profitable to them except on a system of hire. The winnowing machine has also been exhibited and its usefulness shown, but here again the agricultural people have not shown a desire for its adoption.

My own opinion is that the utilisation of this machine is likely to save much labour, and its adoption will be more popular if they could be supplied cheap and so contrived as

not to require repairs at least for the season. The kadaba culling machine has been exhibited and the economy which its use would produce impressed on the agricultural classes, but without much effect.

(d.)

The ordinary manures used are :—

Rubbish.

Rotten kadaba stalks.

Tur stalks.

Cotton stalks.

And cattle droppings.

In a few cases nightsoil also is used.

Chemical and mineral manures are unknown. Small leaflets on these subjects may be issued for instruction. Vishnusa had, I understand, used saltpetre (सैन्धव) as manure for cotton crop and he says it saved the crop from dying when there was a long drought and other plants suffered and died.

7. Co-operative Credit Societies have nowhere been established.

#### B.—MANUFACTURING INDUSTRIES.

1. The industry of tanning leather was carried on at Nandooru until last year. The work turned out here was of a superior quality but the industry has stopped since the last 8 on 9 months. Its revival is a fit subject for the early attention of the Industrial Society.

Earthenware chatties made at Nandooru are reputed to keep water cool. In the hot weather there is a great demand for them and they are exported in large numbers to distant parts.

Nandooru is famous for its dyeing industry. The Rangaries there prepare Gulabies, Chaniadies, and Kasayas. The Rangaries in the villages close by it such as Kolabma, Vadali, Fege, also deal in this business.

Formerly the colours were made from Al (आल) but latterly this substance has disappeared and its place is taken by foreign colours sent ready made. The revival of native colours is also a subject which the Association may include among its practical activities. Khadies are prepared by Mahars in several villages.

At Bhuising, Nandooru and several villages, cheap Sadies (Bands) are prepared on hand looms. The coarse carpets at Jalgaon Jamod are famous. At Nandooru also some Dhangars prepare Tadhavas and Zulas for bullocks.

Bangles used to be prepared at Malkapur, but the industry had ceased to exist long since. There is material for its working and an impetus is needed for its revival.

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C.—MINERALS AND OTHER NATURAL PRODUCTS.

Nil.

D.—CAPITAL.

Nil.

E.—TECHNICAL EDUCATION.

Nil.

F.—INDUSTRIAL ASSOCIATIONS.

Nil.

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(11) DEWAN BAHADUR K. KRISHNASWAMY  
RAO, C.I.E., *Madras.*

AGRICULTURE.

The soil of the District (Chingleput) in which I live, is comparatively poor, but the cultivators are very industrious and neglect no means of securing the fullest advantage possible under the existing conditions. All the culturable land has been brought under cultivation. Most of the cultivators are Ryotwari proprietors. Tenancy-at-will is very rare. Rural co-operative credit societies, recently established in this district (about 8 in number) are likely to supply cheap capital. It is not yet time to give a definite opinion on the results of their operations. As a class, cultivators are too poor and ignorant to use costly manures and adopt improved appliances. Owing to the operations of the Forest law, green-manure is not available. Monsoons have become irregular. The agricultural instruction given in the Sydapet College during the last 30 years and in demonstration farms elsewhere, has proved a complete failure. The local Government is taking steps to open an Agricultural College and Research Institute in Coimbatore. There has been no perceptible improvement either in agriculture or in the condition of the cultivators. All the western methods are very expensive and beyond the capacity of our agriculturists. A large number of agricultural associations are devoting their attention to the improvement of agriculture. The local Government is rendering to them all possible help. But the great problem of "how to improve Indian agriculture" remains as unsolved as it was 50 years ago.

## MANUFACTURING INDUSTRIES.

The local manufacturing industries consist of cotton, silk, leather, pottery, metallic vessels, furniture, decorations and house-construction materials. They are all in a very poor condition and unable to stand the ever-increasing competition of imported articles. They are barely sufficient to supply even the local demand. More than 25-per cent. of the population live on them. They are as a class, uninstructed and averse to adopt new methods. They show no desire for instruction. Even those that have received some instruction in the Schools of Arts, stick to the old processes and appliances. The manufacturers, more or less, are debtors of the local capitalists who hate all innovations lest their business may suffer. The formation of Urban Banks, under the Co-operative Credit Societies' Act, may relieve the manufacturers of the necessity of seeking the aid of the local capitalists and lead to some improvement in their condition. The introduction of power-machinery may, I fear, deprive a large number of existing manufacturers of their already scanty means of livelihood; but will increase the quantity of manufactures so as to make us independent of imported articles. In introducing power-machinery, care should be taken to do as little harm as possible to those who are living on local industries.

## MINERALS.

There are no minerals in this district.

## CAPITAL.

Native Bankers charge high rate of interest. European Bankers avoid dealings in small sums. The only way to supply the industrial classes with cheap capital, is the establishment of urban banks. There is in the town of Conjeeveram, one Urban Bank started under the Act. A majority of its members are weavers. It is worked on the "unlimited liability" principle. It has no capital of its own, but borrows money from the Madras Central Urban Bank formed under the Act, at rates of interest varying from 6 to 7½ per cent per annum, and lends to its members at 9 per cent. per annum, partly in thread and partly in money. The number of weavers that have become members, cannot be said to be even 1/400th part of the weaving male population of the town. As the bank has not been in existence for more than one year, it is too early to pronounce any definite opinion upon its results.

## TECHNICAL EDUCATION.

There is a School of Arts in the City of Madras wherein fine arts, aluminium manufactures, carpentry, chrome tanning and weaving with the aid of fly-shuttle loom are taught. It is

not a regular school of technology. It has, however, produced good results in the aluminium manufactures and chrome-tanning, which may now be counted among the local industries of Madras. Mechanical Engineering is taught in the Local Engineering College. But the results are exceedingly poor. We have not one mechanical engineer, the product of the local college, who had shown any degree of skill in mechanical engineering. Industrial and Commercial classes have been very recently attached to the Patchayapah's College. The world has yet to know what they are, capable of doing. No student has been sent from Madras or Chingleput district to foreign countries for technical education. I hear that a few students have gone to Japan from the Telugu districts of the Presidency. I have no information regarding their course of studies or the agencies under whose auspices they are. A student who has gone to Japan from Bellary, to study glass manufacture, is promised some pecuniary help by the National Fund and the Industrial Association of Madras. There is none now in this Presidency, who has received technical education in foreign countries. The question of the employment of trained students is not likely to arise for 3 or 4 years to come. In the paper I submitted to the last Industrial Conference held in Benares, I have expressed at length my views regarding the establishment of a well-equipped and high-class college of Technology for the whole of India, without which all that is done either by individuals or by Government, in the way of technical education, must prove exceedingly poor and barren of good and substantial results. The approaching conference should, in my opinion, take special steps to secure the establishment of such a College.

#### INDUSTRIAL ASSOCIATIONS.

The National Fund and the Industrial Association of Madras, is the only industrial association I know of in this Presidency. Its object is to encourage technical education of Indian students in and out of India and to improve local industries on modern lines. It was started only 7 months ago. It has a funded capital of Rs. 6,000. The house-to-house collections on the day of Devali, donations given by patriotic gentlemen on festival occasions and the subscriptions of the members constitute the national fund. The association has been devoting its special attention to the improvement of hand looms in this Presidency.

#### GENERAL REMARKS.

In the City of Madras and in the adjoining Tamil districts, the idea of industrial and commercial regeneration of India and the spirit of Swadasmus have not taken hold of the minds of the capitalists, rich merchants and traders, and other



people in receipt of large incomes. They are content with being the media for the sale of imported articles, and for the export of raw materials. The formation of companies on joint stock principle even for business involving no great risks, is beset with formidable difficulties. The only hopeful sign is that there is now a greater number of earnest and educated men working hard in all directions to turn the public mind towards industrial and commercial development of India.

(12) GANESH NAGESH SAHASRABUDDHI, Esq.,

*Ellichpur, Berar.*

A.—AGRICULTURE.

Replies to questions:—

1. Ellichpur was a District in previous years. But when Berar was joined with the Central Provinces the district was reduced to a Taluq, and hence the information recorded below may be classed as that of three taluqs of Ellichpur, Daryapur, and Melghat Hills.

The condition of the Agricultural Industry in the three taluqs of Daryapur, Ellichpur, and Melghat, is just similar to that prevailing in the Province of Berar. The old method of agricultural operations is being followed without any improvement being made as regards agricultural tools and implements. Cotton is sown generally in the soil, which has been found to be a money paying crop, jowari being sown in a very small area.

Rabi crops are sown in greater portion of Daryapur Taluq, such as linseed, wheat, gram, etc.

In Melghat the aboriginal tribes of Gonds and Korkus, cultivate lands and produce jowari, gram, cotton, and their staple food articles, such as kutki, bhodli, kodo, &c. &c.

On the whole the condition of the Agricultural Industry in the taluqs is good, and the cultivators have kept up their old standard of agricultural operations.

2. A greater portion of the culturable area has been brought under cultivation in taluqs of Ellichpur and Daryapur, where there are some waste lands specially reserved by Government for grazing purposes. In Melghat taluq, there is still greater portion of waste land available for cultivation but nobody hazards to go and cultivate the lands owing to unfavourable weather and bad drinking water.

3. The general quality of soil in Ellichpur and Daryapur taluqs is good, Daryapur lands being superior black soil and very fruitful in agricultural out-turns of best quality. The

soil in some cases, in Ellichpur talug, is inferior to Daryapur, and the soil requires but little rain for the production of the out-turn.

In Melghat although the lands are hilly, the soil if well ploughed is little red and good land for sowing potatoes, cotton, jowari, and grams, &c.

4. The condition of land-owning class is better than that of cultivating classes. Cultivating classes lease lands from others and if rains are sufficient and moderate these people do save something sufficient to maintain their family and children, but in cases of irregular and unpunctual rains, crops are destroyed or not produced, and poor people are obliged to pay Government Revenue and lose money, saving scarcely anything to support their wives and children. The condition of cultivating class is therefore generally not good. A scarcity of rain in a single year, pushes them on to relief works, that are kindly opened by Government at the outbreak of famines.

5. Less than one-third of the land is actually held by the so-called real cultivator, the remaining two-thirds being held by persons other than cultivators and cultivated by tenants at will. There are few privileged tenants, taking into consideration the area under cultivation. There is a village of Shahapur in Ellichpur Talug in which privileged tenancy still exists. The above remarks apply only to Ellichpur and Daryapur Taluqs. As for Melghat, the land is held by Korkus and others on a yearly tenure from Government. The Government is thinking of surveying lands in Melghat and introducing a ryotwari system now obtained in other parts of Berars.

6. No steps are taken in my taluqs for the improvement of agriculture. There are no associations formed here to supply cheap capital nor are there any institutions or schools established to impart scientific and practical instructions in the matter. No system of employing improved appliances is in vogue and nor any special-shops opened in taluqs for the sale of manures.

The money-lenders, especially Marwadi class, supply money to poor cultivators when they want money for cultivating purposes or family purposes. But this money is supplied not at a moderate rate of interest but at serious and heavy rates, which are generally charged by money-lending Marwadis. There ought to be some sort of Association established in Districts, Taluqs, consisting of educated and philanthropic gentlemen, well versed in agriculture, who should oftentimes go round the villages and impart education to Kunbis and supply them with scientific and practical instruments and improved apparatus necessary for agricultural operations.

The people have lately commenced to appreciate the benefits of night-soil and rubbish manure, which is nowadays amply used by cultivators. The Ellichpur Civil Station Municipality, of which I have the honor to be a vice-chairman, realised Rs. 2,500 in the auction sale of night-soil and rubbish lying within Municipal Limits. There is keen competition between people at the time of sales with a result that the committee get the enviable amount of Rs. 2,500. I myself have got some land which I cultivate personally and I am satisfied that the night-soil and rubbish manures are a great source of income from lands. But the question is, how it is practicable to supply the manure to all villages. In villages, I am told, the people find it very difficult (in fact they do not get at all) to secure manure for their lands. The lands quite near towns and villages, which are called "Akhar," are naturally provided with manure and villagers generally go to answer calls of nature in their lands. But no manure can be supplied to distant lands, which for want of manure are not very productive soils. I have also tried English manures sold by Mr. Richard Fett, of Bombay, and I found that these English manures are very costly and if the demand increases the proprietors will increase the prices to such an extent that it will be practically impossible for poor people of the country to purchase these manures. To remedy this evil I propose that shops of manure ought to be opened in each village and town, where manure can be sold at a very cheap and moderate rate, within the easy reach of the poor cultivators. The people will then surely purchase these manures and supply them to their lands, which must produce a satisfactory out-turn at the end of the year. I hope, therefore, that the attention of the Indian Industrial Association will be drawn to the subject and some measures will be adopted to improve the deplorable condition of the agricultural classes.

7. No advantage is taken of the village co-operative credit system in these Taluqs, as no societies having that object in view have been established. The system is being tried in the North-West Provinces and Punjab, and I am told success has been attained to a certain extent. The system is worth being tried here too, and I hope some educated gentlemen of the Taluqs will take the matter in their hands and do something to ameliorate the condition of the peasantry.

#### B.—MANUFACTURING INDUSTRIES.

8. There are no manufacturing industries, so to say, in my Taluqs under the heads of:—

(1) Textile fabrics; (2) Vegetable and animal products; (3) Leather, Horn and Paper; (4) Pottery, Porcelain and Glass; (5) Metals; (6) Chemical industries; (7) Furniture and decoration; (8) Materials used in construction.

But there are four Ginning factories and two cotton bale pressing factories at Ellichpur, and some at Anjangaon, Daryapur, Wanosa, &c., &c.

Under "Chemical Industries" I am glad to report a factory called "Match Factory" established at Paratwada, Ellichpur, by the Berar Match Manufacturing Company Limited, Ellichpur, in the month of April last. The company has collected a capital of one lakh of rupees by shares of Rs. 500 each and the business of the company has just commenced and is going on all right.

Under the head "glass," glass bangles are manufactured at Brahmanwada on an old style. The industry is in a primitive state. These bangles were exhibited in Amraoti Exhibition held in the month of April 1906.

Ellichpur City is inhabited by hundreds of weavers who manufacture Khaddes, Sushis, Rumals, Carpets, of various sorts, on hand looms of old models. Recently an energetic and rich weaver named Mr. Kashinath Raoji, owner of the firm of Purushottam Dewaji, has introduced hand looms of improved style with new fly shuttle attached to them, and the work of weaving dhotees will soon commence.

Anjangaon also produces lugdees and khuns, generally used by woman and men of the Brahman and Parbhus, and Kunbee communities.

If new models of looms and flyshuttle are introduced in Ellichpur and Anjangaon, the state of the weaver class will be much improved. I am awaiting with great interest the result of the introduction of new hand looms and flyshuttles by Mr. Kashinath Raoji mentioned above.

9. The Match Factory is recently established and is at present in a good condition.

10. As the Factory is recently established, I cannot say anything of the past.

11. About two hundred people are employed in the Match Factory, Ellichpur.

12. The amount of capital is one lakh of rupees, to be increased if necessary.

13. The matches produced in the factory are better in the opinion of the public, but the company has to compete with matches of Sweden, Norway, and Japan, and to try for matches in the markets at a cheaper rate. Competition with foreign articles is a great point for consideration of the promoters of the company, and help from people is necessary in this direction. Liking for swadeshi articles ought to be developed amongst people. I have observed that there is more talk of "swadeshi" than action in that direction.

14. As the factory is a new one, it supplies local market only at present, though the Director has despatched matches in Amraoti market, and intends to send them to Poona, Satara, Wai, and Sholapur, where there seems to be a great demand for the matches of Ellichpur.

15. If the demand is increased it is impossible for one factory to satisfy all demands. Similar factories must be established at Amraoti and other important and suitable places all over the country. It is hoped that the leading gentlemen of Amraoti and Akola will do something in the matter.

16. In reply to questions I have already described the condition of Ellichpur and Anjangaon, and if some organised association is established to supply them capital at cheap rates of interest and if improved appliances are provided to them, the condition will certainly be improved. The imparting of special education to these weavers will be of much benefit, but I am not for power machinery, which will throw hundreds of weavers out of employment.

17. Silk weaving at Anjangaon.

Al (आळ) colour manufacturing at Ellichpur.

18. Importation of cheap colours from foreign countries has killed the local industry of producing the colour.

Silk industry decayed on account of keen competition of foreign goods and the reckless living of the weaver.

19. I can't say about silk weaving but am sure that if right efforts are made the Al (आळ) colour when prepared by improved methods will be profitable concern. In dyeing the superiority of Al colours to other foreign colours is admitted by dyers.

20. An experiment on a small scale might be made by some rich man who has got some expert at hand with a small capital.

#### C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. Tikhadi (Rosa oil).

Shellac.

Hides, Horns, Bones.

Cotton Seed.

22. None.

23. All the above named articles are exported to other countries.

24. Hides, Horns, Bones. Those come back in finished articles. From enquiry I have found out that one hide costing Rs. 3 here when it comes back finished, is sold at Rs. 14. Bones and horns are made into handles of knives, umbrellas, &c. and the waste is turned into manure.

#### D.—CAPITAL

25. There are no banking facilities for the support of the industries in the Taluqs. Those who wish to start industries borrow money on their credit and do the work.

26. No urban industrial bank has been started in my Taluqs, under the provisions of the Co-operative Credit Societies Act.

27. Hence no particulars can be given required in this question.

#### E.—TECHNICAL EDUCATION.

28. There are no facilities for training young men in various industries in my Taluqs.

29. There are no special schools, no information could therefore be given.

30. There is one man here named Mr. Kärmerker, and one more Mr. Phadke, who have got special training and experience in match manufacturing business and the proportion of sulphur and igniting composition. They are employed in Ellichpur Match Factory.

#### (13) DEWAN BAHADUR R. RAGOONATH RAO,

##### *Kumbakonam.*

1. The condition of the Agricultural Industry is unsatisfactory in this Presidency.

2. The greater portion of the culturable area is under cultivation.

3. All sorts of soil exist.

4. The land-owning and cultivating classes are in an unsatisfactory condition.

5. Mostly the land is held on a proprietary tenure by the cultivators.

6. Very few effective steps are being taken for the improvement of agriculture for want of capital ;

(a) There is no cheap capital.

(b) No scientific and practical instruction is given,

(c) None by improved appliances, some beginning is now being made towards it.

(a) Manure, etc. has been rendered too dear.

7. The village co-operative credit system is not known.
8. There are manufacturing industries in the District as under :
  1. Textile Fabrics, cotton and silk.
  2. Vegetable and animal products, none.
  3. Leather, horn and paper; very little, merely nominal.
  4. Porcelain and glass, none; country pottery exists.
  5. Brass, copper, lead, bell-metal, silver, gold, iron, gilding are manufactured.
  6. No chemical industries except soda-water manufactures and dyeing cloths.
  7. Very little of furniture and decoration. Timber is extensively used for house-building.
  8. Ordinary bricks, tiles and lime are made.
  9. Their present condition is tolerably good.
  10. Owing to less demand, they were not so good in the past.
  11. A very small number as owners.
  12. Not much capital.
  13. Imported articles have supplanted almost all of them.
  14. Indian articles are consumed by local markets, very few articles are exported to foreign countries.
  15. Labourers are plenty. There is no other facility.
  16. Existing Industries are capable of expansion.
    - (a) By making advances to the artisans at low rate of interest, as the principal advance would be jeopardised with particular conditions.
    - (b) Yes.
    - (c) Yes.
    - (d) Yes.
  17. Weaving.
  18. The importation of cheaper cloth, want of Co-operative Societies and Banks.
  19. Yes.
  20. Cultivate raw products, such as cotton, oil seeds, etc. Don't export, spin cotton here, weave here. The same with regard to oil-seeds.
  21. Only mica is said to be found in some parts of this district.
  22. Pebbles are found here and they are worked into spectacles, &c. But the trade is not flourishing.

23. No exports.  
 24. No exports.  
 25. None.

26 and 27. Some have been of late: but there has not been sufficient time for noticing them. Their organisation is difficult.

- 28 to 41. The answers are negative.  
 42. A few small ones exist.

(14) RAO BAHADUR G. V. JOSHI, Satara.

BRIEF NOTE ON SATARA AND ITS INDUSTRIES.

Satara is a *district of the Bombay Division*. It lies at the Western limit of the Deccan upland between  $16^{\circ} 15'$  and  $18^{\circ} 10'$  N. Lat. and  $73^{\circ} 45'$  and  $75^{\circ} 0'$  E. Long. It has an area of 4,825 sq. m. and a population of 11,46,559 souls, are about 238 to the square mile. It is divided for administrative purposes into 11 Talookas and has 8 towns and 1,335 villages.

The district is a *district of considerable resources*. It was at one time a blessed tract of varied industry and plenty, but is now the home of a sinking and struggling population.

The population since 1872 shows a serious decline. The variations have been as per margin. Assuming the normal increase at 1 p.c. per annum, the loss of population in the zilla during the 30 years from 1872 to 1901, was about 2.34 lakhs or 23 p.c. Increasing poverty, famine, and plague have had their effect. There could be no sadder or more eloquent testimony to the trials and sufferings of the conquered period.

Leaving out Government service &c. the distribution of population according to occupation (by the census of 1901) is as under:—

	Nos.	P. C.
A. Professions ...	12,704	1.1
B. Commerce, including transport ...	8,493	.8
C. Industry	1,35,089	12
D. Agriculture and pasture	8,52,842	73
E. Labour	50,109	4.4
Partially agricultural	17,941	

The population is thus almost exclusively agricultural. The shipwreck of non-agricultural industries, is all but total. Some of the old traditional crafts still survive, but only as subsidiary rural occupations, subserving local wants. We have here no mills or factories and no important manufactures of any kind.



A few Census figures regarding *male* workers under these heads of occupation may be of interest.

A. Money lenders ...	674	C. Cotton weavers ...	4,688	C. Workers in iron, &c.	1,487
Pleaders ...	90	Wool weavers, &c....	1,183	Workers in brass, &c. ...	471
Doctors ...	178	Rope, sacking, net makers	3,552	Shoe-makers...	3,688
Actors, &c....	131	Oil pressers	2,121	Potters	2,182
Petition Writers ...	286	Brick and tile makers ...	1,123	D. Cattle breeders and dealers.	7,052
B. General merchants	1,464	Bangle makers ...	618	Shepherds and Goatherds...	4,008
Grocers, &c. .	2,675	Workers in Gold, &c....	2,096	Farm servants	1,075
Shop-keepers, &c....	54			Field labourers	13,968
Cart owners...	391			Land-holders, &c.	2,41,857

#### A.—AGRICULTURE.

The Zilla is a fine agricultural tract. It has a *rich soil*, a *healthy tropical climate* and a *splendid irrigational supply*.

The soils are of these classes, red in the hills, black and light in the plains. The black soil, found in belts along the rivers, is most widely distributed in the Krishna valley, making it the richest garden and dry-crop land in the zilla. The red soils of the valleys yield most of the rice the district produces.

The climate is a tropical climate favourable to varied culture: The seasons are regular and uniform and extremes of heat and cold are unknown.

The rainfall is about 43 inches, and the number of rainy days varies from 70 to 50. There are the vicissitudes of the seasons, to which the Deccan is exposed. The zilla, however, has *irrigational facilities*, which if properly availed of, would make it one of the best watered tracts in the Presidency. On the West, it is flanked along the entire length by the Sahyadri range, and beyond them the Ratnagiri and Kolaba districts. The rainfall in the Konkan zillas ranges over 100 inches in normal years—the whole of which admits of being impounded on the Ghauts with a view to irrigating the lowlands on the East. The rivers are the Krishna, the Mana, the Nira and their feeders.

The forests cover an area of about 4-5 lakhs of acres and contains valuable timbers, sissu, teak, sandalwood, &c.

The Zilla is at present passing through a severe *phase of agricultural depression*.

The past 15 years have been trying years for the agriculturists, years of deficient or irregular rainfall. Since 1890-1 we have had no good harvest. Famine conditions still exist. The famine of 1899-1900 was the worst in the century. Last year, again, we had a virtual famine, the *cropped areas*, the *cropping*, the *agricultural stock*, all exhibit a *serious falling off*.

Year.	Net cropped area in lakhs of acres.	Agricultural stock.	1888-9	1901-2	Land Revenue.
1888-9	17.71	Cattle.	622,099	444,361 (a)	1888-9.
1890-1	17.98	Horses			Lakhs of Rs.
1891-2	17.21	and			12.18
1892-3	16.89	Ponies.	15,018	8,010 (b)	3.20
1893-4	16.42	Sheep.	371,490	271,019 (c)	15.38
1894-5	15.95	Carts.	22,098	21,802 (d)	1903-4.
1895-6	15.86	Goats.	81,899	110,469 (e)	15.62
1896-7	14.93	Ploughs	49,174	50,224 (f)	4.23
1897-8	15.29				19.85
1898-99	15.22				Rs. 4,47,161
1899-1900	14.31				or about 29 p. c.
1900-1	14.62	A serious decline in a, b, c, d; under e and f. The normal increases have almost disappeared.			Net increase during the period
1901-2	14.89				19.85
1902-3	14.92				Rs. 4,47,161
1903-4	14.85				or about 29 p. c.
1904-5	14.44				
1905-6	8.83				
of which 7.72 failed to mature		An increasing state demand on the land on a declining agriculture—has added to the ryots' difficulties.			
The falling off in cropped areas below 1890-1 and 1904-5.—3.54 lakhs of acres.		An increasing state demand on the land on a declining agriculture—has added to the ryots' difficulties.		1888-9	21.16
				1904-5	21.31
				an increase of 15 only	

This year, the agricultural outlook is much better. A few more such seasons, and the present depression will have passed away.

The permanent features of the agricultural position as we find it in the zilla, may be thus sketched.

No. of Villages.	Area in acres in lakhs.	Occupied area in lakhs of men.	Area available for cultivation.
Khalsa ... 965	24.70	17.81	18,532 acres in Khalsa villages.
Alienated ... 393	6.21	3.54	735 alienated.
	1,358	21.32	19,267 acres.

No. and Extent of holdings :—

	Govt.	Inam.	
1 Under and up to 5 acres	12,674	5,816	The system of agriculture holding is mostly <i>petite culture</i> . Over 70 p.c. of the holdings average 2½ acres and under. The large estates are rare. There is much sub-letting in this zilla elsewhere.
2 Over 5 acres up to 25	25,571	7,457	
3 " 25 " 100	16,703	3,116	
4 " 100 " 500	1,875	603	
5 " 500 " "	18	49	
Total	56,841	17,041	
Average area of a holding	24.27	20	

Land holders and their tenants (census 1891)	
Land occupants not cultivating	... 30,615
"    "    cultivating	... 669,425
"    Lessees of villages	... 3
Tenants and sharers cultivating	... 93,453
Govt. assessment.—	
Khalsa lands	... .. Rs. 15.62 lakhs.
Indi or Quit rent on Inam	... .. " 4.23 "

Total Rs. 19.85 lakhs.

Average in Khalsa villages per holding	Rs. 27-7-8.
Inam...	... .. " 25-0-0.

*Per acre in Khalsa* Re. 1-1-9.

*Cultivation.*—It is for the most part *subsistence farming*: It is largely *unmanured* and *exhausting* cultivation. *Fallowing* is *extensively practised* as a restorative method; even in a normal year as much as 627,281 acres area is left in fallow or 30 p.c. (e.g. in 1902-3) 21,19,495 total occupied area.

*Rotation* is understood but *not much practised*. Jawari, Bajri and pulses occupy the major part of the cropped area year after year.

*Exhaustion of the soil*—is fast proceeding.

The available margin for extension of village is not over 20,000 acres.

And yet there is little that may be called intensive cultivation—little agricultural improvement.

The *Crop yield*—according to all accounts, is year by year *falling away*.

The *cropping* in 1902-3, a fairly normal year, was as under:—

	lakhs of acres.	acres	
Jowari ...	... 5.11	12 lakhs	75 p.c.
Bajri ...	... 4.77		
Other cereals ...	... 2.12		
		Total up to 16.19 lakhs.	

*Superior cropping*—on a comparatively small area, less than 5 p.c.

Cotton	... ..	10,488 acres.
Sugar cane	... ..	11,178
Tobacco	... ..	8,386
Garden produce	... ..	9,741
Wheat...	... ..	38,425
		<u>78,218</u>

*Irrigation.*—The total irrigated area in 1902-3 was 93,811 acres, the net cropped area being 14,92,214 acres, or about 6.7 p.c.

The rest of the cropped area was wholly dependent on the rainfall of the season—93·8 p.c.

The irrigated crops—were, Wheat	...	...	...	20,898 acres.
Rice	...	...	...	9,094
Other cereals	...	...	...	34,582
Other food crops	...	...	...	9,482
Sugarcane	...	...	...	11,127
Other crops	...	...	...	27,567
Total	...	...	...	93,811

including 19,000 of double cropping. Of the irrigated cropping three-quarters is inferior cropping, irrigated owing to failure or deficiency of the later rains.

*Manure supply.*—The cost of firewood is almost prohibitive: 6 to 8 annas a maund, and though we have a forest area of about 4½ lakhs of acres, no effort is yet made to supply them with a cheap supply of fuel. The cowdung and other farm-yard manure is consequently for the most part burnt, and little is used as manure. Sheep folding is done on some smaller areas. Rab also here and there is to be met with. But such limited manuring apart, the cropping of the district, generally speaking, is unmanured.

*Ploughing.*—There is the deficiency of plough cattle. Oxen and he-buffaloes 177,000 or 88,500 pairs, or a little over a pair per holding. In the case of smaller holdings ploughing is done by hired cattle. *Good ploughing is rare.*

An expanding population with a declining agriculture, and that, too, in a tract where agriculture is the sole surviving industry and which is exposed to the uncertainty of the seasons, naturally finds the struggle for life harder every day. There is practically no margin now left for extension of tilth; and intensive farming is an economic necessity.

Prominent among the causes of such agricultural deterioration may be mentioned:

1. *Defective irrigation and water conservancy.*
2. *Absence of manures.*
3. *The Ryot's diminishing resourcefulness—and his ignorance.*

As regards irrigation.—

The irrigational equipment of the zilla is as under:—

(1) *Government canals and tanks, Mhasvad main-tank canal, Krishna canal, Revari canal, upper Mari river works, Yerla river irrigation works and Chikhli canal—in all 7 works.*

Capital outlay about	...	50 lakhs of Rs.	The streams
Area commanded	...	58,000 acres	are taken up not
“ irrigated	...	28,000	far from their
Actually irrigated area	...	16,828	sources on this
		“ 1904-5.	side of the Ghats

(2) *Wells, budkis etc.*

Pakka and katcha together 26,946 in 1903-4 against  
19,206 in 1892-3

Increase since 1892-3 6,740

Irrigating 56,062  
acres or a trifle  
over 2 acres each.

(3) There are about 18 *irrigating tanks*—with an irrigated area of 155 acres.

(4) Other Sources.—*The Bandhmas—pakka 99, and kutchha 6,315, temporary constructions for the season = 6,614, irrigating 35,433 acres or less than 6 acres each. In all irrigating 98,950 acres or 6.7 p. c. of the cropped area.*

The Zilla lies on the east side of the ghauts, and has a rainfall of about 43 inches. It is a plentiful rainfall for the crops—but it is uncertain. Sometimes scanty and often ill-distributed. Artificial irrigation is therefore one of the primary needs of the agriculture of the district. *We have a splendid source of such irrigational supply in the rainfall of the ghauts—but it lies yet untapped.*

Much has been done in recent years in the way of well-sinking; some 6,000 wells have been newly sunk. But in a tract like this, such well-supply is necessarily meagre and cannot be depended upon. The geological formation is trappean or basaltic, and we have no underground reservoirs or water-bearing strata of certain occurrence. Well-sinking under such conditions must be more or less in the nature of a speculation. The irrigational capacity can only be small—say 3 acres at the outside to a well. The lift is most expensive; and there is the risk of failure when the need is the greatest.

Government Canals and old tanks go more or less on the faulty plan of catching up the supply when it is scanty and precarious.

The Bandharas, now so few in the district—at one time constituted a most effective scheme of commercial irrigation. They served to impound the rainfall of the plains for agricultural purposes. At present the Patusthal assessment is heavy, about 8-6 rupees per acre, and most of the old weirs are gone; only 100 remain; the rest being temporary structures for the season, of use only for a couple of months or so after the close of the rainy season.

The situation of the Zilla is remarkable. It is divided by the Sahyadries from the coast districts of Ratnagiri and Kolaba on the west, where the rainfall is above 100 inches and is never known to fail. We have also on one side, on the east, a rainfall of over 40 inches. For a tract like this, *what is needed is a comprehensive scheme of irrigational works.*

(1) to catch up the rainfall of the ghauts at convenient centres, and pour it down on the plains: and

(2) to *bund up* the *fall on the plains* by mean of weirs and utilise it for the lands. *Storage works on the ghauts*—with canals and distributaries, and *bandharas* all over the tract, would give us all the irrigation we should require and serve to render the district immune to seasonal disasters. These *weir channels* would be all communal works—only the assessment on them requires lowering a good deal.

Again, we must have a *proper system of water conservancy*. As things are, streams, channels and runlets get silted up, and the waters spread, and flow on uselessly. Some arrangement would seem to be necessary for the removal of silt, and for the conservancy of these sources of irrigational supply.

*Manurial supply*.—The ryot must have a *cheap supply of fuel* before he can be expected, to use his farmyard manure for his lands. The Forest Department is providing such *fuel reserves*. Besides, the use of *artificial manures* is necessary. The soil is much exhausted, and some such dressing for a few years—necessary with state aid—is desirable.

*The Ryot's diminishing resources.*

1. His *losses of crop and cattle* during recent years have been crushing.

2. The *enhanced demand* of the state on his lands, the enhancement by above 4.4 lakhs or 29 p.c., has added largely to his difficulties and more than sweeps off all his savings.

(3) *His indebtedness is heavy*. We have no means of ascertaining the extent of his existing debts. But we can't be far wrong if we take it that they average—generally speaking—about 10 times the assessment on the land—or say about Rs. 200 lakhs for the district. In 1904, his transactions are thus given in the Special Judge's Report:—

	Rs.		
Value of Sale deeds	10.84	lakhs.	(The District under the Deccan Agriculturists' Relief Act of 1879.)
„ Mortgage bonds	12.00	„	
„ Simple money bonds.	.22	„	
Total Rs.	23.06	lakhs.	

Tagai advances and agricultural loans also were given in former years. The balance outstanding at the end of 1904, was 10.82 lakhs.

(4) We have here *no agricultural bank* to give him cheap credit. He gets his money accommodation almost exclusively from the Savkars. *Money-lending* is, however, on the old *individual basis*, and the *interest charge* is heavy, ranging from 9 to 12 and 18 p.c. per annum.

(5) The Ryot has not the help of commercial organisation, such as he enjoyed in days gone by. The *cohesion of the village community* is unfortunately a thing of the past.

(6) *His illiteracy, his dense ignorance, is at the root of his misery and poverty.*

Satara district—Population=11,46,559—  
 literates=46,795—about 4 per cent.  
 45,211 males.  
 1,474 females.

In Javli Taluq with a population of 52,852 souls, we have persons knowing how to read and write=983 only.

(7) *His system of cultivation is primitive and wasteful.*

The Department of Agriculture does not yet send any itinerant teachers to teach him better methods.

Two agricultural associations have been recently formed and are doing useful work.

(1) The *Koyana Valley* (Javli) association, which is doing its work with much vigour, and

(2) The *Karad* agricultural association.

And, *it is proposed to establish a Co-operative credit Society* in Javli *shortly*. Under existing conditions, however, such societies have a poor prospect. The Ryots are at the end of their resources, and must be in a position to save, before they can be expected to exercise thrift.

Cattle are fast and *seriously deteriorating*, losing in size, bone and muscle, and our existing plough cattle, already insufficient in number, are less efficient for field work than ever. Some arrangement seems urgently called for with a view to *improve their breed and increase their working power*. The Veterinary Department ought to look to this, and ought not to lose a day. *More grazing* is also needed and for it we must look to the Forest Department.

The *agricultural needs of the Zilla* may be thus summed up:—

*Extended irrigation* on a better and more systematic plan by means of storage work on the Ghauts, with a network of distributary canals.

*Better manurial supply*, including the use of artificial manures.

*Improvement in the Ryot's position*—

1. The lowering of existing assessment on his lands.
2. Relief for the burden of debts.
3. Cheaper credit.
4. A comprehensive scheme of moral education.
5. Knowledge of better agricultural methods.
6. Association—co-operative organisation—to help him in his work.

*Improvement of cattle, more grazing, and better breeding.*

*Improved cultivation, Superior cropping.*

*Stock-rearing.*

There is a good deal of *uncultivable waste* in the district, the area is 272,469 acres, which is not available for cultivation; but a considerable extent of it, including hill-sides, might be utilised as a grazing area. It lies *outside the forest reserves*. *Stock-rearing ought here to thrive.*

*Cattle-breeding*—There is not much of cattle breeding as such in this district as there is in Khandesh or Gujrat, and what little we have is inferior. There is insufficiency in grazing and there is also an insufficiency of breeding bulls and bull-buffaloes. The number of such stud bulls has largely fallen off in recent years. In 1892-3 we had 664 bulls, and 161 bull buffaloes=825; in 1901-2, there were only 384 bulls and 155 bull buffaloes = 539, and *for a total of 1,358 villages*. This is, however, a branch of the agricultural industry which needs attention. Both the breed and the number of cattle urgently require improvement in the interest of agricultural efficiency.

*Horse-breeding*—The Man valley was at one time famous for its horses: but the industry is now almost gone and the number of horses and ponies in the zilla which was 14,012 in 1892-3, is now only 8,010. *Cannot anything be done, with the help and support of the military authorities to revive interest in the work?*

*Rearing of sheep and goats.*

There is still a considerable population dependent on this industry, over 15,000. In

Shepherds and goatherds ...	10,231
Workers in wool ...	4,784
Wool carders ...	282
Wool dealers ...	194

15,491

Maratha times, we had a fine breed of sheep and goats, and our woollen industry was one of the most thriving. Now, however, it is a declining branch of rural

work. Sheep are reared more for milk, meat and skin than for wool, and the breed is poor. The number has largely

1892-3—1901-2. increased since 1892-3, owing chiefly to deficiency of grazing. There are

Sheeps—371,490—271,019.

the forest restrictions, and there is little grazing available outside except wayside, tree and hedge vegetation. The yield of wool, too, is meagre—not even 2 lbs. to the fleece, as against 4—5 lbs. in England and other countries.

*Sheep-rearing, however, for wool supply—deserves encouragement. Babul reserves might be formed for the purpose on private waste lands or sheep-runs on the hill-sides.*



*Gypsum* is found in abundance in the zilla, and is a most excellent manure for grazing lands intended for sheep. The grass so grown for the sheep is said materially to increase the weight of the fleece.

#### B.—MINING.

The industry as such is in this zilla *non-existing*.

Formerly the Dharuds did some iron smelting, but owing to the want of fuel and owing to the cheapness of imported iron—it has entirely ceased. The Dharuds earn their living as labourers.

The zilla does not seem to be rich in minerals. We have *Iron, Manganese, Gypsum* and *Copper* and there is some prospecting too going on at present in the district. As regards *Manganese* the official report states (vide Geol. Sur. Report Vol. XXXIII. part 2, p. 100:—“The manganese ores of the Mahableshwar, and Yeruli (18° 2' and 73° 54') plateau in the Satara district occur as concretions of Psilomelane in a small thickness of laterite soil, resting on the Deccan trap. They never occur in sufficient quantity to pay for extraction, and have probably been formed by concentration of the manganese which all such basic lavas must contain.” The *mineral* can have no commercial value.

As regards *Iron*, near the Sahyadris, in 20 villages of Javli, 30 of Patan and 3 in Valva, the ore is found in the murum or crumbled trap below the laterite—and is found in plenty. There is, however, no coal in the district, a serious disadvantage.

A suggestion may be thrown out. *Iron smelting—and iron works might be started at some coast town in the Rutnagiri collectorate, where we could get coal easily from Bombay and iron ore might be mined in this district, and carted to such works—the cartage charge would not be heavy, and certainly not prohibitive.*

In Japan, there are such iron works, run at several places, for which the required supply of iron ore is received from China.

For the starting of such iron works in the Konkan, capital and enterprise are needed. The difficulties in the way are considerable, but could be got over.

As to *Gypsum*, it is a *fine manure*; it is in demand in some localities and there is no reason why it should not find a sale in the district itself, and it ought to pay to mine it.

*En passant*, it may be suggested that we should ask, as a necessary condition of practical effort in this direction, that there should be a systematic exploration by an expert of the mineral resources of the zilla. We have had no such exploration yet.

## C.—MANUFACTURES.

We have in this zilla, as elsewhere, a considerable number of old traditional crafts giving employment to a considerable section of the population. They are, however, poor trade concerns and those engaged in them earn but a precarious living. They are run, as of old, on the individual basis, and in some cases on a system of advances from the moneylenders or dealers, and without any special training or acquired technical skill—Weaving, metal work, pottery, etc.

We have also the following recently started:—

Soap making at Satara.

Metal works at Satara.

The Weaving, Dyeing and Trading Company at Wai.

Match making at Dhome and Karad.

While the old crafts have but a poor chance, *these new beginnings are full of promise*. They are yet in their first stages of growth, and it would be too early to speak of their position or prospects.

It is, however, a pleasure to find that the new movement is under the supervision and guidance of a *strong and representative industrial association* presided over by *Rao Bahadur V. N. Pattak, M.A.*, and it would be of interest to watch the forward steps that might be taken along the new path under its auspices.

It would seem, we had at the start *best concentrate our energies on one or two selected industries* for which the zilla affords special facilities. *Sugar refining and oil-pressing (inter alia) would constitute a good beginning*. This is one of the few zillas in this Presidency which has considerable acreages under sugarcane. We have about 12—14,000 acres so planted. Under oil seeds, the area is at present about 75,000 acres. For a sugar factory, the amount of capital required for machinery and plant and working, according to Mr. Jordan, a sugar expert, is Rs. 75,000. An oil-mill would also need a like amount of capital. *The capital, therefore, for these two concerns would be 1½ lakhs*, which ought not to be beyond the resources of local enterprise. *Absence of coal* in the district is a *serious drawback*. But should we be fortunate enough to have a few storage works in the Ghauts for irrigational purposes, we should have at our disposal an amount for *electrical power*, which would meet all our requirements in the new effort. It is *this energy* that is being *utilised to an increasing extent in Japan*, and there is no reason why we should let it run to waste.

This opens up a vista of great possibilities of industrial development. But *the one condition precedent* is the *construction of such storage works on the Sahyadri Ghauts*.

The Assistant Secretary saw at Poona

(15) RAO BAHADUR K. R. GODBOLE; AND MESSRS. N. C. KELKAR AND N. A. DRAVID, and after questioning them obtained the following information.

There are the following private or organised corporate institutions in Poona, where industries are carried on, and the proprietors or shareholders of which receive fair returns on their investments:—1. Reay Paper Mills; 2. Silk and Cotton Manufacturing Co., Ltd. (Mills near the Railway Station); 3. Sugar Factory at Mundhwa; 4. Deccan Brewery Works at Dapudi; 5. Metal Manufacturing Co., in Kasba Pet; 6. Chitra Shala in Sadasiv Peth; 7. Aloe Fibre Works in Sadar Bazar; 8. Iron Foundries and Factories of Bari and Karanj Kar for preparing sugar-cane crushing mills; 9. Victoria Ice Company; 10. Ink Manufactories of Ghorpade, Shinde, Tupe, etc.

A local Gujarati merchant makes *caps* in imitation of Hungarian caps out of Swadeshi material. A large quantity of jaggery is prepared by the growers of sugarcane, and it is mostly, if not wholly, disposed of in the local market. Excellent ivory and blackwood *combs* are prepared at Poona. There are, too, a few small private *pottery* works here and there. Poona has three *metal manufactories* in which iron, brass and aluminium pots are made. At the Technical school workshop, private orders for furniture, etc., are executed. The Silk and Cotton Manufacturing Co.'s mill turns out *silk goods* which are mostly exported to Burma. These include different varieties of sarees, dhoties, pitambaras, etc. The concern is heavily indebted. The debenture holders and commission agents earn good profits, but not the shareholders, who have only latterly been getting a small dividend. A new Cotton Spinning and Weaving Mill is in course of erection. The concern has only been recently floated with a capital of 2½ lakhs and is a product of Swadeshi movement. The Reay or Deccan Paper Mills, where paper of different varieties is manufactured have only latterly begun to pay. The Mills were established in the time of Lord Reay, and enjoy some substantial concessions from Government in respect of the water rate charged for the canal water used in their working. Till lately the only customers of the mill were the Government, but as a result of the Swadeshi enthusiasm there has grown up considerable public demand for the paper of the mills; and at present the mills have for sometime been working at high pressure. Some of the local papers, including the *Kesari*, which has a circulation of nearly 20,000, use the paper of these mills. *Lace*—Kalabattu—is made at Poona. All the lace turned out is consumed

locally. Handloom weavers use this lace in preparing bodice cloth for women. *Ghamelas* (iron pots) and ordinary brass pots and drinking vessels are made from imported sheet metal. The workers get enough to make a decent living. There are a few stone quarries near Poona. As the industries are mostly pursued by private individuals with small capital they are not thriving. There is scope for improvement if organised efforts are made. The small industries, at least some of them, have suffered not so much from competition, but probably because fashions have changed and the demand for those particular kinds of articles ceased to exist. By making advances to artisans at low rates of interest, improving the appliances in use, imparting special instruction to the artisans, as well as by the employment of power machinery, the local industries may be considerably developed.

Formerly there were wooden mills used for crushing sugarcane. Now for nearly thirty years, however, these have been displaced by iron crushing mills. Now almost all have taken to the use of the iron mills. They were introduced by one Soobrao, a copper-smith, who was a watch-maker. There are two factories, one belonging to Ramji Bari who is a *mali* by caste, and the other also owned by an Indian, where these iron sugar cane crushing mills are made. They are made out of old iron things like sleepers etc., and are sold at from Rs. 150 to Rs. 200 each. Well-to-do cultivators buy these mills and let them to others in their villages who are thus able to use them.

At present hides and skins and tallow are exported in their raw state. Tallow could be made into soap locally.

The following Banks are working in Poona city and paying dividends to their shareholders at from 10 to 12 per cent. per annum:—Bank of Bombay, Poona Branch; Deccan Bank; Mercantile Bank; Poona Bank. These banks get large deposits at from  $3\frac{1}{2}$  to 5 per cent. per annum, and lend money at rates varying from 6 to 12 per cent. per annum. Two of the banks finance two industries. The Deccan Bank has advanced money to the Gadag Cotton Mills Co. and the Reay Paper Mill, and the Poona Bank to the Cotton and Silk Mill. It must be stated that the organisers of the banks are also the organisers of the industries.

At present there are four educational institutions in Poona city where elementary technical education is given and manual work taught:—1, the workshop attached to the College of Science, Poona; 2, the Jubilee Municipal Technical School; 3, the class for manual training in the New English School; and 4, the Carpentry and Smithy classes in the Pauch Howd Mission Schools. Private factories also offer scope for apprenticeship. The instruction given is

mostly practical. There are Drawing classes attached in almost all the schools. The College of Science prepares sub-overseers.

Three students have been sent to Japan—One for learning photography and allied businesses; one for learning match-making; and one has gone as Baroda State scholar for learning Mining and Metallurgy. The first two have been sent privately by their own guardians, and have only completed their secondary course. The third is a B.A. and will have to serve the Baroda State for ten years.

Mr. G. B. Athavale is an expert in cutlery who learnt his business in England and America. He was in the Miraj State workshop as cutlery Manufacturer. But the Chief of Miraj is said to be unwilling to invest a large sum in the concern, and Mr. Athavale has accordingly gone over to Poona to see if he could induce some capitalist to go in for the cutlery business on a large scale by investing, say a lakh of rupees in it.

Mr. Shejwalkar, a physician by profession, knows the art of calico-printing and has a small concern in his charge. He employs only manual labour. His chief difficulty is that nobody is prepared to finance him. Since the Swadeshi movement has caught popular fancy, however, he has been faring better. At present he sells his cloth through the manager of the Chitra Shala Press.

There is another person, an artisan by caste, who is making umbrellas out of Swadeshi materials, except for the steel wire which is imported from England and the stick which is imported from Java. He was formerly employed in the Telegraph Department. He is a mechanical engineer himself, though he has not passed the examination. He has succeeded in his experiments, and is now fitting up his factory. Business will be commenced very soon on a commercial scale, and he expects to turn out umbrellas at the rate of one hundred per day. For the present he is working with his own capital; but as demand increases he intends to convert the business into a joint stock concern. Those who have seen the umbrellas say that they are as good as Japanese ones while they will be sold at a slightly lower price. There is a Swadeshi Co-operative Stores. There is another Swadeshi Stores in Budhwar Peth, under Mr. Krisandas Vishnudas, where all Swadeshi goods, and cloth and stationery in particular, are sold at cheap rates. Of Swadeshi stationery shops there are many. Besides, country made articles are sold by almost all the shopkeepers in larger quantities than before.

In a pamphlet entitled "Industrial Activities in Poona," which Rao Bahadur K. R. Godbole, B.A., M.C.E., has published and from which some of the information given

above is taken, it is stated that a Metal Manufacturing Co., a Dye Co., two Pencil factories, a Saw Mill Co., two Flour Mills worked by water power and steam power respectively, Oil Presses, and a Spinning and Weaving Co., worked by water power, were all started at Poona at one time or another, but that they have all failed on account of some reason or other. The Reay Industrial Museum which was started on the 1st of April 1890 and which was to comprise besides the Museum proper, a sale section, an export branch, an import branch, an information branch, a Library and a Reading Room, is now in a decadent condition. And the Industrial Association of Western India, which did good work in the first few years of its existence, has, according to Mr. Godbole, fallen into a moribund condition. Mr. Godbole urges, as steps that can be immediately taken at Poona to further the cause of industrial progress, the renovation of the Reay Industrial Museum and the resuscitation of the Industrial Association of Western India.

An important step in the history of Industrial Poona, is the early foundation of the Ranade Economic Institute of which the Hon'ble Mr. G. K. Gokhale, C.I.E., is the Secretary. The public have contributed liberally towards this project, of which the objects are stated as follows:—“(a) To collect all available information about past and present industrial undertakings and present and future industrial possibilities in India; (b) To collect statistical, historical and other information about other countries, which is likely to be useful to the industrial progress of India. (c) To publish from time to time reviews by competent persons of the Economic position, needs and prospects of India. (d) To send, as funds permit, scholars with good qualifications in Science, Engineering or Technical Arts, to England, Japan and other foreign countries to learn the manufacture of those articles for which there is a plentiful supply of raw material in this country, and which might therefore be profitably manufactured here. (e) To provide facilities to such scholars, on their return to India, to enable them to demonstrate by experiments, on a small scale, that the manufactures in question can be profitably started. (f) To advance in other ways the Industrial development of the country.”

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#### A.—AGRICULTURE.

1. Berar being an agricultural Province with about 75 per cent. of the total population supported by agriculture and with the chief industry affected by the products of the soil, it naturally follows that the material condition of people must depend on the condition of agriculture.

The total agricultural population in 1901 was 20,14,719, against 19,86,263 in 1891, or an increase of  $\frac{1}{4}$  per cent. This includes both workers and dependents. Many women and old people among the better class of agriculturists do not do any field work at all but confine themselves to household duties, &c. In 1901 there were 14,30,174 or 51.93 of actual agricultural workers :—

Persons interested in land, land-holders, tenants, co-sharers, &c. ...	1901	1891
Agricultural labourers ... ..	561,912 =	9,97,602
Growers of fruits, &c. ... ..	14,52,221 =	9,86,644
	586 =	2,017
	<hr/>	
	20,14,719 =	19,86,263

With the increase in area under cultivation there has necessarily been increase in the agricultural population. Apart from this the increase is probably due to the people adopting agricultural pursuits and forsaking other means of livelihood.

Cultivators—land occupants and tenants cultivating, and fruit growers &c., in 1901 were 5,09,314 or 18.5 p.c. of the population. If land occupants, tenants not cultivating and lessees of villages are added, the total number comes to 5,52,498 or 20.4 p. c.

<i>Labourers.</i> —Field labourers ... ..	13,47,448
Farm servants .. ..	1,04,773
General labourers... ..	45,833
	<hr/>
	14,98,054

or in all 14,98,054 represents 54.4 p. c. of the total population. The chief industry is the working and dealing in cotton.

2. Almost all culturable land has been brought under cultivation in the Akola District.

There are 3 classes of soil in Berar. Their description is as follows :—

3. Rich black alluvial soil covers the whole of the low-lying land of Berar. It is either black loam overlying basalt as in the Ellichpur and Amraoti Districts, forming the eastern-northern half of Berar, or a rich black alluvial vegetable mould, as in the case of Akola and portions of the Buldana Districts. In the latter case, the soil goes down to a great depth with a very underlying strata of yellow clay, lime except the portion mostly near hills, where it is shallow and overlying moorum or yellow clay.

A great deal of the Purna alluvium, about 10 miles on either side of the river, produces efflorescences chiefly of salts of soda and in many places wells sunk in this tract have brackish water.

A definitely marked saline tract commences just south of Akola and passes thence north-eastwards, Daryapur Taluq forming a belt about 10 miles broad from east to west and about 150 miles in length.

In the Balaghat or the southern hilly half of Berar, the soil consists of shallow alluvial overlying decayed trap or hard moorum, with repeated outcrops of trap stone. In parts where hard moorum crops up to within a foot of the surface, the soil covering it is very inferior and unculturable. The low-lying culturable portions form the best ground for Rabi cultivation such as wheat and grain.

4. Considering that the greater portion of the gins and presses are now driven by steam power, the labourers have better wages than those given at the time of hand gins.

There are three classes among the land-owning, &c., classes, viz.:

I. Persons possessing land.

II. Persons cultivating do.

III. Labourers—Working in general.

The first class is again sub-divided into:—

1. Persons possessing land but not actually working.

2. Persons possessing land and actually working themselves.

Of them the labourers have better state, and next to them persons cultivating land.

Persons possessing land and actually working are best of all; but this number is very limited. The sub-division *i.e.*, persons possessing land and-cultivating class, have gone down.

The condition of people must depend on the condition of agriculture, as stated above in question 1.

(a) No private efforts have been made up to now, but the Government have intimated in this direction that they have selected the Akola Districts for experiments to create village credit banks (rural banks).

(b) No. The Government have selected Akola for establishing a farm for this purpose now.

(c) No. In a few cases, (*i.e.*, Mr. Gopalrao Kushalrao etc.) Appliances brought into use are:—

Appliances.—Plough, Foddercutter, Winnowing Machine, Grinding Machine, Windmill, Iron Mot etc.



(d) No. The old system of spreading cowdung ashes in the garden lands only, viz:—

Taluqs.

Ellichpur.	Akot.
Chikhli.	Amraoti.
Jalgam.	Morsi.
Akola.	Khamgaum.

7. Please see 6 (a) question.

B.—MANUFACTURING INDUSTRIES.

8. Please see the statement enclosed herewith for Berar.

(1) Cotton, Wool, and Silk are certain industries which will be seen from the state; jute not worth mentioning.

(2) Oil mills, Amraoti 2, Shegaon 1, Akola 4, of which 3 are very small.

In big villages as Akot, Karinja etc., there are oil presses, for oil extracting, by bullock power.

(3) Dhors etc., do for local requirements the business of leather.

Horn. Nil.

Paper working at Akola. Balapur, &c., has decayed.

(4) Generally big villages, towns etc., the business of pottery takes place. Tiles, Pots, Pipes etc.

Porcelain. Nil.

Glass. Bangles at *Bramhanwada Thadi* in the Ellichpur Taluq, *Dhad* in the Chikhli Taluq, are prepared; colors—red, green, blue, and black.

(5) 2nd working *i.e.*, from sheets of brass and copper pots are prepared at Akola, Khamgam, Amraoti etc., but not on a large scale.

(6), (7), (8).—Nil.

9. The present condition of the industries named above is not satisfactory as the requisite knowledge is wanting.

10. Their condition in the past was better, as the industries were supplying the local requirements and also exporting goods to a certain extent though manual labour was working.

No steam power was in use as it is now for cotton, oil-seeds, etc.

13. The imported articles have been sold cheaper, the tendency of the people is to buy things at low price, not minding the quality, whatever it may be. The steam power industries work much and produce articles in abundance. So the dealers sell them cheap. Thereby all the industries have decayed and the artisans have been reduced to labourers.

In order to compete with foreign trade the requisite knowledge is not up-to-date among the artisans, i.e., lack of knowledge in the present time is the cause of ruin.

14. Even the total demands are not supplied by the industries in this part except the agricultural industry which sends outside in noticeable quantities raw cotton and cotton seeds, some quantity of grain, as wheat etc. The following are the firms:—Riley Brothers, Breul & Co., Sabhapathi, Mulji Jetha & Co., export the above articles.

15. Raw Cotton Industry, Coal mines, etc. (To turn the raw materials into industries).

(a) Advances should be given but an organised body must supervise their work every day.

(b) It will.

(c) It is the chief thing, and then to take up the question of (b) and then (a).

(d) This is next to (c).

17. (1) Paper, (2) Salt, (3) Opium, (4) Bhang and Ganja, etc.

The 3rd and 4th industries were principal in Berar.

18. (1) Importation of foreign articles and, (2) their cheap sale.

(3) Government monopoly with regard to opium, ganja, &c.

(4) Lack of requisite capital and self-confidence.

(5) Lack of knowledge in a special branch of industry according to the world's progress in time.

19. Yes.

20. (1) Opium, salt, ganja industries can by the help of Government.

(2) Special training.

(3) Spread of education among the masses.

(4) The rich must be educated so that they will be ready to invest money.

(5) Honest working in any business, which requires a religious education. So that self-confidence must be aroused in the rich class.

#### C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. Red earth can be manufactured into tiles like Bangalore.

Marble stones in the Nun District can be used,

22 & 23. Nil.

24. Raw hides are exported and re-imported as finished articles.

#### D.—CAPITAL.

25. Branch of the Bombay Bank is the only one at Akola and other at Amraoti in Berar.

26 & 27.

#### E.—TECHNICAL EDUCATION.

28. There is one class in the factory named "Native Ginning, &c." which has produced a certain number of engineers for the cotton gin and press working (Akola).

There is also one class for carpentry in "the Industrial School" conducted by the missionaries, but it is restricted to the Christians only. (in Akola).

There is a class at Amraoti in the Industrial school of the Government.

29. There was one Industrial school at Basim but it has been closed now.

32. Please see answer to question 28.

34 to 37. Nil.

38. No proper arrangements have been made.

39. Mr. Tambah in the Ulhara ginning factory is employed as engineer. He is trained specially for the matches.

Mr. Karmarkar is in the match factory at Ellichpur, is engaged for this purpose.

There are several engineers in Berar for the mills (cotton) ginning and pressing factories.

Cotton Mills, Badnera.

Do. Akola.

40. Mr. Tambah is employed as engineer in gins.

Mr. Karmarkar is employed in the match factory.

41. Mr. Tambah has been given a trial for pencil and match factories.

#### F.—INDUSTRIAL ASSOCIATION.

There is one, but nominal. It has worked to a very little extent. No activity it has shown up to now.

District	Teahall.	Name of town or village.	Distance from Railway Station.	Description of articles produced in the Berar Industries.	
Akola	Akola	Panchpimla Akola	Akola station, 2 miles Itself	Tadhas from Cotton. Do. country blankets, brass and copper pots from sheets imported, &c. Chunam oil mills, flour mills, yarn and weaving mill. Dyeing, Leather preparing, &c. Oil pits, Lac bangles.	Paper making at Akola, Balapur, &c. Died out;
		Kutasa, &c.	Do. 19 do	Salt making (not now).	
	Akot	Marsi Takli	Do. 11 do	Khadi cloth.	Opium, Bhang, Ganja, Salt. Restricted Govt. help.
		Akot	Do. 28 do	Carpets, khadi cloth by old hand-looms.	
		Telhapa	Do. 40 do	Introduction of Match and Pencil Factory by hand-made Machineries.	
	Balapur	Balapur	Paras 6 do	Silk as well as cotton cloth. <b>मु०</b> Carpets, Dhoti, Turbans, Laced cloth for males and females, &c.	All Dyeing has gone out at Nandura. Lac do do.
	Basim	Pathur	Akola 21 do	Stone quarry (black)	
		Basim	Do. 51 do	Female Garments, cloth, khadi, turbans, &c. Dyeing for local wants.	
	Manguel Murtzapur	Risode	Do. 58 do	Dyeing by hand-made instruments.	Butter Market. Soap industry in its infant state Dye industry for local requirements, red powder <b>कुंकु</b> which is also exported.
		Shelca	Do 80 do		
Amraoti	Amraoti	Karinga	Murtzapur 20 do		
		Amraoti	Amraoti station	Khadi, Turbans, oil mills, oil pits, flour mill, leather making for local, lac bangles requirements.	
		Kholapur	Do, 20 miles	Silk and cotton cloth for men and women.	

Amraoti	Mersi	Badura	...	Badura station	-	Mill (cotton)	
		Bulgaon	...	Amraoti station	6 miles.	Dyeing industry.	
		Mersi	...	Do.	34 do..	Khadi.	
	Ellichpur	Hingkhed	...	Do.	40 do..	Red-powder कुंकू.	
		Benwad	...	Do.	42 do..	Cutlery but for local requirements, &c.	
		Jasur	...	Do.	32 do..	Dyed khadi, rumal, carpets, female cloth	
		Ellichpur	..	Do.	32 do..	( गुलाबी ) Dyeing industry, lac industry means toys, painting, &c., Combs (carpentry) Toys, &c. Match factory, leather making locally prepared, lac-bangles.	
		Dhamangam	...	Do.	38 do..	Khadi cloth.	
		Bramhanwada Thari.	...	Do.	52 do..	Bangles (glass) industry.	
		Karjgam	...	Do.	38 do	Khadi, Tadhao.	
Chandur	...	Dhamangam	...	Dhamangam station	..	Khadi.	
Daryapur	Babhali	...	Murtzapur	13 miles	...	Silk, female and male cloth, cotton cloth, turbans, &c.	
	Suyi Anganjgam	...	Do.	24 do	...	Do. do. do.	
Melghat	...	Chikalda Melghat	...	Amraoti station	62 miles	Teakwood, Angrabolams हिरडा, बहेडा आवळकटी, rosa oil, lac, first produced, coffee at Chikalda, bamboo, grass, &c. oil pits, butter is exported from the taluq.	
Buldana	Chikhli	Chikhli	..	Malkapur	42 miles	Country blankets, khadi.	
		Dhad	..	Khamgam	29 do		
		Dedgaon Raju...	..	Malkapur	56 do	...	Bangles (glass)
	Mehkar	Deolghat	..	Do.	63 do	...	Female garments, oil pits.
		Mehkar	...	Do.	34 do	..	Cutlery.
			...	Do.	70 do	...	Khadi.

District.	Tehsill.	Name of town or village.	Distance from Railway Station.	Description of the articles produced in the Berar Industries.
Buldana	Malkapur ...	Lonar ...	Do. 82 do	Salt, exported.
Buldana	Malkapur ...	Shindkhed ...	Julna 10 do	Country blankets.
	Malkapur ...	Malkapur ...	Malkapur station ...	Stone quarry.
		Nandura ..	Nandura do ...	Leather, dyeing industry, khadi, &c., Carts, good market for bulls.
	Jalgaon ...	Jalgaon ...	Do. 16 miles ...	Tadhas, Khadi, betel leaves exported.
		Suirgaon ...	Do. 18 do ..	Do. do. do.
	Khamgaon	Khamgaon ...	Khamgaon station ...	Lanterns, brass pots from sheets, iron pots from sheets, &c., lac bangles.
		Shegaon ...	Shegaon ...	Oil mill. ...
Yeotmal	Yeotmal	Babulgaon ...	Dhamangaon 12 miles ...	Khadi.
	Mun ..	Mun ...	Warna 14 do ..	Jajams, khadi, laced cloth, dhoti, female garments, carpentry (old), stones for engraving, coal (mines not yet opened).
	Pusad ..	Pusad ..	Akola station 39 do ...	Oil pits; rosa grass.
		Umerkhed ..	Do. 111 do ...	Khadi.
	Darwha	Digras	Dhamangaon 56 do ...	Dye industry, bullock market.

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*Trivandrum.*

A.—TRAVANCORE INDUSTRIES.

1. Only the traditional primitive system is in vogue. Improved methods have nowhere been introduced. The only change that is worthy of mention with reference to this industry is the cultivation of garden crops (Palms, Plantains, &c.) in many parts of the state in lands formerly under food-grains, pulses and oilseeds, as the former is more remunerative than the latter. Agricultural classes are mostly lazy and not disposed to give much exertion (physical and otherwise) on the lands.

2. Acreage under cultivation of different crops is not given in the Government report as also the acreage that is still to be reclaimed for human use. The total area of the state is 7,129 sq. miles, of which more than two-thirds consist of jungles and forests. Of the remaining one-third, a fourth may be occupied by backwaters, tanks, rivers and human habitations so that a fourth of the total area *i.e.*, 11,40,640 acres may fairly be taken as the total acreage more or less fit for agricultural operations; of which nearly 6 lakhs of acres are under wet cultivation, as stated in the Government report. The acreage under dry cultivation is not given anywhere; but roughly between 2 or 3 lakhs of acres may be estimated, leaving thus a balance of 2 or 3 lakhs of acres still to be brought under cultivation. Of these lands now lying fallow some are unculturable without special irrigation, organised capital, colonisation of tenants and other facilities of an extraordinary nature; while others, though fertile and well watered, are situated in the malarial tracts thoroughly unfit even temporarily for human habitation. To reclaim them, special remedial measures on a large scale of drainage, &c., of the most advanced scientific type will have to be introduced either by Government or properly organised, wealthy, influential and well informed Agricultural Associations or chartered companies with special concessions from Government.

3. Generally fertile for the cultivation of Coconut, Arecanut, Ginger, Tapioca Roots (of a big size), Plantains, Pepper, and unfit for cereals, except in the taluqs of Thevale, Augusteswaram, Edainel Karunagapalle and Karthigapalle. The forests are fertile for Sylviculture. In the taluqs like Ambalepozhe (hollow uneven tracts known as Kuttanad) wholly submerged under water, a special variety of paddy is grown, which yields profitably. Occasionally, marshy tracts by the sea or backwaters are emptied of their water and an ordinary variety of paddy is raised therein, but the yield is precarious

4. Landowning classes have to a very large extent only small holdings insufficient to keep them above want, and the cultivators have mostly wages too low for their maintenance. Further there is not an unfailling demand for labour in the plains. Many are attracted to the hill plantations (coffee and tea, &c.), under Europeans, where they have to groan under some special disabilities and disadvantages.

5. Lands may be said to be held in fairly equal extent by the three classes of cultivators, (land owning, privileged tenants and tenants at will).

6. None.

7. *b, c, and d.* Nil.

(18)

### B.

1. (a). Cotton, fine fabrics with or without silk, border and with or without lace at Kottal and Crainel. Coarse stuffs at Cheranyihkil (Kidakkaval), Valuapuram and Kanjarepally in Chenganechery taluq.

Good checks, kerchiefs, &c., are woven at the local Central Jail, and School of Arts, and Technical Schools at Nagercoil, Trivandrum and Attingal.

\* Lace making and Embroidery in Christian Girls' schools at Trivandrum, Nagercoil, Quilon, Aleppy and Kottayam.

(b) Plantain fibre at the Local School of Arts and Parul (near Quilon).

(c) Pineapple fibre to a slight extent at the School of Arts.

(d) Wool Carpet weaving at the School of Arts.

(e) Cocanut fibre on a large scale (coir stringing and matting) all along the Arabian sea (where cocoanuts abound) in the hands of an enterprising class (Iluvars). This is the chief remunerative industry of this state at present.

2. (a) Sugar (country) at Alengad, Alwaye, Ettumanur, Kottayam, and Chengannur.

(b) Palyre fibre } in Thonala, Augustiswaram, Elaniel,  
(c) Aloe fibre } Kalkulam and Kulittali.

(d) Lemon grass oil all along the lower altitudes of the hills.

(e) Copra (dried cocoanut kernel) is prepared, which is partially manufactured into oil locally at Aleppy, and Quilon oil mills (under native firms recently organised).

(f) Tapioca.

(g) Ginger.

(h) Areca-nut.

(i) Pepper.

(j) Roots.



(k) and Plantains of several kinds (Ettan, Poovan, Annan, Padayamkodan, Mouthan, Kappai, Padathi, Thevan-kathali, Kathali, Chambai, Annan, Kalungathali, Pachaivettan, Chingan), are grown at the foot of the ghats in Menachil, Chenganachery, Thodupayha, Chengamure, Karthigapally, Karunapatty, etc.

(l) Timber. Teak, Blackwood, Ebony, Vendik Them-baga, Jack, Augili, Sandal, in the forests and also Casuarina.

(m) Rubber and Sisal are being experimented and camphor.

(n) Minor forest products. Wax, Honey, Resin, Gallnuts, Soapnuts, &c., in the hills.

(o) Coffee, Tea, Cardamoms, Camphor and Spices in the hills and forests.

3. (a) *Leather*. Boot and Shoe making to a very slight extent in towns Nagercoil, Quilon, Trivandrum and Aleppy to supply a local demand (very limited).

(b) *Horn*. Snuff boxes, walking sticks (with swords inside), handles for knives, hatchets, &c., at Mavelikara.

(c) Ivory carving (superior) at the local School of Arts and by private artisans at Trivandrum.

(d) *Paper*. Manufacture on a large scale was attempted at Punalur, which proved a failure.

4. *Pottery*. Ordinary at Cherayinki and Kottal. Glazed, ornamental, machine mould, and cask mould at the School of Arts (Ink-wells, Urinals, Flower-pots, Jars, &c.)

5. (a) *Cutlery*.—Nutcrackers, sword blades, knives at Mavelika.

(b) Brass and copper ware at Quilon, Trivandrum and Aleppy. Betel and jewel boxes (brass) at Valapalle near Haripad.

(c) Bronzeware at Kottar.

Gendis (Water jug with protruding spouts) at Valapalle. Bronze Mirrors are a speciality of *Arumula* near Ambale pulyha.

(d) Silver and Gold-ware at Trivandrum and Aleppy.

6. Nil.

7. Teakwood, Rosewood, Thembaga, Jack, *Furniture*, Angili, Bamboo and Rattan furniture at Trivandrum, Aleppy and Quilon and Thangachery (a British outpost Varkalai, near it) cane boxes of varying sizes at Varkalai matting with leaves also &c.) in the north.

8. Bricks and tiles, at Kunjerevale near Trivandrum, and Mulla Mudu near Eraniel, (both under native firms). The same are manufactured on a large scale at Quilon with costly machines under European and American firms, for pushing on the sale of which out agencies have been recently opened at Trivandrum, Aleppy and Kottayam.

9. Decaying.

10. Better in most cases. In some cases there is now an improvement owing to the recent Industrial awakening.

11. (From the latest Census report.)

Occupation.	Population engaged.		Percentage to the total.
	Supported.	Workers.	
(1) Agriculture ... ..	1,392,712	490,720	47.2 p. c.
(2) Buildings ... ..	28,703	12,192	1 p. c.
(3) Textile fabrics ... ..	177,022	115,316	6 p. c.
(4) Metals ... ..	51,334	17,579	
(5) Earthen and stoneware ...	8,349	4,900	
(6) Wood, cane and leaves Aloe &c. Matting	84,489	38,436	
(7) Minor forest produce ...	1,028	397	
(8) Leather, horn and bone ...	999	370	

12. It is not possible to supply accurate information on this head without a special Industrial Survey authorised by Government.

13. To a large extent. Except the Iluvars who are enterprising and hard-working, the natives of the soil are mostly lazy.

14. They are sent to foreign markets in noticeable quantities as under, extracted from the latest Administration report (M. E. 1080-1904-1905).

Out of the entire external trade exports amounted to 75 p. c. and imports 25 p. c. (The corresponding figures for the whole of British India being 58 and 42 p. c. for 1905-1906. (Mr. Noel Paton's), showing clearly that it is much poorer than British India.)

Total external trade with (1) British India, 90 p. c.; (2) Pondicherry and Marseilles below 1 p. c.; (3) Ceylon, 1 p. c.; (4) Other Asiatic countries, 5 p. c.; (5) United Kingdom, 2½ p. c.; America above 1 p. c.

Value of Exports Rs. 171,48,056.

Imports „ 57,41,246.

During the particular year there was a very considerable decrease owing to general scarcity, 36 p. c. by sea, 49 by back-water, and 15 by land.

EXPORTS.		Rs.
(1) Copra ...	...	15,45,112*
(2) Coir ...	...	39,12,199
(3) Cocoanut oil ...	...	13,07,762
(4) Fibre ...	...	9,627
(5) Cocoanuts ...	...	3,21,714
(6) Areca-nut ...	...	1,49,887
(7) Dry Ginger ...	...	5,57,232
(8) Coffee ...	...	2,430
(9) Jaggery ...	...	3,50,114
(10) Salt-fish ...	...	1,59,482
(11) Tamarind ...	...	1,70,197
(12) Timber ...	...	1,61,814
(13) Pepper ...	...	15,83,157
(14) Hides ...	...	1,86,991
(15) Cardamoms ...	...	20,309
(16) Tea ...	...	79,115
(17) Other Articles ...	...	66,30,614
IMPORTS.		
(1) Piecegoods ...	...	9,38,523
(2) Thread ...	...	61,268
(3) Cotton ...	...	2,77,588
(4) Rice ...	...	8,82,881
(5) Paddy ...	...	14,62,909
(6) Tobacco ...	...	84,778
Minor articles, Oil, Ghee, &c. ...	...	19,33,362

Tobacco is almost universally used by the people. Government imports it and derives very considerable revenue from it. Revenue Rs. 1,38,066. The average consumption was 3.72 lbs. per head omitting young children, &c. the abstainers (one-third of the population). The leaf is imported from Coimbatore and Tinnevely (Jaffna, Ceylon.)

15. (a) Labour (unskilled) is cheap.

(b) Means of communication are cheap by backwaters and sea. There is a considerable area under sea board which is manufacturing. There are good ports, Aleppy, Quilon and Trivandrum, where steamers call, and minor ports Colachel and Anjengo wherefrom and whereto native ships, boats and katarans carry on minor trades.

(c) Natural resources (mineral and forest) are very rich still, even after European exploitation to a considerable extent.

(d) The Government of a Native sovereign without the drain of home charges and costly defence should, of course, do much towards the development of the rich natural resources under the well directed influence of strong and authoritative agencies.

\* One-third of the previous year's.

16. To a very great extent, the industries are expansible with efforts and facilities shown under a, b, and c.

17. Weaving and Paper manufacture. Neither Agriculture nor any one of the minor local handicrafts can maintain a family entirely. In many cases there are more than one occupation.

18. (a) Competition of cheap foreign articles.

(b) Poverty of the craftsmen.

(c) Want of sympathetic encouragement either from the Government or the moneyed class.

(d) Want of proper technical knowledge.

(e) Want of good habits of method and system.

(f) Utter absence of industrial awakening.

(g) Non-existence of proper ideals of public life and well directed ambition and enthusiasm.

(h) The all-absorbing pursuit among the literate of seeking Government appointments.

(i) Government's comparative indifference to the promotion of industrial enterprise by the natives of the State, at the same time that considerable facilities are given to European producers and merchants.

(To illustrate the above-mentioned Europeanised control, during the year (1904-1905) nearly a lakh of rupees was given by Government to *Kannan Devan* planters for opening roads as they liked in the High Range. More than 3 lakhs was already granted for the same purpose. With this 4 lakhs of hard-earned Government money, 28 miles of road have been opened in the High Ranges by *Kannan Devan* planters.)

(j) Utter absence of organised unofficial agencies either for independent industrial, social or other work, or for bringing wholesome influence to bear on the actions of the Government.

19. Decidedly.

20. (1) Starting with the help of Government urban and rural banks to provide cheap capital for the handicraftsmea.

(2) Opening special industrial schools for training boys of the special industrial classes in the particular industries.

(3) Sending to Japan qualified young men for industrial training instead of sending the sons or wards of influential officials to the United Kingdom to qualify themselves for entering the service of the state.

(4) Appointing an industrial expert properly qualified for the work and extremely enthusiastic about his duties to prepare an accurate and elaborate Industrial Directory for the state. (Information detailed about all the mineral, natural or other raw produce, produced or produceable, and the ways and

means for manufacturing any or all of them into finished articles for local consumption and export.)

(5) Starting Industrial Associations for doing active work in the improvement of industries.

(6) Utilising for practical work the unused expert knowledge of the heads of the Government School of Arts and Agricultural Demonstration Farm.

(7) Discouraging foreign exploitation and encouraging indigenous activities.

(8) Facilitating the means of communication.

(9) Infusion of the spirit of Swadeshism.

(10) Substantial recognition by Government of patriotic unofficial work.

21. All the exported raw products and rubber, camphor, gold, plumbago, mica, iron, banana, yams.

22. Coconut oil, copra to a slight extent.

23. Copra, oil fibre, hides, jaggery and country sugar, tapioca, plumbago, mica and forest produce.

24. Hides, etc: all the above.

#### D.

25, 26 and 27. Absolutely Nil.

28 and 29. In the Government school of arts, Trivandrum, instruction in pottery, ivory carving, cotton, plantain fibre and wool weaving is given. In the Nagercoil Technical Institute carpentry and weaving are taught. In the Attingal and Trivandrum Technical Institute weaving of cloths (checks etc. towels). In the Christian girls' schools at Kottayam, Aleppy, Trivandrum, Nagercoil and Quilon, lacemaking and embroidery are taught. In Mission Boys' schools for the backward classes carpentry is taught. In the Government Agricultural Demonstration Farm instruction in agriculture and allied science *may be given*; but now only the students of the Normal school receive instruction once a week on elementary agriculture to be used in the teaching of the subject in the rural Primary schools to which they go after their period of training is over.

30. Merely empirical industries taught, not being scientific at all.

31. They are of recent growth and doing useful work. Government gives 75 per cent. grant-in-aid for Industrial and Engineering subjects and 50 per cent for Commercial subjects taught in such schools. The existing ones are capable of much improvement under proper control and initiation, if the educative value of such school is predominated to the commercial and engineering.

32 and 33. Commercial classes are attached to the Fort High School and Native High School. Shorthand, typewriting, banking, book-keeping and commercial correspondence as well as surveying and levelling, mensuration, estimates and design, building materials and construction, &c., are taught in the above schools as well as in the Nagercoil Technical Institute.

34. Yes, for Mining, Agriculture, Medicine, Engineering and Textile Fabrics.

35. They were not tested. They are the sons or otherwise related to the influential officials of the state.

36. The Government. To serve the state.

37. In the United Kingdom.

38. No arrangement known till now they will be given appointment in the service.

39. The Heads of the Industrial School and Agricultural Demonstration Farm; the former in pottery (advanced) and carving and the latter in agriculture and applied sciences.

40. Not very usefully for the improvement of the industries they may be expected to foster.

41. A scheme of practical work should be given to each of them and efficient control should be exercised over their work. All possible facilities and encouragement should be given to them by Government. The former may be asked to go round the state and select the places where pottery industry can be newly started or existing crude form of it may be improved by special glazing processes or new designs etc. Specimens of pottery manufactured in the Government school with locally procured clay may be shown to the people and they may be persuaded and encouraged to improve their methods. The latter may experiment by rotation the cultivation of one or more special products congenial to the Travancore soil in his farm on scientific methods and communicate impressively the new knowledge thus gained to the people of the parts where such products are at present grown in the old primitive way, by holding there actual Demonstration classes, stopping if necessary for a considerable time at any one place. Publishing occasional leaflets. Distributing new seeds that may be profitably introduced with special instructions relating to their cultivation.

42. None native.

There are of course European associations well organised. The only exception is the one Agricultural Association recently started at Chenganechery, not yet doing much useful work.

(18) V. V. JOGIAH, Esq., *Berhampore, (Madras Presidency).*

The Industries of this District are not in a flourishing condition. Berhampore was once reputed, and I may even say it has not as yet ceased to have the reputation, as being an emporium for the best and most durable *Silk Manufactures*. The weavers for want of sufficient encouragement and on account of poverty have been leaving the District for Calcutta and other places to work in the mills there. It is said their residence in other places has been teaching them thrift and self-help which they wanted most when they were here. A number of improved looms and their practical working, if exhibited here to the advantage of the weavers, may to some extent benefit the wearers by inducing them to take to these looms and thus increase the outturn of their industry.

Chicacole, a town about 90 miles from Berhampore, is reputed for its *shirting cloth*. It is generally used for summer wear. Though it is not thick, it is durable and is generally in use in the District. *Superior cotton cloths* are made at Ampola near Chicacole, and Narasampeta, a town of some importance; while *coarse cloth* which is worn by the common people and is said to be durable is made at Itchapore, Sanpett and other places.

There are also other industries in the District. *Sugar* is manufactured in a Factory at Aska. This has been under the management of Mr. Menchin, a well known European merchant in these parts for a long number of years. *Brass utensils* and *brass betel-nut boxes* and *fancy works* are made in a village called Pitala and Bellagunta in the Gumsur Taluk of this District. The work is considered very superior. At Russeludi in the Gumsur Taluq there is a Mohammadan merchant by name Nyaz Mahamed Sahib who has two big godowns to convert raw hide into *tanned hide* for export and his business is flourishing. There has lately been established a *rice-mill* by a Godavery merchant of repute in Sanpett, a railway station, about 32 miles from Berhampore. Just at present, it has not been as profitable as it was expected to be. It is said that there has not been a sufficient supply of paddy for the mill. It is suggested that if it is made a joint-stock concern taking a large number of influential men of the District as shareholders, the latter may be able to secure large quantities of paddy for the mill and that the result will be large profits. It is encouraging to hear that Mr. Kovvuru Basivi Reddi, who has opened factories elsewhere and who is the owner of the mill at Sanpett, contemplates taking a large number of shareholders. By this means the working of the mill can be made a success, and of profit to all concerned.

I should say there is nothing like industrial activity in the District. An Industrial Association—a co-operative concern—was formed with the object of encouraging the sale of Swadeshi goods and of purchasing looms and exhibiting the same for the benefit of the weavers here. It has not done much work as yet, but it is to be hoped that it will do some work in the future.

In this connection I must not omit to mention the good; useful and practical work which the Baptist mission have been doing at Berhampore. They have started a workshop and have been training Native Christians in weaving coarse cloth, towels, &c., with improved looms, in carpentry, carriage building and repairing, furniture-making and shoe-making &c.

As for agriculture, the District may be said to contain a large and fertile tract of country fit for this purpose. At present almost the whole of this tract is brought under plough. Generally only one crop is raised. It is very unusual to raise a second crop. There is an Agricultural Association in the District with the Collector as its President and it has opened an experimental farm in Berhampore.

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(19) G. R. GAMBHIR RAO, Esq., *Deshmukh of Savada*  
(*Khandesh district*).

There are no manufacturing industries of any kind. There are no minerals. There are no banking facilities. There are no facilities for technical education. And there is no industrial association.

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(20) THE EDITOR, "*The Khandesh Vaibhar*," *Dhulia*.  
Same as above.



## APPENDIX VI.

### THE INDIAN INDUSTRIAL CONFERENCE.

#### Prizes for Model Hand-loom.

A prize of Rs. 300 cash will be given to the best factory hand-loom and one of Rs. 200 to the best cottage hand-loom which will satisfy the following conditions:—

The factory loom should be able to work 100 to 120 picks per minute without undue fatigue to a practised weaver, should be able to work at this speed on a warp of 40's counts without undue breakage, should be simple of construction and easy of repairs by a town mechanic, should have automatic taking-up motion to control the number of picks per inch in the cloth, and should not exceed Rs. 100 in price for a 45 inch loom.

The cottage loom should be able to work 100 to 120 picks per minute without undue fatigue to a practised weaver, should be able to work at this speed on a warp of 40's counts without undue breakage, should be simple of construction and easy of repair by a village or town mechanic, and should not exceed Rs. 50 in price for a 45 inch loom.

The inspection and examination of the competing hand-loom will take place at Calcutta in December next in the week of the meeting of the next Indian Industrial Conference, and will be conducted by competent men selected for the purpose. The place for the exhibition of the model looms will be announced later on. All intending competitors should communicate to the undersigned their intention to exhibit their models before the 15th November 1906.

R. N. MUDHOLKAR,

*General Secretary,*

*Indian Industrial Conference,*

*Amrotsi (Bewar),*

## APPENDIX VII.

### JOINT STOCK COMPANIES.

*Number and Particulars of Joint Stock Companies Registered in each Province in British India in the nine months ending the 30th September 1906.\**

No.	Name of Company and Situation of its Registered Office.	Object.	Capital.
<b>1.—BANKING AND INSURANCE.</b>			
(a) BANKING.			Rs.
1	Indian Mills, Co-operative Life Assurance and Mahomedan Central Banking Co., Bengal.	Erecting mills and factories for the production of cloth, etc., carrying on the business of life and other forms of insurance and the business of banking	10,00,000
2	Sidlaghatta Sri Suryanarayanaaswami Bank, Mysore	Banking and Trading in Silk and Jewels	20,000
3	Lahore Bank, Lahore, Punjab	Banking and General Trading	2,50,000
4	Canara Banking Corporation, Udipi, S. Canara, Madras	Banking	90,000
5	Pioneer Investment Co., Lahore	Lending money, dealing in shares, receiving deposits, etc.	2,50,000
6	Kapur Commercial Agency, Lahore	Money-lending and Commission Agency	1,00,000
7	Swadeshi Bank, Bombay	Banking	1,00,000
8	Hindustan Bank, Multan, Punjab	Banking and Agency	2,50,000
9	Marwar Bank, Hissar	Banking	10,00,000
10	Chalapuram Bank, South Malabar, Madras	Do.	40,000
11	Banking and Ornament Manufacturing Co., Meerut, U. P.	Banking and Ornament Manufacture	1,00,000

12	Islamic Bank, Delhi, Punjab...	...	Banking	10,00,000
13	Bank of Western India, Bombay	...	Do.	25,00,000
14	Bank of India, Bombay	...	Do.	1,00,00,000
			Total, Banking	1,67,00,000
<b>(b) INSURANCE.</b>				
15	Indian Mutual Assurance Co., Vizagapatam, Madras	...	Life Insurance	20,000
16	Co-operative Assurance Co., Lahore, Punjab	...	Fire and Accident Insurance	5,00,000
17	All India United Insurance Co., Bombay...	...	Fire Insurance	50,00,000
			Total, Insurance	55,20,000
			Total, Banking and Insurance	2,22,20,000
<b>II.—TRADING.</b>				
<b>(a) NAVIGATION.</b>				
18	East Bengal River Steam Service, Bengal	...	Carrying on the business of ship-owners and carriers by land and water	6,00,000
19	Madras Steam Navigation Co., Rangoon, Burma	...	Navigation between Rangoon and the Coromandel Ports	10,00,000
20	Port Shipping Co., Bengal	...	Business of carrying by land and water and of ship-owners	15,00,000
21	Bombay Steam Navigation Co., Bombay	...	Business of ship-owners and charterers	60,00,000
22	Shah Steam Navigation Co. of India, Bombay	...	Ship-owners and charterers of ships, etc.	30,00,000
			Total, Navigation	1,21,00,000

\* Compiled from the Indian Trade Journal.

No.	Name of Company and Situation of its Registered Office.	Object.	Capital.
II.—TRADING.—(Continued.)			
(b) CO-OPERATIVE ASSOCIATION, ETC.			Rs.
23	Kumbakonam Co-operative Stores, Kumbakonam, Madras	Co-operative Stores, etc.	10,000
24	Munshiganj Co-operative Co., Bengal	General trading, and trading in Indian arts and manufactures	20,000
25	Magura Desiya Bhandar, Bengal	Trading in country-made goods	15,000
26	Bengal Industrial and Trading Co., Bengal	General trading	50,00,000
27	Laxmir Bhandar, Calcutta	Trading in Indian Manufactures and products	1,00,000
28	Oriental Match Manufacturing Co., Bengal	Manufacturing Matches	1,00,000
29	Shragers, Bengal	Spinning and doubling cotton, flax, etc., and manufacturing linen	1,00,000
30	Swadeshi Vastu Prachar Co., Maghiana, Jhang, Punjab	Encouraging Indian Arts and Industries	20,000
31	Ahmedabad General Agency Co., Ahmedabad	Commission Agency	1,00,000
32	Swadeshi Hitechu Traders Co., Nasik, Bombay	Trading in cloth	20,000
33	Swadeshi Vyapar Ootejak Mandali Satara	General trading...	20,000
34	Kishorganj Trading Co., Mymensingh, Eastern Bengal and Assam	Do.	20,000
35	Habiganj Jatiya Bhandar Sanuti, Sylhet, Eastern Bengal and Assam	Banking, Agriculture and General Trading	50,000
36	Cachar National Union Club, Cachar	General trading	20,000
37	Bharat Champad, Cachar	Do.	20,000
38	National Stores, Bengal	Do.	1,00,000
39	Beliaghata Cardboard Manufacturing Co., Bengal	Manufacturing strawboards, cardboard, etc.	50,000
40	Krishnagar Desiya Drabyagar, Bengal	Trading in Indian arts, manufactures, etc.	20,000
41	Jubilee Workshop, Aligarh, U. P.	Trading in leather, rubber, wood, etc.	30,000
42	Salem Shevvapet Sri Ramalinga Samdesvari Varthaka Co., Shevvapet, Salem, Madras	Trading in cloth, etc.	1,00,000
43	Central Indian Co-operative Stores & Manufacturing Co., Delhi	Manufacture of and trade in Indian goods	1,00,000

44	Shet Rustomjee Devicha and Co., Ahmedabad	Carrying on the agency of a mill	3,200
45	Rushtea Desiya Bhandar, Bengal	Dealing in articles of Indian or Japanese art and Manufacture	20,000
46	Bengal Pottery Works, Bengal	Manufacture of Terracotta, porcelain and earthenware	20,000
47	Shripad Ranchandra & Co., Poona	Commission Agency	20,000
48	Swadeshi Knitting Factory, Tanukur, Madras	Sale of country-made goods	5,000
49	Swadeshi Stores, Godavari	Trade in indigenous articles, etc.	10,000
50	Giridih Swadeshi Gola, Bengal	Trading in Indian art, manufacture and produce	20,000
51	Chhatra Bhandar, Bengal	General trading, etc.	20,000
52	Arta Shilpa Samity, Bengal	Development of Cotton Industry, etc.	5,000
53	United Bengal and Assam Pharmaceutical and Chemical Works, Bengal	Manufacturing Medicines and Chemicals	5,00,000
54	Bagirhat Bharat Bhandar, Bengal	General trading	10,000
55	Sholapur Handloom Weaving Co., Sholapur, Bombay	Trading in hand-made cloth	15,000
56	Swadeshi Vastu Bhandar, Sholapur	Dealing in Country goods	10,000
57	Gujarat Candle Factory and Asbestos Works, Bombay	Manufacturing Candles, Soaps & Asbestos Wicks.	2,00,000
58	Indian Bobbin Manufacturing Co., Surat, Bombay	Making bobbins, Shuttles, and other articles of wood	75,000
59	Athani Swadeshi Vyaparotejak Co., Athani, Bombay	Trading in Indian goods	20,000
60	Sind Weaving Co., Sind	Encouraging textile industry by use of handlooms.	20,000
61	Indian Co-operative Society, Bombay	Trading in Indian Articles	1,00,000
62	Desiya Stores, Vizagapatam	Do.	10,000
63	Oriental Glass Works, Aligarh, U. P.	Manufacture of Glassware	50,000
64	Pioneer Handloom Weaving Co., Jullundhur, Punjab	Weaving cloth	50,000
65	Swadeshi Hitachintak Mandali, Jalgaon, Bombay	Trade in country goods	10,000
66	Dosabhoy Baghabhai & Co., Ahmedabad, Bombay	Agency of a mill	8,000
67	Parlakemidi Weaving Co., Ganjam, Madras	Manufacture and sale of cloth	12,000
68	South Indian Stores and Agency Co., Madras	General Merchants and Commission Agents, etc.	25,000
		Total, Co-operative Associations, etc.	70,53,200
		Total, Trading	1,91,53,200

No.	Name of Company and Situation of its Registered Office.	Object.	Capital.
<b>III—MILLS AND PRESSES.</b>			
<b>(a) COTTON MILLS.</b>			
69	Bengal Luxmi Cotton Mills, Bengal ... ..	Spinning and Manufacturing of Cotton	12,00,000
70	Ahmedabad New Edward Manufacturing Co., Ahmedabad ...	Spinning and Weaving Cotton, etc. ...	5,25,000
71	Bankey Behari Lal Jai Narayan Cotton Mills Co., Etawah, U. P. ... ..	Manufacture and Sale of Cotton, etc....	1,20,000
72	Ahmedabad Swadeshi Spinning and Manufacturing Co., Ahmedabad ... ..	Spinning and Weaving Cotton, etc. ...	8,00,000
73	Poona Swadeshi Weaving Co., Poona ... ..	Do. Do. ... ..	2,50,000
74	Rehmani Mills, Bombay ... ..	Do. Do. ... ..	10,00,000
75	Vizagapatam Spinning and Weaving Co., Vizagapatam, Madras	Do. Do. ... ..	1,00,000
76	Finlay Mills, Bombay ... ..	Do. Do. ... ..	20,00,000
77	Desi Cloth Mills Co., Bengal... ..	Spinning, Manufacturing, etc., cotton, cotton stuffs and fabrics ... ..	6,00,000
78	Godavari Weaving Factory, Tamerker, Godavari, Madras ...	Spinning and Weaving Cotton, etc. ...	12,000
79	Coimbatore Imperial Cotton Mills Co., Coimbatore, Madras...	Do. Do. ... ..	7,00,000
80	Ganesh Cloth Mills Co., Bengal ... ..	Do. Do. ... ..	5,00,000
81	Madras Mercantile and Industrial Corporation, Madras ...	Do. Do. ... ..	25,00,000
82	Tripura Co., Bengal ... ..	Business of Spinners, weavers, etc., of cotton jute, hemp, etc. ... ..	15,00,000
83	Bharat Hitaishi Spinning and Weaving Co., Bengal ...	Business of Manufacture, dyeing, etc., of, cotton, cotton stuffs, etc. ... ..	10,00,000
84	Barsi Spinning and Weaving Mills, Bombay ... ..	Spinning and Weaving Cotton, Flax, etc. ...	10,00,000
85	Akola and Central India Spinning, Weaving and Manufacturing Co., Bombay ... ..	Do. Do. ... ..	7,50,000
86	Edward Mills Co., Beawar, Ajmer, Merwara ... ..	Spinning, Weaving, ginning and packing cotton ...	8,40,000
87	Pratap Spinning, Weaving and Manufacturing Co., Khandesh ...	Weaving cloth and spinning cotton, silk, etc ...	10,00,000
88	Kamala Mills, Bengal ... ..	Weaving yarn ... ..	1,80,000

89	Gordhan Spinning and Manufacturing Co., Ahmedabad	Spinning and Weaving Cotton	5,25,000
90	Burhanpur Tapti Mill, Bombay	Do. Do.	12,00,000
<b>Total Cotton Mills</b>			<b>1,80,82,000</b>
<b>(b) JUTE MILLS.</b>			
91	Belvedere Jute Mills, Bengal...	Spinning, weaving, manufacturing, etc., Jute.	14,00,000
92	Lawrence Jute Co, Bengal ...	Spinning and Weaving Jute, etc.	15,00,000
<b>Total, Jute Mills</b>			<b>29,00,000</b>
<b>(c) OTHER MILLS AND PRESSES.</b>			
93	Dattatraya Oil Mill Co., Khandesh, Shirpur, Bombay	Expressing Oil	35,000
94	Sharada Mills Co., Delhi, Punjab	Spinning, weaving, manufacturing wool, etc.	5,00,000
95	Aya Ram Ginning and Press Co., Dera Ghazi Khan, Punjab...	Ginning and pressing cotton, etc.	1,00,000
96	Narnarayan Press and Manufacturing Co., Broach, Bombay	Do. Do.	60,000
97	Sholapur Oil and Flour Mills Co., Sholapur, Bombay	Millers and oil compressors	50,000
98	Rannabennur Ginning and Trading Co., Rannabennur, Bombay	Ginning and pressing cotton, etc.	50,000
99	Gujarat Oil Mill and Manufacturing Co., Ahmedabad	Manufacturing and selling oil	2,50,000
100	Krishna Ginning Co., Shikohabad, United Provinces	General trading	80,000
101	Sialkot Swadeshi Co., Sialkot, Punjab ...	Ginning, pressing, etc., textiles, fabrics, wool, etc.	50,000
102	Coromandel Baling Co., Cocanada, Godavari, Madras	Baling and pressing	3,00,000
103	Punjab Brothers Co., Multan, Punjab ...	Ginning, pressing, etc., wool, hemp, etc.	2,50,000
104	Dhanki Ginning and Manufacturing Co., Ahmedabad, Bombay	Ginning and pressing cotton	10,000
105	Barsi Cotton Ginning Factory Co., Bombay	Do. Do.	40,000
106	Mhow-Woon Rice Mill Co., Hanthawady, Burma ...	Rice Millers and Traders	1,11,750
<b>Total, other Mills and Presses</b>			<b>18,86,750</b>
<b>Total, Mills and Presses...</b>			<b>2,28,38,750</b>

No.	Name of Company and Situation of its Registered Office.	Object.	Capital.
<b>IV.—SUGAR MANUFACTURE.</b>			
107	Anakapalle Sugar Works and Trading Co., Anakapalle, Vizagapatam, Madras ...	Sugar Manufacturing and trading ...	2,00,000
108	Maharajunga Desi Sugar Works, Bengal ...	Manufacturing, refining, etc., Sugar, Molasses, etc. ...	3,00,000
<b>Total, Sugar Manufacture...</b>			<b>5,00,000</b>
<b>V.—PLANTING, MINING AND QUARRYING.</b>			
109	Indian Cotton Cultivation Co., Bengal ...	Cotton Cultivation ...	10,000
110	Western India Cotton Growing Syndicate, Bombay ...	Growing Cotton and other fibrous substances ...	52,000
111	Peninsular Mineral Co., of Mysore, Bangalore City ...	Mining of Manganese ore ...	3,00,000
112	British India Coal Co., Bengal ...	Colliery business ...	1,00,000
<b>Total, Planting, Mining and Quarrying</b>			<b>4,62,000</b>
<b>VI.—OTHERS.</b>			
113	Ice Factory and General Mills, Shahpur, Punjab ...	Erecting ice and other factories ...	10,000
114	National Indian Trustee Association, Lahore, Punjab ...	Acting as Executors, Administrators, Receivers, Guardians, Managers, Agents and Trustees for Wards, Clients and Charities of Investment, etc.	5,00,000
<b>Total, others,</b>			<b>5,50,000</b>
<b>Grand Total ...</b>			<b>6,57,23,950</b>



*Abstract Table of Companies Registered in the Months  
January—September, 1906.*

No.		Capital Rs.
14	Banking Companies ... ..	1,67,00,000
3	Insurance Companies ... ..	55,20,000
5	Navigation Companies ... ..	1,21,00,000
46	Co-operative Associations, etc. ... ..	70,53,200
22	Cotton Mills ... ..	1,80,52,000
2	Jute Mills .. ...	29,00,000
14	Other Mills and Presses ... ..	18,86,750
2	Sugar Manufacturing Companies ... ..	5,00,000
4	Planting, Mining and Quarrying Companies ... ..	4,62,000
2	Other Companies ... ..	5,50,000
114	Grand Total ... ..	6,57,23,950

## APPENDIX VIII.

### INDIAN PATENTS.

(Filed in the ten months December 1905—September 1906.)

#### APPLICATIONS FILED.

1. Suraj Narayan Verma, of Rae Bareilly, and Jagat Narayan of Sultanpur, for improvements in shaft bearings applicable to sugarcane crushing mills.

2. Balkrishna Chintaman Chhatre, of Bombay, for improvements in fibre extracting machines.

3. Abdeali Haji Sultanally, and Dinshaw Eduljee Dotivalla, both of Amraoti, for improvements in cotton gins.

4. Khan Bahadur Haji Sajan Laljee, and Dosabhoj Jamsetjee Kanga, both of Secunderabad, for manufacture of an artificial blue colour.

5. Rai Bishambar Nath, Executive Engineer, Public Works Department, Punjab, for a cheap country oil lamp.

6. Rai Bishambar Nath, Executive Engineer, Public Works Department, Punjab, for a cheap bed warmer.

7. Rai Bishambar Nath, Executive Engineer, Public Works Department, Punjab, for a cheap water heater.

8. Mirza Mahamed Ali Khan, of Tonk, for improvements in chaff cutters and the like.

9. Laljee Madhowjee, of Sukkur, for improvements in clocks.

10. Akshoy Kumar Mazumdar, of Mymensingh, for "Tarunia," or form of wood-substitute.

11. Bonkim Lal Das, of Calcutta, for an improved handloom.

12. Gangadhar Ramachandra Mangrulkar, of Bombay, for a grass match-box.

13. R. B. Patel, of Baroda, for automatic fly-shuttle arrangement for handlooms.

14. Ebrahim Abdul Razaq Moulvi, Alishaik Bidree, and Mohamed Ishaq Bidree, all of Sholapur, for improvements in basing mechanisms for warping machines and the like.

15. Rao Bahadur Cheverur Krishnachar Subba Rao, of Coimbatore, for a Ryots' improved water-lift and general worker.

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\* Compiled from the lists published in the numbers of the *Indian Textile Journal* from January to October.

16. The Bengal Rhea Syndicate, Limited, of Calcutta, and H. E. Whitehead, of Dalsingh Serai, for improvements in and relating to apparatus for cleaning fibres.

17. Bonkim Lal Das, of Calcutta, for a loom to be called Bonkim's Domestic Loom.

18. Gulam Hyder, of Bombay, for self-acting orifice cleaning needle for petroleum vapour lamp or stove.

19. Shapoorji Burjorji Fraser, of Bombay, for improvements in the smoke-burning apparatus of steam boiler furnaces.

20. Ram Nath, of Delhi, for a new process for reproducing copies of drawings on paper in blue-black lines on perfectly white ground direct from tracings which may be coloured or uncoloured.

21. Lalit Chandra of Ganhati, Assam, for improvements in spinning and twisting machines.

22. Banwarilal, of Arohra, for improvements in the sugar cane crushing mill.

23. Gangadhar Ramchandra Mangrulkar, of Bombay for improvements in the manufacture of matches.

24. Hari Sakharam Chowan and Karve, of Nasik, for a mote for pumping or drawing out water from wells by means of bullock power.

25. Madan Lal Kapoor, of Peshawar, for a machine (Head and Treadle or Power Loom) for weaving cotton, silk or similar yarn into cloth.

26. Chandra Nath Bose, of Bally, for a process for manufacturing celluloid choories (bangles).

27. Puran Chandra Chatterjee, of Calcutta, for an improved fly-shuttle loom to be called "Sree Krishna" loom.

28. Sait Mutumull and Sait Naraindas, of Sukkur, for improvements in the construction of reservoirs for obtaining and storing water for drinking or other purposes.

29. Krishna Chandra Dass, and Brindaban Chandra Maitra, both of Calcutta, for an improved and simple form of automatic loom entitled "Krishna Brindaban's Patent Jahar Loom."

30. Nur Din, Siraj Din, Shah Mohammad, and Nur Ahmad, all of Lahore, for a syphon fitted with filter for drawing oil or spirits from cans and casks.

31. C. M. Roy, of Lucknow, for improved brick burning in a trench or over ground kiln.

32. A. Subramania Servai, of . . . a water lift.

33. Khetromohon Doss, care of L. Deveria, Alipore, for the "Bengal" self-acting brick and tile-making machine, and the "Bengal" season and weather-proof kiln.

34. Khetromohon Doss, care of L. Deveria, Alipore, for the "Bengal" season and weather proof kiln.

35. A. L. Gange, and Kumud Nath Mazumdar, both of Calcutta, for a process for making waterproof and enamelling ordinary native earthenware to be known as enamelled pottery.

36. Bandu Ganoba Kalhaikar, of Nasik, for an iron water mot.

37. Pestonjee Cursetjee Mehta, of Bombay, for a new fuel briquette.

38. Kedarnath Mendul and Hiralal Mendul, of Howrah, for hand wheel boomur press for pressing of loose jute in one bundle of one and a half maund in weight.

39. Gangadhar Ramchandra Mangrulkar, of Sholapur, for paper or cardboard box making machine.

40. Varajlal Karsandas Davda, of Bombay, for improvements in lamp chimneys of mica.

41. Dr. V. K. Kirloskar and V. K. Tembe, of Sholapur, for an improvement in the bath boiler for heating water for domestic purposes.

42. Ganesh Chandra Aduck, of Calcutta, for improvements in hand power jute and similar presses.

43. Priya Nath Roy, of Darjeeling for a semi-automatic spinning wheel, a rustic machine with common material to be called "Sarala Charka."

#### SPECIFICATIONS FILED.

1. Surapati Ghatak, Shahapur, for a continuous revolving machine for drying and roasting grains and small leaves.

2. Suraj Narayan Verma, and Jagat Narayan, both of Delhi, for a road ramming machine.

3. David Dhanakoti Raju, of Madras, for an oil extracting machine.

4. Ardeshir Temuljee Mirza, of Jamnagar, for improvements in automatic sluice gates.

5. Villupuram Rajaratna Swaminatha Mudaliar, of Madras, for a self-bucket lifting and depositing hand sanitary cart.

6. Mahomed Abdul Kuddus Badsha Sahib, of Madras, for improvements in the construction of curtains or screens known as "rust screens."

7. Govind Ramji, of Kalian, for an improved method of work in burning bricks.