

# **PRESIDENTIAL ADDRESS**

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**INDUSTRIAL CONFERENCE**  
**ALLAHABAD, 1910**

I thank you, gentlemen, for the great honour you have done me in selecting me to preside over the Conference this year. The honour of being your President for the year 1907 was offered to me, on the day of my arrival in Bombay from Europe, but I could not accept your kind offer then as, much to my regret, it was impossible for me, after an absence of six months from my own business, to spare the amount of time, presiding over so important a Conference demands.

I have accepted the honour this year with great diffidence, gentlemen, because I am fully conscious of my own inability to do justice to the duties which devolve upon me as your President. My sense of unfitness is all the more acute when I call to mind that I have been preceded in this honourable office by such able and public-spirited men as the late Mr. Ramesh Chandra Dutt, Sir Vithaldas Thackersay, Dewan Bahadur Ambalal Sakarlal Desai, the Hon'ble Rao Bahadur R. N. Mudholkar and the Maharajah of Durbhanga.

I have been emboldened to accept the presidentship by the knowledge that most of the subjects upon which in the ordinary course I should be required to touch, have already formed the subject of discussion during the last five annual gatherings and I feel sure of your indulgence in listening to one who is a plain business man endeavouring to place the subjects before you from a commercial point of view.

There are now published in India excellent technical journals dealing with practically every class of industry that is capable of development in India. These journals and the records of this Conference furnish us with full details of the numerous industries which we all hope some day to see more fully developed in our country, by the friendly co-operation of capital and labour. Technical papers, exhaustively dealing with various industries, have been read from time to time at these Conferences, by men eminently qualified to speak, containing most valuable suggestions for the industrial development we are so anxious to see established. In fact, the records of the meetings of the last five years furnish sufficient information and it only remains for us to give an impetus to a movement, which will not only supply the ordinary commodities of Indian life, but will keep in the country a large portion of that wealth which now goes to foreign countries, besides giving our country a commercial standing it does not now possess. It is important that we should have some idea of the true direction in which such development lies, added to a practical knowledge, to enable us to guard against the pitfalls of a wrongly directed development, wherein lies the road to disappointment and failure.

I shall only venture to offer a few practical suggestions and to remark upon what I consider fundamental principles, which must not be disregarded, if we are to make any material progress. Several small industries have been started during recent years, in different parts of India, with, in most cases, but indifferent success. We should, therefore, try to trace the causes of failure. In the present condition of our country we should recognize that to develop any industry successfully, we must have, first and foremost, expert knowledge as well as men of undoubted practical experience in the particular industry which we desire to establish. From Bengal students have been sent abroad to Europe and America, at public expense, to acquire scientific knowledge. Some of these students have returned, and doubtless, have acquired a fair knowledge of what they were sent to learn but they must necessarily

lack that practical training and capacity for management, that comes only with long experience and is so necessary for men who hope to become pioneers of new industries. None of these students, so far as I am aware, has shown any capacity for taking charge of, or efficiently managing, any large industrial concern. Nor do they get any opportunity, prior to being sent abroad, to acquire sufficient technical knowledge here, that they might ascertain for themselves, whether they have any liking for, or aptitude in, the particular line in which they are to become experts. It has happened that some of these young men, on returning to their country, have taken up an altogether different profession from that, to learn which, they were sent abroad, and the public money expended on their training has therefore been wasted. If we are really serious in our desire to give an impetus to the development of our industries, we should press for the establishment, in some central part of India, of a well-equipped Technical College, fitted with proper workshops and up-to-date laboratories. Students from the existing technical schools, now established in different parts of India should, if they so desire, after completing their course, be admitted into the Central Technical College. This, I do not think, would clash in any way with the Tata Institute, which, if I am not mistaken, is intended for original research.

With the establishment of a Central Technical College, students from the Universities —(those for example who take the B.Sc. degree), would be afforded an opportunity of continuing further their scientific education and of acquiring practical knowledge in this College. To establish such a college would mean a large outlay of money, and I think that this Conference should without delay approach the Government of India with a draft scheme. The existing technical schools should be placed in a position to offer suitable scholarships to successful and deserving candidates, who may be desirous of continuing their scientific studies, in this proposed Central College. Government scholarships, which are now offered yearly for the acquisition of technical knowledge abroad, could with advantage be diverted to this purpose and to granting scholarships from the Central College for the purpose of gaining further experience by a course of, say two years, in England or other foreign country.

Apart from the doubtful result of sending our young untrained students to foreign countries, as is now done, to acquire technical knowledge, there are grave dangers at the present time, both personal and politic, in sending a large number of students abroad, selected in a more or less haphazard fashion, and the Government of India would, perhaps, be prepared seriously to consider this point, when deciding as to the necessity of establishing a well-equipped Technical College in India. This, gentlemen, is only a rough outline of the scheme. Details would have to be carefully worked out, if the general idea is approved. No private individual, or association, I am afraid, would be able to control or manage such a technical college, or to carry out the scheme in its entirety. The Conference should, therefore, as I have said before, represent the matter to the Government of India and press for the establishment, as early as possible, of a Central Technical College, on the same lines as those now established at Birmingham, Manchester, Leeds and other places.

In the meantime, however, we must not neglect to take advantage of the general feeling that something should be done towards industrial development and I would suggest to our earnest workers that they should not hesitate to engage foreign experts for the present and do away with the vain prejudices of a narrow-minded "Swadeshi", which mistakenly advocates the employment of Indians only, to the exclusion of foreigners.

The next problem to be considered is the raising of capital. Having obtained a reliable expert and established confidence in the public mind, our next difficulty is the finding of the necessary capital. This, indeed, is a difficult problem—private enterprise in this country is only in its infancy, and therefore companies with a really sound and promising future often fail to attract capital. Indian capital, gentlemen, is proverbially

shy and unenterprising but this I ascribe largely to a want of industrial and commercial knowledge on the part of Indian capitalists and a consequent failure to realise the potentialities of the various schemes placed before them, coupled with a disinclination to depart from those time-honoured methods of investing and lending money, which have been in force for so many centuries and, in many instances, bring in a return which can only be considered as usury. India, genenerally speaking, is a poor country, that is to say, the majority of the population are poor. But there is wealth in India, and the possessors of it could, with but a fractional part of their amassed wealth, not only develop many of the industries, that are dormant to-day, but make India industrially equal to any other country in the world.

There must always be a certain amount of risk and uncertainty involved in the early stages of the new class of industry and it is the want of knowledge, referred to before, which prevents Indian capitalists from correctly estimating what those risks are, as against the higher return on their capital which industrial concerns usually give. No new industry in any country, and particularly in India, can be sure of such success as to shew a remunerative return from their very inception. Unless, therefore, our capitalists could be assured of at least  $3\frac{1}{2}$  to 4 per cent. interest on their outlay, it is not likely that they will help in the promotion and financing of such companies. The Government cannot be expected to guarantee a minimum return, even for a short period of years, and it would not be for the ultimate good of the industry itself to be dry-nursed to this extent, but in a country, industrially new, as India is, a certain amount of dry-nursing has to be done and a great deal more could be done in this direction, by granting bounties, or even by preferential duties.

The most convenient method of establishing and working large industrial concerns is undoubtedly that of the Joint Stock Company whereby the investors' liability is limited to the amount subscribed. The Act, however, regulating such enterprises in this country is far from perfect and should be brought more into line with the new English Act of 1908, with such modifications as the different conditions existing in this country, may suggest. It should give ample protection to the shareholders without being so stringent as to strangle commercial development. I believe the matter is already receiving the serious consideration of Government and I hope that we may shortly have an Act that will stimulate enterprise, while providing the necessary safeguards to investors.

In forming a Joint Stock Company the first step is the formation of a strong Board of Directors. Our Boards hitherto have consisted too largely of figure heads. We must, in addition, have on our Boards a few workers,—genuine sincere workers—and men of experience, who are prepared to work honestly and whole-heartedly for the good of the concern. In the present state of our commercial ignorance, I venture to think that it is not only desirable, but indispensable, to secure the services of a fair proportion of commercial European gentlemen on our boards, selected for their sympathy with, and their knowledge of and experience in, the industry to be developed.

The Board thus formed should have only a general control of the Company, the details of working and manufacturing should be left with the manager responsible for the production, who would, of course, be duly selected for his business qualifications and fitness for the post.

There should also be a commercial firm, of good status, selected as Managing Agents, whose functions would be to look after the commercial part of the concern.

What I have said above will doubtless appear very elementary to my Bombay friends, who are managing, and most successfully managing, much bigger concerns than I have in view. My remarks are meant for those who have not been so successful and I am prompted to make these remarks as I have regretfully seen the failure of many



promising ventures through want of the right sort of men on the Board, the lack of good managing agents, and through undue interference, by well-meaning but incompetent directors, with the manager working the concern.

The last and most important requirement is the easy and quick disposal of the articles manufactured. Notwithstanding the best expert knowledge, the required capital, the formation of competent Boards and the securing of capable managing agents; unless our productions can be quickly disposed of, and at a remunerative price, we cannot achieve that financial success which is the object of all commercial undertakings. When we begin manufacturing goods that are now imported from Europe, we shall find many difficulties,—the most formidable being foreign competition. I am sure that any industry started in this country, calculated to decrease foreign imports, will lead to foreign manufacturers putting down goods at our doors at a price considerably below that at which they can be produced in this country, and we shall not be able to find a market for our goods unless we have Protection in some form. Such industries, as we may develop in our country, will not, for years to come, seek a foreign market for their manufactures and our home market, under present conditions, might be practically closed to us by foreign manufacturers, who, with unlimited resources at their command, might possibly consider it policy to dump their goods in the country at a price below our manufacturing cost, with the object of killing local competition and then again raising the prices to a profitable figure.

This is a most serious question, gentlemen, and not only this Conference but every man of this country should continue to constitutionally agitate, until Government affords Protection, in some shape or other, to local manufactures.

Gentlemen, we all know that if the Government of India were left alone to do its duty towards India, there would be no hesitation in introducing some such measure, suitable to the special needs of India. But there are stronger influences at work, whose interests clash with our own, and without the combined efforts of the Government and the people, I am afraid, we shall never get a satisfactory solution. The question of Protection is, I admit, a complicated and serious one and it is with a great deal of hesitation and diffidence that I refer to it at all, but it is a question that should be most carefully considered, as otherwise to do good to some of our industries we may court disaster in other branches of commerce. I would suggest that the Government should be approached and asked to appoint a Joint Commission of officials and commercial men to discuss and decide in what particular form Protection would be most beneficial to India. This point should be definitely decided before we actually apply for any protective legislation. I think it is imperative on our leaders to give this question their first consideration and, if we are successful in securing a wise form of Protection, I am sure the country's industrial development will receive a great impetus.

In connection with foreign competition, I should also like to add that the Patent laws are a very important consideration. In recent years this law has been revised in England by which it is provided that, to retain the protection of law, it is necessary, within a specified period, to manufacture the patented article in England. I think that such a law in this country will assist very materially in the establishment of factories and I earnestly commend the adoption of some such law, in a modified form, to the consideration of the Government. It has been in operation in England sufficiently long to enable one to form an opinion as to its success or otherwise.

The prosperity of the country should be our first thought and, I venture to think that the gratification of our political aspirations is of little avail, if this be lost sight of.

Another point which I think the Government of India might reasonably be asked to insist upon, is that every Government Officer should purchase their requirements from

Indian manufacturers, if the price be the same as imported goods, and provided that the quality of the Indian manufactures is in no way inferior to that of imported goods.

A benevolent inactivity is not the attitude we have a right to expect from Government and indefinite promises of assistance are not of any practical value. Nothing short of definite, and fully authorised assurances of support, confirmed, if necessary, by legislative enactment, should satisfy us. Indefinite promises, in such matters, are subject to different interpretations by different people.

You will pardon my quoting an instance to emphasise the discouraging treatment industrial concerns receive in this country at the hands of Government. A few years ago the Government required a large quantity of materials for the State Railways and an Indian Concern asked that it might be allowed to supply these. The local manufacturers were asked if they would agree to their goods being subjected to the same tests as the English manufactures were, and on their agreeing to this, it might reasonably have been expected that the Government would have willingly paid the same rate in India as the cost of the same goods from England.

Instead of this, it was stipulated that the goods should be supplied at 5 per cent. less than the imported cost.

We should also agitate for the abolition, or at least reduction, of the gigantic Store Department of the India Office in England. When the Store Department of the India Office was established, conditions were entirely different to what they are to-day and it was not possible to obtain locally the requirements of Government. There are now hundreds of firms of repute established in India, capable of supplying the requirements of all the State Departments. The competition, and the staff which the Government of India now has in India, would ensure all goods being supplied at rates quite as low as at present, when the saving that would be effected by the abolition of this department, is taken into account.

Illustrative of the attitude of Government towards the local purchase of stores I may be permitted to refer to a recent order on the subject.

The Government of India issued on the 29th of October last, a revised rule for the supply of articles for public service. It says "when serious inconvenience to the public service would be caused by waiting to obtain an article from England through the Director-General of Stores, or when, owing to the greater promptitude of supply, an economy can be effected by purchasing in India articles which, under the foregoing rules, should be obtained through the Stores Department, the purchase may be made in India, subject to rule 13: provided that the articles are already in India at the time of order; but in such cases, if the value of the articles exceed Rs. 50, the sanctioning officer should place on record the reasons which make the local purchase desirable. This record shall be available for the inspection of the Examiner of Accounts or the supervising officer when required". When we read through the above order carefully, we note that it begins with the qualification, that when a *serious* inconvenience (the word serious is important) would be caused; and it goes on to say that when an *economy* can be effected by purchasing in India, and concludes by saying that when the value of the articles exceeds Rs. 50, the sanctioning officer should place on record the reasons which make the local purchase desirable.

I should like to refer briefly to one other important matter. We often see articles in Indian newspapers, or hear speeches from public platforms, condemning the use of foreign (English) capital for the development of Indian industries. But, I am afraid, those who hold such views do not seriously consider the question in all its aspects. Apart from the fact that foreign capital is only attracted by signs of peace and prosperity, and that we know that foreign capital is welcome in any other country for the development of her

industries, an important consideration for us in India arises from the fact that, for our own good, it is wise to allow British capitalists to interest themselves in our industries, and thus take an active part in their development. That industrial enterprise can be successful in India is amply proved by the many large and thriving industries, representing millions of capital, which already exist and it is a reproach to us, as a people, that practically the whole of these, with the exception of a certain number on the Bombay side, have been financed and developed by English capital and energy. It is true that when these industries were first started, our countrymen had little interest in, or knowledge of, such enterprises, but that attitude is rapidly changing and it should be our aim and endeavour to emulate the example set us by our English fellow-subjects and to join with them in the industrial development of India. Our success in this direction lies in creating for them a personal interest in our concerns as, without their help, co-operation and guidance, it is doubtful if we should succeed, either in our industries or in securing such form of protection as will solidly establish such industries.

Most of my remarks, up to the present, apply to large concerns, requiring considerable capital. But we must not lose sight of the smaller industries, such as tanning, dyeing, soap and match making and sugar manufacturing concerns which only require a capital ranging from Rs. 50,000, to two lacs. These have, of late, got an impetus from the Swadeshi movement, inaugurated 3 or 4 years ago. But for want of practical support on the part of men of our middle classes, these concerns are not thriving as much as we could wish. There is no lack of so-called enthusiasm, but I may be pardoned, if I say it is only lip-enthusiasm on part of many of our countrymen. There are many who are loud in their praises of Swadeshism and the revival of Indian industries, but their patriotism is not equal to the practical test of assisting in the finance of such enterprises. Amongst the most prosperous of our middle class men are those of the legal profession, and members of that profession, owing to their higher and better education, are the natural leaders of the middle classes. They represent us in councils, in Municipalities, in short, in all public bodies. If these gentlemen, who are so ready in offering suggestions for the encouragement of Indian industries, would each put down, say but one month's earnings out of a whole year, for investment in industrial concerns, there would be less difficulty in raising capital for the development of our industries. I count many personal and intimate friends amongst the members of the legal profession, and I hope they know me well enough not to take amiss the charge I have brought against them. I feel sure that they, themselves, will admit it is not unfounded.

As I have said before, a great stimulus has been given to the promotion, improvement, and expansion of small industries by the recent revival of Swadeshi feeling. In this land of ours, from time immemorial up to the middle of the last century, our artisans and craftsmen were justly celebrated, all over the world, for their skill, and the products of their craftsmanship were in great demand in foreign countries. But from the middle of the last century, that is, from the period when steam power was perfected and manufacturing science made such great strides, our manufactures have steadily declined and our industries have languished. To such perfection has manufacturing by machinery now been brought that it has become impossible for our artisans and craftsmen to make even the scantiest livelihood and the industries are consequently either dead or moribund. This is a matter of common knowledge. But what I should like to emphasise and especially draw your attention to, is that for want of elementary education, the artisan and craftsmen classes, even if they had the necessary capital, cannot appreciate the advantage of introducing machinery to cheapen the cost of production. They are very conservative in their ideas, and nothing but the spread of education amongst this class will induce them to welcome and make use of mechanical improvements, which would enable them to compete on more equal terms with the machine-made production. I have come in contact, in my experience of over 25 years, with thousands of artisans and mechanics of different grades. Their natural intelli-

gence and hereditary aptitude, make them skilful workmen in their respective callings, and they do their work, under proper guidance, with a care and skill in no way inferior to the same class of workmen in any part of the world. But, being universally illiterate and thus shut out from a knowledge of any improved methods in their respective trades, they make no advancement or progress throughout their lives and are content to continue working on lines that for generations have become obsolete. They are handicapped by the want of that primary education which their fellow-workmen in other countries have enjoyed for several generations. This state of things has, for some time, been felt to be unsatisfactory and the Indian Government have recently created a separate education department, for the better advancement of education. The time is therefore opportune for this Conference to approach the Government, to extend the system of primary education, and, when the time is ripe, to make elementary education compulsory.

It has been said that one great difference between India and Japan is, that in India 95 per cent. of the population *cannot* read and in Japan 95 per cent. *can*, and this, I am convinced, is the real secret of the disparity that exists between the commercial development of India and Japan.

And, now, gentlemen, I pass to a subject, which though, strictly speaking, is not industrial development, is so bound up, and intimately connected therewith, as to form an integral part of any well-considered scheme of this kind. I refer to the building of new railways and extensions to existing ones.

I think we all recognise that the Government of this country has for years followed a consistent policy of building trunk and main lines, as far as the funds at their disposal warranted, and these lines, which may be described as the main arteries of the commercial life of India, are in a prosperous and thoroughly sound condition and form a most valuable asset of the people. I think you will agree with me that this portion of the railway development of India is being well looked after by Government.

What, however, I wish to draw attention to is the vast opening which exists for light feeder railways. The main lines of railway are made chiefly to establish communication between important towns and sea-ports and to carry the export and import trade of the country. They must, of necessity, leave untouched large intermediate tracts and these provide an unlimited field for cheaply constructed feeder lines which would provide facilities for a traffic which is not sufficient to justify the construction of an expensive broad gauge line.

Such lines should be constructed on terms sufficiently liberal to attract, what has been aptly termed, the "buried millions of India." Government has endeavoured to meet this undoubted want in the new "branch line terms," which are much more liberal than those they have superseded.

These, however, in my opinion, do not go far enough. It is true that the rebate terms give a reasonable certainty of a minimum return, where the lead over the main line is sufficiently long. It is otherwise where the light railway is situated within a short distance of the port or city to which its traffic is destined.

In such cases something more is needed. There are already a number of successful light railways, constructed and worked under a District Board guarantee of four per cent., with a division of profits above that figure, but every District Board is not financially strong enough to contemplate lightly such a guarantee, with the present means of raising funds allowed by the law. The Branch line terms, by raising the "rebate-guaranteed" interest to 5 per cent, encourage the construction of branch lines, under certain conditions, but cut the ground from under the feet of those promoted by District Boards with a guarantee of 4 per cent.

It is a fact beyond contention that more lines of the "light narrow gauge railway" type, would be constructed, were the District Boards encouraged to promote such within their districts. Such bodies are, or should be, the best judges of local needs and the possibilities of financial success or otherwise.

A few years ago there was an act before Government authorizing District Boards to levy a special cess for the purpose of guaranteeing such lines and it is my belief that such an Act is necessary. Its terms should empower the District Boards to levy such a cess, and should provide that such revenue as might be received from a share in the surplus profits might be put against the amount so raised.

It would be necessary, however, in order to bring the Act into line with the branch line terms to raise the District Board guarantee to 5 per cent.

It has probably been noticed by many of you here, that during the last decade monetary conditions seem to have changed and people, who were previously content with a safe return of 3 per cent to 3½ per cent, now look for a much higher return. It is not for me to attempt to diagnose the economic conditions which have brought about this feeling, but it is not common to India alone. In the past it has, at favourable opportunities, been possible to raise capital on a District Board guarantee of 4 per cent, in the same manner as it was possible for Government to raise loans cheaper than it is at present, but that time seems to have passed and it is now necessary to offer more liberal terms.

I would ask our new Commercial Member and the Railway Board to give this question their consideration, as it is possible that the effect the new Branch line terms would have on the promotion of District Board lines, was not considered. It may be possible, in some form or other, to combine the District Board guarantee with a rebate from the main line on interchanged traffic.

Talking about the Railway Board, as a commercial man, I would like to see a commercial or financial expert as one of the members. As at present constituted the Board is what I may call a technical one. Each member has wide and expert experience and knowledge in the construction and working of Railways but, inasmuch as Railways are inseparably connected with the commercial interests and development of the country, what is wanted, in my humble opinion, is an additional member who should be a commercial and financial expert. I will give an instance where the trade of the country is suffering for want of such knowledge.

In the Central Provinces we have a valuable industry that requires to be fostered or it will die out altogether. I refer to the trade in Manganese Ore. This trade, so far as India is concerned, only came into existence a few years ago, when after much prospecting, valuable Mines were discovered. The chief rival of Indian Manganese is the Russian Ore, from Mines in the Caucasus, where, it is reported, sufficient ore exists to continue producing at the rate of 6,00,000 to 7,00,000 tons per annum for the next 20 or 30 years. Therefore, the competition with Indian Ore must continue. In quality the Indian Ore is somewhat superior to the Russian and, given reasonable facilities in transport, would always be able to hold its own on the European Markets. As a matter of fact, however, the exports of Manganese from India have been steadily on the decline, and during the last 3 years, our competitors in Russia are actually going ahead.

In 1908 (January to September) the imports of Caucasian Ore into the home market were 2,86,416 tons. In 1909 for same period they advanced to 4,26,488 tons and, up to September 30th of the present year, have reached 5,85,205 tons. The trade, therefore, from Russia has doubled itself in 3 years and this is entirely due to the reduced transport charges sanctioned by the Russian Government, with the object of fostering and holding the trade.

To enable India to retain some portion of the trade it is necessary to reduce the railway freight from the mines to the port. Such a reduction, as would enable this to be

done, would still leave the railways concerned a handsome profit, inasmuch as a large proportion of the wagons now returning empty, particularly on the B. N. Railway, would then be carrying manganese. ..

Before I conclude, I would like to say a few words about agriculture which, as we must all admit, is the mainstay of the country. Two-thirds of the population of India are directly dependent on agriculture. Both the Government of India and the Local Governments are making serious efforts for the improvement of agriculture, according to recent scientific methods. As we are all aware, a splendidly equipped Scientific College has been established at Pusa under the Government of India. Local Governments have also provided provincial agricultural colleges, with a home-farm attached, for imparting instruction in improved methods of agriculture. But I have my misgivings as to the amount of direct good these schemes will achieve, in proportion to the money expended by Government. For want of elementary education amongst the cultivators, the sons of middle class men, who have hitherto been educated to earn a livelihood as clerks etc., are largely admitted into these Colleges and they will doubtless, in course of time, acquire a knowledge of agriculture, according to recent scientific methods. The question that arises, however, is, how will such students employ the knowledge thus acquired, at enormous expense, in actual, practical cultivation. Throughout India cultivation, as a rule, is carried on by the cultivators themselves in small lots of from 3 to 20 acres, according to their means, and the number of men in the family. These cultivators carry on the work according to their own ideas, and it is very difficult—almost insurmountably so—to persuade them to adopt any new suggestions or improved means, which involve extra expenditure at the beginning. I also know from my own personal experience, that they are very averse to allow any improvements or experiments to be carried on in their fields, even if they do not bear the extra expense. The students of these agricultural colleges have, generally speaking, either no land to cultivate or no capital to start work, even on a moderate scale. There is very little land, suitable for cultivation, which is not already cultivated, except jungle land, which might be cleared, or such places as the Sundarbans. Few of our landed aristocrats or Zemindars have large areas in their Khas possession, which they would be willing to place at the service of these students to experiment with. The only satisfactory solution seems to be the elementary education of the ryots, to enable them to appreciate the advantages they would derive by adopting improved methods of agriculture, and by joining together in small groups to utilise the services and advice of the students who graduate from the agricultural colleges. I am not an advocate of compulsory education at this stage. This is impracticable for many reasons, but there is no doubt that without the extensive spread of primary education amongst the illiterate classes, both artisan and cultivator, there is very little hope of any real improvement or advancement in either small industries or agriculture.

Here, in sight of this great Industrial Exhibition, we should indeed be lacking in gratitude (a quality which, despite our critics, we are by no means deficient in) if we did not acknowledge our indebtedness to the Government and all those who have worked so hard to make it a success.

Many of us may have our misgivings that here again the ultimate result—the industrial advancement of our country—achieved by this effort, will not be commensurate with the expenditure of money upon it, for the same reason that many thousands of the visitors have not had sufficient education to appreciate what they see. But I am sure that we all realise the good intentions which prompted the Government to organise this Exhibition and appreciate the devotion and energy with which Sir John Hewett and his officers have worked to make it a success.

There is no doubt that these Exhibitions do a great deal of good, but until the indus-

trial development of the country has made considerably more advance, than is the case at present, they are very much on a par with a manufacturer who spends large sums on advertising in a country, the inhabitants of which cannot read the language in which he advertises.

I thank you, gentlemen, for the indulgent hearing you have given me. The subjects I have spoken of are not new to you. They are old ideas, in other clothing. If I have succeeded in placing them before you in a different guise and in a manner that has brought forth fresh ideas and new thoughts I shall feel that I have not occupied so much of your time in vain.

Allow me again to express my thanks for the cordial welcome I have received and appreciation of the confidence you have shewn in me in electing me your Chairman.

The Presidential Address of Mr. V. P. Madhava Rao, C.I.E., at the  
Thirteenth Session of the Indian Industrial Conference held  
at Calcutta on the 30th December 1917.

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MR. CHAIRMAN OF THE RECEPTION COMMITTEE, BROTHER DELEGATES, LADIES  
AND GENTLEMEN,

I thank you most sincerely for the great honour you have done me in electing me President of the Thirteenth Session of the Indian Industrial Conference, a body which has been silently doing its educative and propagandist work during the last thirteen years. When the Conference organisation offered the presidentship to me, it was not without hesitation that I accepted the offer as I had my own misgivings about my competence to discharge the duties of the high position, which had been so worthily held by so many distinguished industrialists. It is only the deep sense of duty which every son of the Motherland owes to her at this critical stage of her history, that emboldened me to take up the work, however deficient my qualifications may be ; and when I have the co-operation of such earnest and devoted workers as yourselves, I am sure the work of this Session will be done no less efficiently than has been the case with the previous Sessions.

Before I proceed further, I may be permitted to remark that this address will be confined to topics which should form the subject of the different resolutions and to a few general observations on the condition of the country at the present time and this course, I am sure, will commend itself the more readily to you, in that the addresses of the previous years have given a general survey of the Industrial position of India and have dealt with industrial and commercial questions in a full and comprehensive manner.

You are aware that the great war in Europe which has dislocated the commerce and industry of all the civilised nations, has greatly affected our trade, and several new and important problems have arisen since the commencement of this world-conflict demanding the utmost watchfulness on the part of our rulers and readiness to exploit our economic resources and organise our industrial forces in a manner that will, to some extent, compensate India for the wrong done in the early years of the last century ; and in this work, the co-operation of this Conference, which is the organ of the Indian industrialists, will be of the utmost value. Every patriotic Indian should give his whole-hearted support to the work of reviving our industries and establishing them on a firm basis. We are glad that the Government has seriously taken this work in hand as will be seen from the pronouncement recently made by H. E. the Viceroy at the opening of the Exhibition at Madras.

Since the appointment of the Indian Industrial Commission under Sir Thomas Holland, a portion of the valuable and important evidence has already become available to the public and apart from the question as to what recom-



mentations it may make ultimately, the information that has been collected so far is very valuable and I propose to utilise it to some extent in indicating the economic needs of the country at this juncture.

It is well known that for the industrial development of a country the following things are essential :—

- (1) Natural resources.
- (2) Capital.
- (3) State Aid.
- (4) Market facilities.
- (5) Transport facilities.
- (6) Skilled labour.

With regard to the natural resources, our country is proverbially rich, as raw materials for the manufacture of various articles are to be found in abundance almost everywhere. It is only capital and other factors that are required for the conversion of this abundant supply into finished products. Although Indian capital is generally shy, it is the experience of those, who have started big concerns of the Joint Stock type, that if an enterprise is backed up by good names or by influential persons of proved integrity, there will be no difficulty in raising funds. Again, if Government guarantee dividends for a limited period, the present difficulties could be greatly overcome. Savings of people in large cities and earnings from speculations are the main sources from which capital is generally drawn. It is very difficult to tap the mofussil. The seven forms of Government Aid suggested by the Commission are not equally suitable for every kind of venture, and the aid to be given will have to be determined by the nature of each case. The Government may also lend the services of their experts on payment of reasonable fees. As for research in specific industrial problems, there ought to be Research Institutes in the country itself, which may occasionally consult Research Institutes in England, if they meet with any difficulty. In addition to the Research Institutes, there ought to be Industrial Schools working in co-ordination with the apprenticeship system. This will gradually increase the efficiency of labour.

The marketing of products will be helped by the establishment of Commercial Museums in all important centres, as well as opening of shops on the model of the Swadeshi Co-operative Stores. Travelling Exhibitions will also render much help to Industries.

The question of the transport of articles deserves careful consideration. The rates at present charged by the Indian Railway Companies are in the majority of cases prejudicial to the growth of indigenous enterprise. Transport facilities both by land and water and other special concessions should be given to new ventures to minimise the effects of competition. The Seaport rates work to the advantage of foreign imports and the local manufactures have to contend with very high rates for transporting their goods inland. This affects the development of local manufactures to a great extent. The Directors

of Commerce and Industries, wherever they exist either in British India or Indian States are striving their best to collect information and to help the starting of new concerns and much can be done by the educated classes, if they could second their efforts and co-operate with them. For the diffusion of knowledge of arts and sciences, there is need of a well equipped Library in a central place for the different provinces of India. There is to my knowledge not a single library of this kind in the whole country. There should also be laboratories to encourage private individuals to carry on research work.

In this connection, I would be failing in my duty if I omitted to refer to the Swadeshi movement, which has again come to the front and the necessity for which is being realised all over the country, both by the people and the government. If we want our country's arts and crafts to be revived and fostered and raw products utilised for the manufacture of goods which we now import from foreign countries, it is obvious that the only course for attaining our object is to create a demand for the use of Swadeshi articles. The cause of Swadeshi is so well-known in every part of the country and is familiar to both prince and peasant, that it does not require much advocacy from me. The Swadeshi Movement throws certain responsibilities on the producers as well as on the dealers and these responsibilities should always be borne in mind by every well-wisher of the country. The efforts of the Bombay Swadeshi Co-operative Stores Company, Limited, to push forward the sale of Swadeshi articles have been attended with conspicuous success and this concern may well be taken as a model for other centres to follow. We learn that this agency is willing to open branches in all important towns and appoint local committees to supervise the working of each branch and it behoves our countrymen to avail themselves of the proffered aid and invite this concern to start Swadesh shops in different parts of the country. This is the most practical step, that I can suggest for the encouragement of the Swadeshi movement. The credit of the revival of the Swadeshi spirit, its renewed vigour and vitality since 1905, belongs to our Bengalee brethren to whom we pay our humble tribute of gratitude for the martyrdom, and admirable self-sacrifice of some of the early advocates of this Movement, but for whose selfless and patriotic efforts, the Swadeshi ideal would never have become a living force. The reactionary policy which led to the partition of Bengal and the upheaval of the Swadeshi, was indeed a blessing in disguise. In the pregnant words of His Highness the Maharaja Gaikwar of Baroda, "This economic problem is our last ordeal as a nation, it is our last chance."

I appeal to my countrymen to stand fast by the Swadeshi and go in for the swadeshi articles and patronize home industries, even if the prices of these articles are slightly higher and their quality a little inferior. Unless we make a slight sacrifice in the purchase of swadeshi goods, it is not possible for us to tide over the difficulties of the initial stages of its working and to compete successfully with foreign industries.

The industrial activity during the year on the part of the Government, the results achieved so far by the Directors of Industries in the different provinces and steps taken within their territories by the Rulers of Indian States, as well as what the people have done for the revival of industries will be found

detailed in Part II, Sections A and B of the Annual Report on the work of the Industrial Conference, which will soon be submitted by the Honorary Joint Secretaries. I would not take up your valuable time by recounting the various enterprises started in the course of the year under review. I cannot, however, pass important undertakings like the projected Industrial Bank of Messrs. Tata Sons and Company unnoticed. This Bank will indeed be a notable addition to the many gigantic schemes which have been successfully floated by that firm. In this connection, I cannot emphasise too strongly the necessity that exists for Government to induce the Presidency Banks to afford facilities to our young men for getting an intimate knowledge of the working of the different departments of the Banks, so that these apprentices may in course of time be able to manage a bank themselves. I quite agree with the Hon'ble Lala Sultan Sing in thinking that there ought to be at least one Industrial Bank in every Province, which should receive full support from the Government. The Government may also co-operate with the people in strengthening the position of the Bank by depositing a portion of the public money in them. This will create confidence in the mind of the public and there would be very little difficulty in the collection of capital which is now lying idle in many mofussil centres. My friend, the Hon'ble Mr. Manmohandas Ramji has outlined a scheme for the starting of Industrial Banks which deserves to be carefully considered both by the Government and the people. He advocates the starting of Industrial Banks each with a capital of about fifty lakhs of rupees, half the capital to be contributed by the Government, and with the local Directors of Commerce as Government Directors. I need not remark that in such Banks, the majority of Directors should be Indians.

While on the subject of Banking, it may not be superfluous to point out that Banking is the most important factor in the economic development of a country, as Banks help the capitalless class and serve to encourage thrift, and enterprise among them and promote larger production by placing capital at the disposal of those who can best use it. They play an equally important part in lowering the cost of production and securing high prices of sales. They thus benefit the country in various ways and tend to the fair distribution of property, general prosperity, rapid increase of capital and wealth even in times of financial and political trouble. A small manufacturer under the present system has to limit his business to the small amount of capital he actually possesses or could borrow on mortgages or other securities. Owing to these difficulties, the purchase of raw materials by a small manufacturer has to be small and even those purchases generally have to be done through some middleman at a very high price. When he has finished his goods to the extent of his means, he is forced to restrict his production, until his goods are sold and paid for and as in most cases he wants cash quickly, he is compelled to sell to other middlemen often at a low price. Thus dear raw material, low price of sale, limited production and heavy expenses are the conditions under which a poor craftsman has to work. If banking facilities are obtainable near the homes of these craftsmen, they can buy very largely in the best markets without the help of middlemen. They can also manufacture on a larger scale for the simple reason that as soon as their goods are out of their works, they can draw drafts on customers and against these the "*Banquier*" renews his capital at once and thus the artisans are enabled to make large turns-over within a given capital

and time. By extending Banking facilities to small craftsmen and merchants, we shall achieve in India the extraordinary prosperity we see in Germany, due to union of capital and labour, greater demand for goods, low cost of production, higher wages, great power of consumption, immense demand for goods and high selling prices. The idea is to do away with usury and replace it by Commercial and Industrial Banking. The best means to attain this object is to have a large number of banks in large cities with a number of branches even in small places.

There is yet another industry which deserves to be revived in the interest of the foreign trade of our country and that is Ship-building. The art of building ships and the science of navigation over vast seas were known to our forefathers centuries ago, as there are clear evidences that India once occupied and maintained for many centuries her proud position of Queen of the Eastern Seas. Coming to more recent times, we find that only about a hundred years ago, shipbuilding and practical navigation were in such excellent condition that ships built in India sailed up to the Thames along with British vessels. The Ports of Bombay and Calcutta contained a large tonnage of shipping entirely of Indian construction and the teak vessels of Bombay were regarded as superior to even the English ships made of oak and they were more durable than the English vessels. It is a recognised fact that the merchantile marine is an essential factor in the industrial success of England and other nations. The cost of production of any article includes its freight by land and sea. Along with the disadvantage of iniquitous Railway rates, our country has to suffer also from want of a mercantile marine of her own. She cannot place her goods in the foreign markets as cheaply as other nations can do owing to the fact that they have got their own ships which convey goods even at nominal rates to beat down foreign competition. They also bring raw materials from other countries in their own ships for manufacturing purposes and convey them back in a finished form at cheap rates. Under these circumstances, I would exhort my brethren of Calcutta and other Seaports to start Navigation Companies on a large scale and make provision for the training of boys and youngmen in the art of shipbuilding and navigation—subjects which have hitherto remained neglected.

It is matter for thankfulness that a recent cablegram from home announces that a Commission has been appointed to inquire into the potentialities of shipbuilding on the Hooghly. This announcement raises hopes of revival of this ancient industry of Bengal on very sound lines.

The Jute industry is also another industry which should be in the hands of Bengal Capitalists. I hope my Bengalee brethren will direct their energies towards Jute Manufacture.

I would summarise the relative duties of the Government and the people as regards the industrial and commercial development of the country thus :—

The duties of the Government are :—

- (1) To have a thorough industrial and geological survey of the whole country made and to publish the results from time to time.

- (2) To afford financial and technical aid.
- (3) To check foreign competition.
- (4) To encourage opening of Banks.
- (5) To start Model Pioneer Factories on the reports of Government experts and hand them over to private capitalists, if successful or close them if unsuccessful. In no case should they be continued as permanent Government enterprises.
- (6) Purchase by Government of all their requirements in India, preference being given to locally made articles, even if they be slightly dearer or a little inferior in quality.
- (7) Establishment of Museums and Travelling Libraries and holding of exhibitions at large fairs of goods as well as the processes of manufacture.

The duties of the people :—

- (1) Use of locally made articles as largely as possible, even at a small sacrifice in cost and quality.
- (2) Co-operation between the capitalists and the technically trained experts.
- (3) Raising the standard of Commercial Morality in the country.
- (4) Utilisation of unproductive wealth for commercial and industrial purposes.
- (5) Arousing the Indian States to the Economic needs on the above lines.

A writer in the "Round Table" has recently pointed out certain weak points in the British Industrial Organisation, which ought to be carefully noted by our countrymen, if they wish to trace the causes of our industrial backwardness :

They are :—

- (1) Inferior equipment of factories and use of old types of plant and machinery, which have long been discarded by progressive countries like America.
- (2) Mechanical inefficiency due to a lack of Research, which results in the use of antiquated processes of manufacture.
- (3) Factories, Docks, Workshops of England are on too small a scale, to meet the growing needs of the time.
- (4) England cannot face untodate competition owing to her ruinous tendency to divide profits upto the hilt.

- (5) Inferior organisation both in manufacturing and selling. There are too many small concerns or workshops carrying on the same manufactures instead of forming combinations.
- (6) There is no co-operation worth the name between the Banks and the Manufacturers.
- (7) Unwillingness to adopt new processes or theories owing to the ignorance of the value of Research.

If this is the case with the free and progressive England, what can be said of India labouring under manifold disadvantages and draw-backs? The Free trade Policy of the British Government exposing even our smallest concerns to a world-wide competition, the inability or rather unwillingness of Indian Princes and Capitalists to help the poor manufacturers with necessary Funds and several other causes have compelled the artisans to give up their ancient callings and to take exclusively to agriculture. Certain hereditary tendencies have also to be taken into account. The aversion of the average educated man to manual work and industrial or commercial careers, the inefficiency and ignorance of Indian Labour, want of organised associations or Financiers to help the technically trained students, when they complete their training either here or in foreign countries, constitute some of our draw-backs. We hear that in Japan, Industries suitable to particular localities are first selected after careful investigation and students are then sent out for acquiring instruction in the Arts so selected. This arrangement gives the student a guarantee of employment on return and the Financier a guarantee of securing an expert in return for the amount that he has spent over the young man's training. If the Indian People succeed in getting a representative form of Government, in other words, the Home Rule for which they are honestly and vigorously striving, it is only then they can have a voice in the shaping of the fiscal Policy of their country. Till fiscal and financial autonomy is secured for this country, we should try and help the development of Industry and commerce by using nothing but Swadeshi Articles.

Bengal deserves indeed to be heartily congratulated on having produced highly capable Chemists and scientists whose researches have gained world-wide recognition. The Institute lately started by our illustrious countryman, Sir J. C. Bose, who has given away all his hard earned money for founding it with the object of encouraging original Research will serve as a beacon light to similar Institutes, for which there is a real demand in the Country. Mr. S. R. Bomanji and Mr. Khatau of Bombay have ~~led~~ the whole country under a deep debt of gratitude to them by their princely donations to this Research Institute and their example is worthy of emulation by other philanthropists.

The Industrial Conference has been clamouring for the establishment of at least one fully equipped Polytechnic Institute, but so far there has been no response from Government. In this connection, I may invite your attention to the suggestion made by the Hon'ble Mr. James Currie, the President of the Punjab Chamber of Commerce, who in his evidence before the Industrial Commission advocates the establishment of an Imperial Research Institute, which should be equipped with the best brains available. On its Industrial

side, the Institute should also be in a position to supply sound advice to private enterprise. It will be noted that the Tatas have already a scheme under contemplation for starting a Research Laboratory at Sakchi with a view to making this Laboratory a Central National Research Laboratory in that part of India.

Gentlemen, there has been a feeling within the last three or four years, that it was time the Conference directed its attention to doing something practical towards the industrial regeneration of our country and did not content itself with coming together at the close of the year to have addresses and papers read at its meeting. There is some force in this complaint and the Honorary Secretaries are quite alive to the necessity for the Conference changing its methods and have during the last two years given unremitting attention to getting advice as to how best to give a practical turn to the activities of the Conference. Last year they had addressed a circular letter to all the principal periodicals, leading gentlemen, as well as members of the Standing Committee of the Conference inviting their suggestions. The replies received in response to this request have been embodied in the report of the Lucknow Conference, which will be submitted to you by the Honorary Joint Secretaries. The Report forms very interesting reading. Among the suggestions received, the only one that appears to be both practical and falling legitimately within the range of our Conference, is the establishment of an Intelligence or Information Bureau for the benefit of the whole country. Most of the other suggestions are such as even the Government of India, with its unlimited resources would hesitate to take up. From enquiries made, I learn that the Central Office of the All-India Industrial Conference, which is located at Bombay, receives every year enquiries on a variety of subjects, bearing on the industrial and economic development of the country. It has endeavoured to supply the required information to the best of its ability; but in the absence of a qualified staff of experts in the various lines, the advice the Honorary Secretaries can give and the accuracy and fullness of the information they can supply, must be of a limited nature. It will be useful in this connection, if I give you a few instances of the enquiries made at the Central Office. This will enable you to judge of the nature and magnitude of the work that is thrown on the Central Office with its small and poorly paid establishment. I may at once say that the whole clerical and compilation work has to be attended to by an Assistant Secretary and a Clerk.

### QUERIES.

1. Small capitalists and gentlemen of limited means seek the advice of the Central Office for starting small cottage industries, which do not require a large outlay of money or the use of expensive or intricate machinery.
2. Persons wishing to start soap or candle works, varnish making and similar chemical industries, ask for an estimate of the cost of machinery and plant for these different concerns, as well as rates for the chemicals required by them and the names of the firms from whom they can obtain the supplies.
3. Syndicates or companies formed for the purpose of working mica, iron or other works are anxious to know the names of Indian as well as foreign exporting firms which will purchase the minerals from them.

4. Advice is sometimes sought by Indian States and private individuals anxious to start plantations of Ramie, and other fibre producing plants and the cultivation of Rubber and other economic products.

5. Parents and Guardians of students have addressed the Office for information in connection with institutions both in India and in foreign countries, where the youngmen can get the training suited to them in Electrical Engineering and other technical courses.

6. Statistical Information of Exports and Imports of particular products.

7. Information regarding experts in various branches.

8. Small concerns which have already commenced to place their goods in the market, expect the Office of the Industrial Conference to help them in pushing forward the sale of their goods by prevailing upon well-known merchants to help them by guaranteeing the purchase of their goods up to a certain extent every year.

The above list gives only a slight indication of the nature of the enquiries made at the Central Office. You can easily form a conception of how even in this limited field of activity, the Central Office cannot cope with the work thrown on it without the help of a staff of experts and enlargement of its Library and Office establishment. All this means money. I appeal to the merchant princes and land-holders to interest themselves in this great work and give it their moral and material support.

To me, coming as a stranger to this organisation, it is a matter of sincere gratification that a movement of this kind was brought into existence at a critical time in the fortunes of our motherland. The patriotism and high sense of public duty, which led the originators of the movement, at much sacrifice of time, money and personal convenience to start and work this Institution with such enthusiasm and sustained zeal, are beyond all praise. Its achievements are not small or insignificant. It has done work which in a self-governing country like Japan would have devolved entirely on the Government or in the case of a dependency like the Philippines would have been taken up by the Ruling power of the United States. Will it be too much to expect that in the altered attitude of England towards the indigenous industries and trade of India, our Conference would receive greater sympathy and support and material help from our Government?



With the best complements of V. V. JOGIAH

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**THE  
PRESIDENTIAL ADDRESS**

OF

**V. V. Jogiah Pantulu Garu of Berhampore  
[Ganjam].**

AT THE

First Vizagapatam District Industrial Conference

**HELD AT**

**VIZIANAGRAM**

ON

*8TH JUNE 1911.*

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## **Welcome to their Majesties.**

**GENTLEMEN,**

Before I enter into the business part of my address I consider it my duty and the duty of us all assembled here to offer a right royal welcome to their majesties, the King and the Queen of Great Britain who have condescended to go over here to assume the title of Emperor and Empress of India. It is unique in the annals of Indian History that ~~the~~<sup>an</sup> English sovereign should assume the title of Emperor and crowned at Delhi—the ancient capital of the Indian Empire. This praiseworthy example on the part of their majesties is worthy of the large heart which they possess. This is not the first time that His Majesty gave proof of his large hearted magnanimity. His plea for sympathy on the part of the officials towards Indians long before he became our sovereign won for himself our undying gratitude and regard. This noble resolve on the part of their majesties to visit our country even at the risk of personal discomfort and under circumstances which would have deferred even ordinary people from undertaking this journey without hesitation is another proof of their solicitude to win the affections of their subjects. We of Madras regret very much that their majesties could not find it convenient to visit our Presidency, a presidency, the loyalty of which has always been unquestionable and recognised in eulogistic terms by successive sovereigns. However we will take the will for the deed and offer a most warm and loyal reception to their majesties to this country and hope they will enjoy this visit and carry home kind and sympathetic recollections of their loyal, dutiful, and obedient subjects.

### **Thanks.**

I thank you sincerely for the honor you have done me in asking me to preside over the deliberations of this conference. I regret I cannot lay claim to any practical knowledge or experience of trade and industries. My study of economics is very limited and superficial. I have therefore accepted this position not without considerable diffidence and I feel I cannot do justice to the important work entrusted to me. I trust you will therefore be pleased to take an indulgent view of my short comings in the few observations I make for your consideration.

### **Aims and Objects.**

Gentlemen, I believe this is the first District Industrial Conference you hold and you desire to make this in the future an adjunct to your other conferences to be held annually. I congratulate you over this happy idea. I take it that this conference is intended to promote the industries of our country & especially of this district and that we meet here to compare notes with each other in regard to the several industries with which we may happen to be familiar. If these are the aims and objects of this conference, it becomes necessary for us to take stock of our present day industries, and in doing so, it would not be out of place to consider the position of the Indian industries in the past and in the light thereof understand the present and reflect as to what we should aim at in the future.

### **The Past Greatness of Indian Arts and Industries.**

The Arts and Industries of India were once the wonder and the admiration of the whole world. They were the objects of much praise in the markets of Asia and Europe. So early as the year 73 A. D. Pliny, in enumerating the imports of Europe, mentioned Indian muslins and calicoes as of superior quality. It was the fine muslins of Dacca that adorned the noblest beauties of the Court of Augustus Cæsar. The muslins known as "running-water" were the choicest gifts which Bengal offered to its noblest princes and foreign conquerors. Yarn was worked to such fineness with nothing but the distaff and the spindle that it was a wonder how that could be manufactured with a finish and fineness superior to the highest counts made in England or woven by any machine. A brisk trade existed between India and the other parts of the world and merchants from various parts of Asia and Europe congregated in this country and shipped consignments of Indian goods to the various parts of the world.

### **The Ruin of Industries.**

But a change soon came over the country with the advent of the East India Company. Deleberate steps were taken by it by means of unjust tariffs to ruin our Industries and promote their own. The truth of this statement was borne ample testimony to, by English Historians of repute. Mr. H. H. Wilson said that the English manufacturer "employed the arm of political injustice to keep down and ultimately strangle a competitor with whom he could not have contended on equal terms." In fact this had become the traditional policy of England not only with respect to India but also towards Ireland and America, the object of England being to reduce India into a country of raw products for the benefit of her manufactures. Other causes that contributed to the decline of industries were the invention of labour-saving machines worked with the aid of steam-power and the progress which science made in England and other countries. Thus, the ruin which was begun by unjust tariffs was completed by the introduction of steam power and machinery into the manufactures of English goods with which Indian goods manufactured by means of the hand-loom could not compete. The result of all this is, our industrial condition has become very lamentable. But it cannot be said that it has become altogether hopeless, as our industrial life has not as yet so far declined as to annihilate altogether the artistic talent and the Industrial capacity in us. While these instincts still survive let us consider how best to recover the lost ground & try to improve our arts and industries. For this end it would not be out of place here to speak a few words about some of the chief industries of our country.

## **AGRICULTURE.**

### **A Retrospect.**

3. Gentlemen, India is pre-eminently an agricultural country. 80 per cent of its population are dependant on Agriculture. So that the agricultural problem is a most vital one and deserves the earnest and serious attention of both the rulers and the ruled. There is no denying that in spite of its importance, our methods of agriculture continue to be primitive. Our knowledge of agricultural science,

practical and theoretical, has instead of improving of late years deteriorated, though we find there is an ardent desire just at present to acquire knowledge and improve the agricultural condition of the country. It must be admitted that the surface soil of the lands in the country being subjected year after year to the methods of cultivation in vogue from time immemorial has become exhausted and we have not taken care to relieve the lands for a number of years by adopting the system of rotation of crops or using powerful manures which science suggests and which other countries have adopted with advantage. It is therefore the paramount duty of both the Government and the people to take stock of the present agricultural methods of the country and strive to raise the ryot from the quagmire of poverty in which he finds himself immersed to-day. It is a matter for gratification to note that both the Government and the people have become alive to the importance of the situation and a beginning has been made to carry on agricultural reforms on some systematic lines. Practical steps, though by no means sufficient for the needs of the country, are being taken for the encouragement and improvement of agriculture. This spirit on the part of the Government and an anxious desire on the part of the people to improve the largest and perhaps the sole surviving industry augur well for the future of the country. The Government, have taken in hand agricultural research, the training of students and scientific and experimental farming. It has founded a few Schools and Colleges; established a number of farms; started a few experimental pumping stations and Veterinary Hospitals, arranged cattle shows, awarded prizes to encourage the breed of cattle; issued bulletins and pamphlets for the benefit of the agricultural population; directed experiments to be made for the reclamation of saline soils. While the Government has begun its work in the direction of agricultural improvement in earnest, the non-official public are not behind hand in doing their best in the matter. They started agricultural Associations in each District. They have been running shows almost in every District. They have been discussing problems agricultural, in their annual conferences. But recognising as we do this re-awakening in this country and appreciating with gratitude the interest evinced by the Government we cannot help remarking that we lamentably lack efficient Agricultural Schools or Colleges; the experimental farms and pumping stations can be counted on one's fingers; the staff of agricultural experts is exceedingly small; the bulletins issued are very few and serve as yet no useful purpose; and in fact the allotment of 20 lakhs a year made by the Imperial Government some years ago for agriculture is too small, and the Agricultural Associations have not been able to do the work which was expected of them and attract the notice or gain the good will of the agricultural population.

### **Agricultural progress in the United States.**

While on this subject it would not be out of place here to refer to the progress which agriculture made in the United States of America—a country where the Government and the people have to attend not merely to agriculture but have to bestow their attention on many other industries. One will be struck at the amount of useful work which it has been doing in this direction I had occasion to speak of this subject often but I am sure the importance thereof bears any amount of

repetition. We were told by the Honourable Mr. Hamilton in the year 1904 from his seat in the Imperial Legislative Council that the annual income of the land grant Colleges and other agricultural Institutions of America is  $6\frac{1}{2}$  million dollars or nearly Rs. 21 Millions. There are 54 Agricultural experimental stations maintained by the State. A sum 720,000 dollars or Rs. 22 Millions are spent annually on this account. From the provincial funds a grant of 9 lakhs of Rupees is made. There are 10 Agricultural Colleges. The Staff employed in these Institutions number 685 of whom 308 are teachers scientifically trained. The number of publications issued by the American Board of Agriculture annually is nearly 6 millions, not to speak of innumerable bulletins issued every now and then by the Government. Such is the wonderful work which we were told it had been doing and the results did not belie its expectations. As to the utility of improved methods of agriculture and scientific farming if we take America and Siberia and compare their present condition with what they were a few years ago, we will find what gigantic improvements modern science has effected in the agricultural condition of the two countries. We all know what Siberia was a few years ago. It was no better than an arid and deserted waste. We are told it is now almost a garden. This is due to the application of modern science to the improved methods of agriculture.

#### **Need for Investigation into Local Agricultural practices.**

Gentlemen, When I refer to this I do not mean that the Government or the people should introduce these reforms all at once or that it is absolutely necessary to borrow all the methods employed in advanced agricultural countries like America, Japan, Belgium or Holland whatever may be the progress which these countries have made in matters agricultural. I am one of those who advocate a study of local agricultural practices before we think of effecting scientific improvements and adopting those found in foreign countries into our agricultural methods. Eminent Scientists like Dr. Voelckar have recorded it as their firm conviction that Indian agriculture is good and the Indian ryot has not much to learn from his Western brethren. The same eminent authority considers that the cultivation in Nadiad and some other parts of Guzerat is about the best in the world. Sir Frederick Nicholson who was so popular as an official and whose love for this country has induced him to make it his home referred to the garden cultivation of Coimbatore in eulogistic terms. In the matter of agricultural implements and manures also the systems obtaining in the West to some extent are either unnecessary or unsuited to the conditions of our country. For instance, steam ploughs, Mowing Machines, costly threshing and husking and hulling machines etc, such as are used in America and other Western countries are needless and will be disproportionately expensive for this country where labour is cheap and ready to hand and skilled machanics to repair them are rare. But improved Swedish ploughs like those now in use in the Ceded Districts will be of great service. Again in the matter of manures, though powerful manures are available in the West, their cost is prohibitive and they are not absolutely needed as there are valuable manures in the country to replace them. So that the view of Mr. Robertson, who is no doubt considered to be the pioneer of agricultural education in this country, that the Indian agriculturist knows nothing of his business and his methods or practices are utterly wrong, wasteful and unscientific,

is not quite correct. It is therefore necessary that a commission of a few experts must go about the country, study and collect information as to the existing methods of cultivation, implements used and manures employed and put the best of these methods and practices into operation and introduce them in backward Districts by modifying and adopting them to the existing conditions of the place where they are to be introduced; other practices and methods which do not obtain here but which will be equally useful in this country may be borrowed from abroad, provided the cost is not prohibitive. This method, if employed, will be both popular and cheap.

### **Need for Agricultural Cooperative organisations.**

In this connection it is necessary to bear in mind that our country is a country of small holdings and high interest and the cultivator has little or no capital but has ample skill unlike his brother of the west who has large capital but little skill. The advantage which his western brother possesses over him is that he can use the information as to the new methods of cultivation placed at his disposal at once, as he commands the necessary capital. The capital employed on Agriculture has doubled since 1840 in Europe and increased six fold in the United States, while the capital employed in this country has been extremely low & shows no signs of increase. What little increase there is in production is due to the employment of larger number of hands and to the bringing under plough larger areas of land but not to the introduction of the improved implements or new methods which developed agriculture in all the civilized countries of the world. So that if we want to improve the lot of our cultivator, we must bring within his reach capital, the supply thereof being made promptly & on terms which the cultivator can accept. To some extent this supply is being attempted by the 'Grain Banks' in Bengal and the co-operative Rural organisations lately formed through out the country. But at present they are few in number and must increase until we find one in each big village. If we are to prevent the present progressive degradation of this great industry it becomes our paramount duty to betake ourselves to villages, explain to the villagers the benefits of co-operation, encourage the expansion of co-operative organizations and enable them not to borrow at usurious rates.

### **Irrigational Facilities.**

Further, no fund of scientific knowledge and no amount of improved methods of cultivation would avail us unless we are provided with good irrigational facilities. Some Districts are fortunate in this respect on account of the large rivers they possess. For instance, Ganjam, Godavery, Kistna, Tanjore & Madura have natural advantages and the Government have undertaken large irrigation projects for the benefit of the ryots. Your District, Gentlemen, is one which has a laborious peasantry unlike that of Ganjam; the soil, on the whole, is fertile and the major portion of the population is agriculturists and they produce in addition to paddy, cumbu, raggi, gingelly, gram, cholum, also sugar-cane and cotton. Of late, I am glad to hear they have given up large tracts of land hitherto under wet cultivation and taken to the production of jute which has been fetching high profits. This shows the commendable adaptability which your peasantry is capable of. But I am sorry to note that your chief wants are water and manure and that you depend for your irrigation mostly on wells, tanks,

and hill streams and that in case the mon-soon fails, there is nothing for the ryot to fall back upon. It is a matter for regret that no irrigational facilities are afforded to your District. This is due, to a large extent, to the absence of large rivers. I remember there was once a scheme to utilize the Nagavali and serve it as a project to supply water to some portion of your District. I do not know at what stage is the scheme at present. I hope it will soon be an accomplished fact. Without minimising the utility of large irrigation projects, such as those referred to, I must not omit to urge upon the attention of the Authorities and the public the necessity of reviving large storage tanks in all the villages of this Presidency.

### **Lift Irrigation.**

Connected with this subject, is the pump-irrigation which has been largely developed through the exertions of the Department of Industries under the able guidance of its energetic Director Mr. Chatterton and his staff, who have discovered new sources of underground supply of water by boring operations. Though the first experiment in respect to this pump or lift-irrigation was made 20 years ago yet a steady increase in pumping operations has begun only since 1902-3; and within these eight short years considerable interest has been created for this kind of irrigation in the ryots and much progress has been made. We are told that "there are now 250 pumping installations—13 owned by Government 178 erected by private persons with the aid given by Government and the rest exclusively by private persons. These engines and pumps lift water from wells channels, tanks, and rivers and irrigate at a rough estimate 12,000 acres. The total capacity is reckoned at 9-25 gallons per hour or 411 cubic feet per second. The capital invested in these 250 installations is stated to be nearly 7 lakhs of rupees and the cost of cultivation in areas irrigated by these engines is calculated at Rs. 30 per acre". Judging from the results already achieved and the work already done, great hopes are entertained about the future of this irrigation. It is a matter to be deplored that in spite of the recommendations of the Madras Government, the Secretary of State for India in Council decided to abolish the post of the Director of Industries and place these pumping operations in the charge of the agricultural Department. To place operations of this sort, which require a knowledge of engineering in those who presume to give advice to ryots under the agricultural Department, is, I consider, a retrograde step and this will place ryots at the mercy of the Firms that import, supply and repair the machinery and, I fear, on the whole the operations so successful at present will be discouraged and the cost of boring wells and lifting water will increase. I hope the Secretary of State will reconsider his decision as the extension of irrigation through lifts is still in its infancy and requires careful nursing and cheap execution under expert guidance.

### **Dignity of Labour**

If we are really to improve the agriculture of our country there is one aspect which should not be lightly passed over. Our educated young men must learn not to despise the calling of a peasant. They must not consider agriculture to be a degrading profession. Though once our Aryan forefathers were all agriculturists, we have now come to despise the position of our ancestors and unless we begin to respect their calling, we cannot hope to improve our country and rise in the scale

of nations. It is a matter of common knowledge that a cultivator, however rich he may be, however good and straight forward his conduct may be, is not respected. He is at present looked down upon even by the pettiest of officials, such as a Police Constable. This is one of the reasons why our young men have no attractions for this profession. If some men of intelligence, men who have taken their degrees and studied Physical Science, Chemistry, Geology, or Botany, can be induced to undergo a course of training in Agricultural Colleges, *then and then alone*, we can hope really to apply the principles of modern science to the methods of improved agriculture. We, therefore, earnestly hope that some of our youngmen will attach importance to dignity of labour and will, instead of getting into the beaten tracks of public service or the bar, help themselves and the country by taking to agriculture which, if properly worked, can never prove unprofitable.

### **Excessive assessments.**

In spite of the already inordinate length of space I have allowed in this address of mine to agriculture, I cannot help, on account of its highest importance to the ryot, making at least a passing reference to the excessive and periodical, or I should say short-term, assessments, which tell very highly upon the chronic impecunious condition of the ryot. The subject has been discussed so often and the time at my disposal is so short that I would not dilate upon it but state how erroneous it is to say that our assessments are moderate. A comparison of our assessments with those in Europe shows how high our assessments are. In Europe it is estimated that the proportion of rent to gross produce is 1 to 55, while in India it is 1 to 3 or 4. This shows how excessive, comparatively, are our assessments. It is therefore absolutely necessary, if the ryot is to be saved, some sort of permanent settlement should be granted to him and the period of revision should be increased at least to 60 years.

### **Requisites.**

What we, therefore, ask our Government and the landed aristocracy to do is to give our ryots a sound elementary education, to disseminate broad-cast a knowledge of agricultural science and improve methods of cultivation. We want them to found scholarships for our young men. We want in every District in the Head Quarters of the Collector a branch of the agricultural department under the directions of Agricultural Superintendants with a number of Inspectors under them. We want model farms on an extensive scale to be opened in the Head Quarters of each Taluk with an Agricultural Museum attached thereto, which is accessible to the agricultural population. We want tables containing an analysis of soils of each Taluk, so far as practicable, to be prepared and kept in these Museums, so that those ingredients of the manures which are wanting in them may be supplied. We want the Inspectors under the supervision of Superintendants to establish small model farms in rural centres, make experiments, distribute leaflets to the ryots in vernaculars, and lecture, in easy language which they can understand, the advantages of improved methods and demonstrate to them the benefits thereof at their very doors. We want the irrigational facilities to be greatly increased, the permanent settlements be considerably modified, and the terms of periodical settlements increased. In fact, we want the Government & the landed aristocracy to expand the Agricultural Department and to



bring home to the doors of our people in the villages all the help which modern science has been able to find for the improvement of agriculture. These are some of our wants and we hope the Government and the landed aristocracy with the help of our District Agricultural Associations will give them their early and undivided attention.

## COTTON INDUSTRY.

### Need for Industrial Banks for handloom weavers.

To us, Gentlemen, next in importance to Agriculture is the Weaving Industry. I do not propose, on this occasion, to speak about the cultivation of cotton but will confine myself to the industrial part thereof. Gentlemen, you are all aware of the great reputation which the chintz of the circars, especially those of Masulipatam, enjoyed in times long gone by in the Industrial world. Fortunately for us, though this industry on account of the competition of the power-loom and machinery and unjust tariffs has considerably died out, yet we have a large number of weavers in the country who depend for their subsistence on this industry and ply their shuttle in the primitive method. In the whole of India, according to the figures of the census of 1901, there are about 12½ millions of weavers. Some of these men are employed in cotton mills established by Capitalists-European or Indian. But their number according to one calculation does not exceed 1½ millions. Mr. Toser of the India Office once said that even if all the cloth required by the people of India were manufactured by Indians in factories with European machinery they would not employ more than a million men. So that there is no doubt that the majority of weaver population of India to the extent of about 11 millions must depend upon their home industries and the only industry to which they can take to is Weaving. This industry is divided into power-loom weaving and hand-loom weaving. In this country there is three times as much of handloom cloth as there is of power-loom. So that there is no doubt that in spite of the several labour-saving and power-loom machines our old hand-loom weaving shews a good deal of vitality. Though we must admit that in the long run this old handicraft must give way under the strong pressure of competition, still it will take a long time before the process of decay could be complete. It is therefore desirable to place these weavers in possession of best hand-loom which will facilitate comparatively rapid and effective working. They must be provided with a good hand apparatus and proper instructions. By spending a small sum, say, of Rs. 10 to Rs. 20 per loom on improved weaving and warping apparatus, the out-turn now made, it is said, could be doubled. Some of the best Engineering Firms in Europe, we are told, have been producing looms which nearly equal power-loom in speed. Messrs Hattersley and Sons have already produced a special loom for weaving *dhoties* and *saries* and the price of it was reduced to a low figure. The purchase of labor-saving and time-saving machines make investment of capital, however small, a necessity. Another thing which is as important to these weavers as capital is a ready sale for their manufactures. The only way to supply this capital and to help the weavers in finding a ready sale for the finished article is by way of forming Organisations on the co-operative principle such as Urban Banks or Co-operative societies. These institutions may lend them small sums for the purchase of yarn and other necessities of their trade on sufficient personal security, take the finished article, pay for it a price due

allowance being made for reasonable profit to them and encourage their industry without any loss to the Banks or societies. Either the agricultural banks now opened may develop themselves also into Industrial Banks or separate organisations may be formed all over the country for this purpose.

### **Industrial Salvation of India.**

While on this subject it is necessary to consider the question which is constantly raised as to whether India's Industrial salvation lies in reviving the dead Arts and Industries by infusing fresh life into them and maintaining their vitality or in the introduction of European machinery and investment of large capital in Mills and Factories. I am not at one with those who support the one view or the other. I think that if we aim at the real developement of Indian Industries neither the promotion and expansion of the cottage industries nor those of the larger industries worked in the mills and Factories could be neglected. While the one provides sustenance for the agricultural tenants who have to supplement their wages from non-agricultural labour during some parts of the year and for artizans and petty workers who cannot afford large capital, the other helps capitalists in securing thereby large profits and promotes accumulation of wealth in the country, besides providing employment to a number of labourers. So that, we must adopt the Factory system and manufacture goods on a large scale and keep pace with the rapid production of western manufactures and at the same time rescue from ruin our cottage industries and make them a source of livelihood and profit to our masses.

### **Indications of India's Tendencies towards Factory Industries.**

It will not be out of place here to note that India has been, gradually, though very slowly and imperceptibly, passing from home into factory industries. Statistics show that "during the last six or seven years the No. of cotton gining, cleansing and pressing mills worked by machine-power has increased from 713 to 1090 throughout India and the textile mills from 1125 to 1589, while mills not worked by machine power have decreased in number. In 1904, the No. of mills in India not worked by machine was 240 employing 20,340 hands, in 1905, 253 employing 22320, in 1906, 259 employing 23000, in 1907, 185 employing 18000 but in 1908, the No. fell down to 85 employing only 6225. Simultaneously with a decrease here, there was a noticeable increase in the No. of employees in mills worked by machine-power. Throughout the whole India the No. rose from 55041 to 75,722 in the cotton ginning, cleansing, and pressing mills and from 196369 to 236709 in the cotton spinning weaving and other mills. Some useful comparison may be made in this connection—a comparison which should inspire every Indian with hope for the future. In 1879-80 there were only 58 mills in India with a total capital of 533 lakhs and in all of them not more than 40,000 were employed. At present we have 232 employing over 240,000 men and working with a capital of nearly 20 crores of rupees." The Hindu—These are figures for the whole of India. Coming down to our Presidency, we find a similar encouraging advance in the number of factories. During the year 1909-10 the No. of factories rose from 153 to 181 of these 28, four new factories were established in the Madras town itself and 24 in the mofussil. The largest increase of these factories was in the Districts of Guntur and Kistna, 13 in the

former and 6 in the latter. While congratulating the Presidency & especially the Northern circles over the progress it has been making in the matter of these factories I cannot help remarking that there is a tendency at least in the District of Ganjam and also I believe in this District and its neighbouring ones to start too many factories in the same line of business. This has necessarily the effect of reducing the profits without developing other profitable industries. It is therefore hoped that different merchants would start factories working different lucrative industries.

### **Anakapalli Pencil Factory.**

Before I pass on from this subject of factories to Cottage Industries of this District, I think, it behoves me to refer to the Pencil Factory at Anakapalli. It is being worked up for a very long time by that youngman of remarkable energy, perseverance and skill Mr. K. Narayenarao Pantulu. The work of the factory is spoken of as efficient. The pencils produced stand comparison with some of the best pencils manufactured in the factories of the west. The factory is situated in a locality, which commands large facilities of communication and where plumbago and wood suited to the manufacture are said to be found in abundance. It is, in these circumstances, a matter for regret that an institution like this should not prosper as it ought to be and that too for want of a small capital of Rs 4000 or so. I strongly urge, in the name of our Industrial enterprise, upon the Zemindars and other well-to-do and enlightened men of this District to come forward with help, make up the capital required and place it on a sound working basis.

### **Cottage industries of Vizagapatam.**

I shall now pass on to the Cottage Industries of this District and say a few words about them. In this District as in its neighbouring ones, Cotton Weaving is the chief occupation of a large number of people only next to agriculture. I am glad to note that there are a large number of weavers following their hereditary occupation. To this industry a sort of impetus was given lately by the spread of the swadesi spirit in the villages of Rajam, Pondur, Boddam, Kancharam and a large number of other places in this District. They are said to weave clothes noted for their fineness and durability. There are innumerable other industries extending over all parts of the District, such as, jute, Jaggery, tannery, horns, rugs and carpets, lacquer works; works in gold, silver, brass and bell-metal, wood work and last, though not least, the ivory work. The last named has still been in a very flourishing condition and has won several medals at Exhibitions held all over the world. Vizagapatam is the centre of this industry in this District. Of the other industries, all were once in a very flourishing condition. At present, most of them have been decaying for want of patronage and encouragement. These arts and industries will, if revived, surely, be of great help to the poor, whose aptitude and skill to work them has not as yet disappeared. It is a matter for great pity that Co-operative work has not begun in an important District like this. It is hoped that the leading men of the District will interest themselves in Co-operative work, start Co-operative institutions and thereby help artisans, who take to the various arts and industries, with capital, find a ready sale for their manufactures and thus lend a helping hand to them and raise them from poverty in which they find themselves immersed at present.

### Sugar Industry.

Sugar is one of the most important of our Industries. The District of Vizagapatam and its two neighbouring Districts—Ganjam and Godavary—are specially interested in it. We have in Ganjam, at Aska, a sugar factory, known as the Aska Sugar Works and Distillery, in the centre of sugar-cane cultivation. Similarly situate, I believe, is the Sugar Factory at Samalkote in the Godavary District. Some time ago, I read of the formation at Anakapally, another centre of sugar cane crop of what was called "The Vizagapatam Sugar Development Company Ltd." with the object of erecting a model Sugar Factory; but I am sorry to hear that though it was once an accomplished fact and worked well for sometime its condition at present is not as encouraging as one would wish it to be. It is a matter for grief that not only this factory but also the other sugar factories are not in a flourishing condition, so far as the manufacture of sugar is concerned, if we do not take the profits of the by-products manufactured from the *Molasses* into consideration.

India is known to be the home of the sugar cane. It is grown yearly on an area of about 4000 square miles. If this Industry is encouraged and if the cane is grown as it ought to and as it is grown in other countries it not only saves for our country the profits made by foreign merchants but it would turn out sugar sufficient for export to foreign countries in large quantities. It is, therefore, a matter for surprise why there has arisen any necessity for importing any foreign sugar into our country. Our surprise becomes all the greater when we remember that the imports during the last 20 years increased at the rate of 400 per cent. But what is all this due to? This is due chiefly to the sugar in the foreign countries being protected by bounties in the manufacturing countries and admitted into India by our Government duty free. The Government of India saw through this injustice some years ago recognised its duty and in the year 1899 when it found that France, Germany Austria and Russia were protecting sugar by bounties in their own countries, it levied protective duties on the import of sugar from foreign countries and the result was a good reduction in the imports of bounty-fed foreign sugar. But 4 years afterwards, in the year 1903 after the Convention of Brussels, our Government for reasons best known to itself, removed these duties and the imports have gone on increasing ever since. England, fortunately, is not a great sugar producing country and there is therefore no competition between India and England in the matter of this Industry and this is a great advantage to us; and we can, without any hesitation, ask England to revive these protective duties. The figures of imports are mounting up year after year and this means much of our money is going out of the country every year and the situation has been becoming graver day by day. It, therefore, becomes our duty to approach the Government to re-impose the protective duties and I am sure it would accede to our request. Another cause of the decadence of this Industry lies not merely in the bounties being against us but also in the employment of scientific methods in the cultivation of cane by foreign countries. As a result of our adhering to the primitive methods of production, we raise per acre 1-30 tons of cane while Egypt and Cuba which use improved methods produce 3 tons and 2 tons respectively. It is also pointed out that our old method of refining sugar is also answerable to the decay of this industry. So that it becomes our paramount duty

if we would not allow this important and ancient Industry to disappear from this land of ours, we must not only secure protection and improved irrigational facilities from Government but also adopt the modern methods of cultivation and introduce healthier and more prolific varieties of cane into our country. Further Sugar factories should be established in centres where sugar cane is largely grown as is done here and the neighbouring Districts. Sugar must be prepared directly through sugar and not through *gur* or Jaggery Sugar cane should be crushed not as at present by means of Wooden mills but by means of heavy Iron mills and steam rollers. Improved and up-to-date machines for refining and filtration should be used and in the words of Professor Shaw "The feature of the Indian Sugar Industry does not depend on the farmers or the capitalists but will be worked out only by a sincere co-operation between the expert agriculturist to take care of the quantity and the quality of the crop and the chemist and the Engineer to help the most economical management of the Technical process involved and the able financier to take advantage of the rise and fall in prices of raw and refined sugar. And the failure of the recent sugar factories can be best attributed, in a nut shell, to the absence of this co-operation."

### **Seri Culture.**

I now pass on to Silk Industry, which is one of the important industries of this country. It obtains largely in Bengal and to some extent in Ganjam and a few Districts in the south of this Presidency. I propose, on this occasion, to confine my remarks to the silks of Berhampore in Ganjam. These have acquired a name for their softness and durability, though not for their great finish and fineness. These goods secured prizes and medals at several exhibitions for their excellence. There are at present about 200 silk looms in Berhampore. The workmen are poor, have no capital, and are in a state of chronic impecuniosity. If Industrial Banks are formed on co-operative lines and an organization is found to find a ready sale for the finished article allowing a reasonable profit to the weaver, it would not only help the poor weaver but would also serve as a great incentive for the development of the industry. Other things which would give an impetus to the promotion of this Industry are growth of mulberry near to this centre of silk trade and the rearing of silk worms and the establishing of an institution at Berhampore for experiment and instruction in sericulture. I remember sometime ago these proposals were before the Government and formed the subject of consideration though nothing seems to have come out of it. I hope one of our Hon'ble non-official members will interest himself in this subject.

### **Swadesism and Protection.**

Great stimulus to the manufacture of our home industries was lately given by the spread of the swadesi spirit. There is nothing objectionable in this spirit but on the other hand there is something highly patriotic and laudable in it. It is a spirit by means of which Indians try to establish industries with Indian capital and work it with Indian labour in order, if possible, to be independant of foreign imports that flood the country. This spirit which is sought to be promoted in the country is a sort of protection against foreign imports. The Government of India, however, anxious it may be not to impose duties on indigenous cotton goods exported, was forced by a superior hand to impose these tariffs and is therefore quite helpless. It

is a fact recognised by writers of Political Economy that all infant industries deserve protection and it is unwise to extend to them the principles and policy of Free Trade. Even countries like England enjoyed protection until about 60 years ago and when it became a full fledged manufacturing country it took to Free Trade so that there may be no tax imposed on her manufactures exported to foreign countries. In England, we find, in spite of the great progress it has made in industries, there is a great agitation going on at present to return to her old policy of protection and preference. So far as India is concerned, we may note that Lord Minto very recently in his speech at the central Asian Dinner urged "the necessity for the protection of industries upon the development of which the future of India largely depended" and said that "without something like tariff reform he failed to see how great industries could be created. He felt strongly on this question because he had the welfare of India at heart." In spite of these sympathetic pronouncements and good intentions expressed by far-seeing and experienced statesmen, nothing has been done to protect our industries and the result has been every year we receive by way of imports into India articles worth about 100 crores of rupees while we send out to foreign countries by way of exports mostly raw material, to the tune of about 150 crores of rupees in value. The imports above said do not include precious stones, which are valued to be from 10 to 20 crores every year. We therefore find, even after including the value of precious stones, that we incur a loss of about 30 or 40 crores a year. This loss continues not for a few years or a few decades but for ever. How can any country in the world with such a heavy annual drain on her resources hope to prosper? Finding that the State has not been able to do its duty in this particular, and seeing that financially we are going down year after year, we, to whom no fiscal independence is open, have adopted swadesi, the only course left open to us, a course adopted by other countries, such as England, France, Germany, and United States, by means of protective tariffs and bounties. It would be interesting in this connection to recall to your mind an incident which would show how unobjectionable is our swadesi movement. There was a depression in the English trade in the year 1882. Several measures were considered as to how to overcome it. "Lord Dunraven raised a great debate in the house of Lords actually advocating the adoption of the policy of protection. At this time the Pioneer of Allahabad advocated the adoption of "the swadesi vow" by the Englishmen. It said that if Englishmen want to find food for their own countrymen then starving for want of food they will have to resort to such a movement". In fact our "Swadesi movement" in the words of the late lamented Mr. R. C. Dutt "is one which all nations on the earth are seeking to adopt in the present day. Mr. Chamberlain is seeking to adopt it by a system of protection. Mr. Balfour seeks to adopt it by a scheme of retaliation. France, Germany and United States and all the British Colonies adopt it by building up a wall of prohibitive duties". So that there is nothing wrong in trying to encourage our own industries by abjuring from the use of foreign goods, so long as the methods of encouragement are not accompanied by acts of violence and intimidation, which we condemn with all the vehemence we can command. So that it becomes the duty of every honest and patriotic Indian to improve and spread the swadesi movement and thus improve and develop our indigenous industries though in a small measure.

## Impediments to Industries and their Remedies.

Let us next see what are the greatest impediments for the development of our Industries and consider how best these can be got over. One whom we may accept as one of the non-official authorities in matters industrial has summarised the defects in the present condition of things tending to the progress of our industries as follows:—(1) wide spread and chronic poverty among a large proportion of the population (2) dense ignorance of the masses (3) an abundance of raw materials (4) absence of technical knowledge and practical skill (5) a low state of commercial enterprise and (6) a large deficiency in Capital.

The only remedies to these defects appear to me to be the inauguration of Education in the large sense of the word including elementary, technical scientific and commercial education, and large number of Banking institutions.

### Education.

As for Education, the panacea for all the defects pointed out, both the Government and the people hitherto gave no thought to it, so far as it concerned the progress of Industries. The prevalent ideas about Education a few years ago are quite different from those which have now sprung up. If a portion of the funds, yearly set apart for education were spent in educating our Artisans, Farmers and Capitalists in the ways that are best suited to their callings they would not have been what they are today. We are glad that our attention and the attention of the Government has at last been drawn to the right sort of education to men following the various industries. The Government may be expected to take the lead in a matter of this prime importance. But this should not relieve non-officials from bearing their own share of the burden. We must have technical schools not only in big cities but also in all towns and gradually in all big villages. No doubt the extension of schools to all the villages and towns is at present only an ideal and is necessarily a work of time. The instruction to be imparted in these schools must be under the guidance of expert teachers and must depend on the industries prevalent in the locality in which the school is to be situated. But what is the sort of education to be imparted to students of these institutions is a more difficult question. It is agreed that there should be first the foundation of a sound system of at least elementary education before any technical education is attempted to be imparted. But after that, opinions differ. Some advocate a bifurcation of studies at the end of the primary or secondary course towards some technical pursuits while others suggest that at the end of the primary or secondary course the industrial training should be given not in schools but in factories. The safest course, in this state of opinion, is to follow the course adopted by western countries in this matter. We must not forget in this connection the necessity of a few commercial schools to supplement these technical institutions as they are very necessary for the successful progress of our industries. It is these technical and commercial schools that are expected to improve the workman and equip him with scientific skill and technical knowledge necessary to the successful working of our industries and remedy the defects pointed out in our industrial system.

### Capital

To come to the second remedy suggested for overcoming the impediments in the way of our industrial regeneration, it is a notorious fact that India is greatly handicapped in the Industrial race by the absence of capital. To find capital on a large scale is no easy matter. Several suggestions are made to raise it, some say there is no lack of wealth in this country provided we can utilize the large amounts converted into jewels and buried without any expectation of reasonable returns in the Government Promissory Notes and the Post Office Savings Banks. It is expected that, if people investing moneys in the two latter methods be induced to withdraw a portion to invest them in industries, we shall be imparting a measure of strength to our industries of which, at present, we can have no adequate conception. It is suggested that large Banking institutions should be started mainly for the purpose of helping industries and people should be educated to divert at least  $\frac{1}{4}$  their Savings Bank Deposits and a fourth invested in the Government Pronotes which are calculated to come up in all to about 20 crores of rupees for the capital of these Banks. No doubt this is no easy matter But it is hoped that if the best minds apply to it the solution may not present very formidable difficulties. At present no doubt there are sowcars and banks to advance moneys on commodities and earn a handsome profit. Every branch of trade has been rapidly growing and special banks with a large reserve capital and managed on modern methods can alone meet the multifarious demands of these present times. These Banks if they are to do the work for which they are intended and supply capital to greater industrial concerns must have feeders in each important District and these must in turn be supported by Urban banks formed on the basis of co-operative credit. In order to form these Banks and provide them with capital we must create a strong public opinion in favour of the utility, importance, soundness and security of these Banks. This is, no doubt, a work of time and I trust the leaders of public opinion in the country will undertake it and work it with vigour.

### Industrial Survey.

If any effective work is to be done in the matter of industries, the necessity for an industrial survey cannot be overrated. Time was, when doubts were entertained as to the utility of such a survey but it is now agreed that it is not possible to do anything real in the field of Industries, unless we know in detail the present condition of each of our industries. Such a survey was recommended by the Ootacamund Industrial Conference, so kindly arranged by H. E. Sir Arthur Lawley for ascertaining the Industrial conditions and possibilities of this Presidency. It was directed by the Government of the United Provinces and the Central Provinces. It is under the contemplation of the Governments of Bengal and Bombay. Let us hope the Madras Government will consider it carefully and undertake it. It will place before the Government and the public the Industrial situation of each Province. It will, for instance, take stock of all the raw products in the country and this will enable the authorities or the public to consider how best these products can be utilised in the particular localities. Again, it will consider the question of the labour supply. In many industries, this question presents the greatest difficulty. A survey, on this head, will enable location of industries in places where labour is cheap and the raw products to be used in the



particular industry are near at hand. While an injudicious location without enquiry or survey causes great loss to the industry. Another important matter which a real survey should take note of and make enquiries and suggestions is on the question of capital without which no industry can thrive. It will enable the people and the Government to gather information about the great possibilities of obtaining capital to promote the industries of the country. It has to make attempts to see what methods of advertising and marketing could best be adopted with reference to each industry so that craftsmen may not find a glut of certain articles in the market. Another thing which an Industrial survey cannot neglect to note is the facilities of communication. On this depends largely the success or failure of large industries. Our Railway freights are said to be exceedingly high. So that it becomes necessary to find places of production as near localities of consumption as possible in order to minimise the prohibitive cost of freight. A work of this nature can no doubt be attempted by non-official bodies such as the Conferences and our thanks are due to the Honorable Mr. R. N. Modholkar, the General Secretary of the Industrial Conference, and Mr. C. Y. Chintamani, the then Assistant Secretary and now the talented Editor of the Leader of Allahabad, for having attempted such a Survey and collected some information. But a work of this magnitude to be done in a very satisfactory manner could be taken up by Government and Government alone and none others.

### Conclusion.

Gentlemen, in conclusion I say that the utility of conferences like these are now considered to be beyond question. They have the effect of bringing us together and giving us an opportunity of exchanging our thoughts regarding the various industries of our country. What is more, the knowledge which specialists bring to bear on the subjects discussed in these conferences and especially the papers contributed by experts will be of immense use, as they will give us a fund of information about our industries which we cannot otherwise have. This new departure made by you at Vizianagaram in inaugurating Industrial Conferences as an adjunct to your other Conferences is very laudable and reflects great credit on the organisers of this Conference and I hope this will continue hereafter as a necessary adjunct.

With these words, I thank you, once again, for the honor you have done me by asking me to preside on this occasion and for the patient hearing given me.

# ABOLITION OF THE INDIAN COTTON DUTIES.

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**PUBLIC MEETING IN BOMBAY**

**TO ADOPT A PETITION**

**TO THE HOUSE OF COMMONS.**

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**Bombay :**

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**1879.**

# ABOLITION OF THE INDIAN COTTON DUTIES.

## PUBLIC MEETING IN BOMBAY TO ADOPT A PETITION TO THE HOUSE OF COMMONS.

ON Saturday, May 3, a crowded meeting was held in the Framjee Cowasjee Institute, Bombay, to adopt a petition to the House of Commons protesting against the abolition of the import duties on cotton. Amongst those present were—

Sir Munguldas Nathooobhoy  
(chairman).  
Hon. Morarjee Goculdas.  
Mr. J. A. Forbes.  
Mr. Nanabhoy Byramjee  
Jeejeebhoy.  
Mr. G. A. Kittredge.  
Mr. Nowrozjee Furdonjee.  
Mr. Raghunath Narayan  
Khote.  
Mr. Pherozsha M. Mehta.  
Mr. Kassinath T. Telang.  
Mr. M. R. De Quadros.  
Mr. Budroodeen Tyebjee.  
Mr. Atmaram Pandurang.  
Mr. Hormarjee A. Wadia.  
Mr. Vundrawundas Purshotamdas.  
Mr. K. R. Kama.  
Mr. Rustonjee N. B. Jeejeebhoy.  
Mr. Pestonjee N. Wadia.  
Mr. Harkeerosondas Vurjee  
wundas.  
Mr. Tribhovaudas M. Nathooobhoy.  
Mr. Purshotamdas M. Nathooobhoy.  
Mr. W. M. Wood.  
Mr. Kaikhoorao N. Kabrajee.  
Mr. Khanderao C. Bodarkar.  
Mr. Nanabhai R. Rautina.

Mr. Mahadew Govind  
Ranade.  
Mr. Bomanjee Pestonjee  
Master.  
Mr. Bala Mungesh Wagle.  
Mr. Abbas Tyebjee.  
Mr. Janardhan Gopal.  
Mr. Bomanjee M. Punthakey.  
Mr. Shantaram Narayan.  
Mr. Ahmedbhoy Habibbhoy.  
Mr. Jairam Pirbhai.  
Mr. W. Pendlebury.  
Mr. Cursetjee Furdonjee  
Parekh.  
Mr. Fazulbhoy Cassimbhoy  
Gangjee.  
Mr. Goculdas Jugmohondas.  
Mr. Thakurdas Atmaram.  
Mr. R. G. Bhandarkar.  
Mr. Vishnu Ganesham.  
Mr. Jemsetjee N. Tata.  
Mr. Cursetjee Jehanghir Tarachund.  
Mr. Hormusjee N. Saklatwala.  
Mr. Manekshaw Jehanghirshah.  
Mr. Balajee Pandurang.  
Dr. Furdonjee B. Servai.  
Mr. Bomanjee Dinsha  
Petit, and others.

The Sheriff (Dr. Atmaram Pandurang) having read the notice convening the meeting, it was proposed by Mr. J. A. Forbes and seconded by Mr. Cursetjee Furdonjee that Sir Mangaldass Nathooobhai, C.S.I., should take the chair.

SIR MUNGULDAS on taking the chair said that they had been invited to consider the proposal of addressing a petition to Parliament, from the inhabitants of the Presidency, remonstrating against the total abolition of duties now levied on the import of cotton goods and ~~from~~ <sup>from</sup> ~~manufactured~~ <sup>manufactured</sup> in England. Last year, the duties levied on coarse goods of the same quality as those manufactured in India were removed, and all protective duties were wholly abolished, and cotton goods imported from England were placed on a footing of equality with those manufactured in India. But not content with this important concession the Government of India had this year abolished duties which were not protective, and it was proposed to make a further sacrifice of the Indian revenue, to the extent of about three-quarters of a crore per annum, to favour the manufacturing interests of Great Britain, by the total removal of duties now levied on goods and yarn imported from England. A provisional committee consisting of several able and well informed gentlemen had considered the question in all its bearings, and had after due deliberation prepared a petition which would be submitted to them for adoption. This important document put their case clearly and in a dignified tone before the supreme legislature, to whose care the destinies of two hundred millions of people had been entrusted by Providence. It prayed for justice at the hands of the chosen representatives of the British nation, and protected

against the recent and proposed abolition of the import duties. No pains had been spared to make this remonstrance worthy of consideration by the august assembly to whom it was addressed. He sincerely trusted, it would meet with the unanimous approval of the meeting. (Applause.) He confessed the task they had undertaken was not easy. It was very difficult, because powerful interests in England were arrayed against them. The commercial and manufacturing classes in England possessed the right of direct representation in Parliament, whilst the people of India had no voice whatever. Moreover, their grievance was intensified by the fact that members of Parliament were usually apathetic and indifferent, and took very little interest in matters affecting their weal or woe. They should not, however, abandon their task in despair. By combined and persevering efforts they might eventually succeed in obtaining redress from the Imperial Parliament. If the House of Commons, as at present constituted, declined to comply with their prayer for justice, they might try the new House—which might not disappoint their reasonable hopes. The difficulty with which their path was beset, induced him to point out to them the want of a powerful and efficient organization for taking up with promptness such questions as they occurred, for submitting their wants to the governing authorities in India and England, for protecting their interests, and for watching the course of legislation. They would, he trusted, admit the necessity of taking immediate steps to supply this want. (Hear, hear.) The Bombay Association, which for many years did valuable service to their countrymen, had again been allowed to slumber,—ought to be resuscitated and placed on a sound footing, or some new organisation might be substituted and provided with the means necessary for conducting its operations with ability and vigour. Let them look at the good which the Sarvajnik Sabha of Poona was doing and what success it had already achieved. (Applause.) Should they, the inhabitants of the chief presidency town, quietly submit to be surpassed by their brethren of the Deccan? Had they no merchants, no bankers, no tradesmen, no University men amongst them who could emulate the Sirdars of the Deccan and their able coadjutors? This was the subject which deserved their earliest and most careful consideration. He had witnessed with intense pain the attempts which had recently been made to reverse the policy laid down for the Government of this country. (Loud

applause.) It had been the province of the Government of India to initiate all measures relating to revenue and other important matters. On the receipt of directions from England, the Government of India lately appointed the Tariff Committee, who reported against the abolition of the bulk of the import duties. This report was adopted by Government. On his recent visit to Bombay, His Excellency the Viceroy of India declared his deliberate opinion to the Bombay Chamber of Commerce in the following terms:—"He was of opinion that with the exception of about forty thousand pounds sterling, the duties were not protective, because Manchester had no Indian competitors in finer manufactures. He thought the eight hundred thousand pounds collected yearly, as duty on finer fabrics, a fair item of revenue." With regard to the duty on coarse goods he thought it "protective, because Bombay mills competed with Manchester; but he did not see how it could be abolished because it would lead to irregularities in order to evade duty." (Applause.) Since the public expression of these views so recently as three years ago the "protective duty" on coarse goods had been removed; but, not content with this concession and a further concession which was made this year, the English manufacturers had, it was reported, prevailed on the Secretary of State for India, to instruct the Governor-General gradually to repeal these unobjectionable duties, which were a fair source of income and did not press on the people like the licence tax, salt tax, and other heavy burdens. (Applause.) It was further reported that Lord Lytton had resolved to carry out the instruction against the advice of his able, experienced and distinguished councillors, who had protested against his proposal. Thus Her Majesty's Ministry now in office had inaugurated a change in the policy which was fraught with mischievous consequences. (Applause.) With these remarks he commended to their earnest consideration the adoption of the proposed petition to Parliament, and the resolution relating thereto, to be submitted to the meeting which represented the different classes of the community of Western India. (Applause.)

The HON. MORARJEE GOULDAS, C.I.E., moved the first resolution. He said—Mr. Chairman and Gentlemen, I have been asked to propose the first and the most important resolution for the consideration of this large assembly, consisting of the representatives of all classes and professions in this great city. It is in no spirit of affectation and false modesty that I wish the

resolution had been placed in other hands abler than mine. I have a large interest in the mill industry of this city, but at the same time I need not say that I take my stand here upon my rights as a tax-payer of this already overtaxed country and not in my capacity as a mill-owner; and it is on behalf of the country that I appeal to you for support in this our common effort to move the House of Commons to look closely into the details of this import duty question and to realise the great responsibility that lies upon them by overruling the step which the Viceroy has recently thought fit to adopt. Gentlemen, the main position taken up in the Memorial drawn up for your acceptance is simple and comprehensible. The question now is not one of Free Trade or protection—it is not a conflict between the mill-owners of Manchester and the mill-owners of Bombay. That feature of the controversy is beyond the pale of discussion, now that the duties so far as they partook of a protective character were abolished by Government last year, when all coarse yarns and goods below 20s were rendered free of import duty. The question has now assumed a different aspect and lies between the interests of the people in India and the interests of the Manchester spinners. Manchester agitation is at present directed to the repeal of the duties, not because of their alleged protective character, but solely because these duties are supposed to restrict the demand which Manchester expects to find in the Indian markets for its goods. If the duties on all the counts were abolished, the consumers—that is, the people of India—would it is asserted buy them cheaper than they do now. The agitation therefore is based on the interests of the people of India—its efforts are said to aim at enabling them to buy finer cloths imported from Manchester at a cheaper price. The people of India are poor, and therefore they cannot afford to buy these goods. Remove the duties and you make them rich enough to be clad well. That is the line of argument taken by Manchester and her advocates. Now, gentlemen, it is not for me to question the sincerity of this good-will for the people of India exhibited by Manchester. But it is as well to remember, gentlemen, that philanthropy has often a tendency to be deceived, especially when it is combined with any prejudices or notions of self-interest; and with due deference to the benevolent spirit in which Manchester professes to labour for the interests of the people of this country, I am constrained to say that her philan-

thropy is not based upon a due foresight and upon the real circumstances in which this country happens just now to be placed. Manchester is quite at fault in thinking that the finer sorts of her goods will be cheapened to the poverty-stricken ryot of this country. The ryot does not wear fine clothes and has to be content with a *camble* to keep off the sun and rain and a common country *lungote* to hide his nakedness. It is a misfortune that we cannot induce the Manchester men to consider these facts; but we can still, however, hope to satisfy them by an appeal to figures. In considering the question of competition between the mills of Manchester and those of Bombay, I would remind you, that Bombay labours under so many disadvantages compared with her formidable rival, that even in manufacturing coarse goods she cannot hold her own. Some time ago I clearly proved this, and were this the place to do so I would convince you by figures that my statement is correct. That is, however, not the question now. The repeal of the duties in 1878 should have, on the assumption that the abolition of the duties would lead to a greater consumption of Manchester goods, led to a fall of price and increase in the quantity consumed of these goods. Has it brought about any of these consequences? You will see from the figures of the import returns that this millennium is as far as ever removed from our vision, and see the sufficient reason that many millions of the people of India cannot afford the luxury of foreign cloth. If this has been proved by the unimpeachable testimony of figures in reference to the coarser goods, it needs no prophetic vision to help us to understand that the recent abolition of the duties on all goods under 30s and the contemplated abolition of the duty on higher counts will not, so far as the ryot is concerned, help Manchester in the least. Of course, as you well know, the consumers of these imported goods are mostly found among the middle and upper classes of British and Native States. These classes might be slightly benefited by the repeal of the duties, if that repeal were brought about in times of prosperity and without the weight of additional taxation. But, unfortunately, there is a different state of things altogether now. While trade is depressed, cries of famine are heard everywhere. The task of feeding the millions has developed upon our Government and additional taxation has become absolutely necessary. Since the first reduction of the duties in 1878, new local cesses on land,

enhanced salt duties, a most iniquitous licence tax, increased stamp and other duties have had to be imposed upon the tax-payer in India, and still the cry is, *they come*. These duties represent a burden of direct taxes of at least eight times the weight of the indirect ones abolished. Then, again, there is the glaring fact that while the greater part of this additional taxation has had to be levied as a famine insurance fund, the fund itself has disappeared most suddenly, without a pie of it being spent on the special purpose for which it was last year raised. The Afghan war expenses have swallowed this amount and as if the misfortunes of this country were not complete, it has pleased Heaven to threaten us with a new period of famine. This is not the place for me to say that had the famine reserve fund, which was raised last year to insure the country against droughts, been at hand just now, things would have gone more smoothly and the prospect would have been a little more hopeful. But such a prospect has not been reserved for us. Well, under these circumstances, with famine, war, and new taxes bearing on the people of India, one and all at the same time, I must say, it is difficult to understand how the Manchester people expect to find them better prepared to buy larger stocks of their manufactured goods. Have they duly weighed this fact? Have they examined our present situation, and do they see its gravity? I fear not. These facts are not difficult to see—they are as clear as anything, but alas! self-interest induces and distance perhaps helps Manchester to ignore them. If Manchester could insure the prosperity of the people of India and aid her own self-interest, good and well. Has she done so? Well it would be something if she could do this—there would be some ground for her agitation in that case. The moment these duties go from our sources of revenue, Government will find themselves in the unhappy predicament of making up the loss to the revenue by new measures of taxation. And the consequence of such additional taxation can only be to make the people of India still poorer, and hence less able to buy either coarse or finer cloths. The surest way for Manchester to help the people of this country as well as its own interests in this matter is to insist upon the reduction of expenditure in India and in England, and thus to keep more money in people's pockets to buy their goods than unfortunately is the case at present. Any other course of policy can only end in the ruin and bankruptcy of Manchester's Indian customers; and by pursuing

it she will find that by her caresses she has killed the geese that laid the golden eggs. The well-being and prosperity of India is the only road to secure a permanent development of the demand for Manchester goods. Reduce the enormous expenditure of the administration of this country and of the home charges, allow money to be collected in the hands of its people, see that they are not unnecessarily and unjustly called on to pay for imperial wars and concerns, and that their famine reserve funds are not devoted to purposes other than those for which they are raised—in short make the people prosperous, and then, let Manchester cry for a better market for her goods. This is the only expedient which can save India, and which, because it can save India, can purchase Manchester goods. I do not here mean to sit in judgment over the decision which Lord Lytton has arrived at in this matter, but to me as to all it appears something anomalous that the Viceroy should have, at a critical time like this, allowed Indian interests to be sacrificed to those of Manchester. I have said already that in making this agitation Manchester ignores the actual condition of this country, but that is itself not so bad as the encouragement she gets from the Home Government. If anybody ought to know better the financial difficulties of this country, it is the Government, and yet on this import duty question we find that Government act as if they were ignorant of those difficulties, or as if, knowing them, they made light of them. Everything that Manchester demands finds a ready hearing. She has only to get up a deputation and she is successful, whereas the loudest cries of India from one end of the country to the other and the assertions of Government themselves that the country is in a chaos of deficits and loans, are forgotten as if they were nothing before Manchester's demands. The Government knew well that there have been famines in the land for the last few years, and that in recognition of this circumstance a famine reserve fund had to be created last year. This year there was the Afghan war, and the Government are also aware that its expenses have been thrown on this country. They also see that the National Debt has had to be increased by raising frequent loans; and yet at a critical moment when Indian misfortunes have come in battalions, our authorities have thought it a wise policy to give up a portion of the revenue. Was there any reasonable ground for this? It is said that it has all been done out of sympathy for the

people of India; but Gentlemen, I have already shown to you how hollow and misleading such an argument is. If the interests of the people of India have brought about the reduction of these duties—may I ask, whether there is nothing else in the system of Indian taxation which deserved consideration before this import duty question? It is said it has been done in the interests of Free Trade against protection. But what duty—what system of taxation—can you exclude from *protection* except perhaps the income tax and a few other duties. Are not some of the foreign goods taxed by England herself? Why even in India, as the *London Times* was wise enough to point out only the other day, are not rice, sugar, and other articles taxed when imported? What is there in the cotton goods alone that should induce Government to make them free of import duty and not these articles? When all this is considered, can any one avoid the unpleasant suspicion that it is not *protection*, it is not the interest of the people of India but it is some pressure which the eye does not detect, the mind can grasp, that has exercised an influence over the Government too strong to be resisted? That is, gentlemen, not all. It is said the abolition of these duties has been resolved upon at the direction of the present English Ministry; but are the English Ministry consistent with themselves in asking the Indian authorities to repeal these duties on the grounds of protection? Why, we need not go very far to satisfy ourselves on this point. I will not refer here to the views of so high an authority on economical matters as Professor Fawcett, who has proved in his new work on *Free Trade and Protection* that these import duties are not protective, and as a just source of revenue should not be dispensed with. Nor will I here quote the testimony of Lord Lytton himself, who soon after his arrival in India advocated a policy different from that to which His Excellency has now unfortunately committed himself, by expressing it as his opinion to the Bombay Chamber of Commerce that these duties were not protective and could not be given up without entailing fresh and unnecessary troubles. These are matters which are patent to all who have not forgotten the past. On the 6th of March last—it deserves to be well remembered—a deputation of British manufacturers waited upon Lord Salisbury, the Secretary of State for Foreign Affairs, to request His Lordship to confer with the continental powers as to effecting some reform in their tariffs so as to abandon the protec-

tive duties which some of these powers have been levying on foreign imported goods. Lord Salisbury's reply puts the scope and nature of such duties in an intelligible light and lets us into the secret, that these duties are levied not for the purpose of encouraging local manufacturers but for securing more money to the finances without putting any new burdens of taxation on their subjects. I will read to you an extract from his Lordship's reply which bears on this point:—  
 "A good deal has been said about protectionist views in this country and elsewhere. There is no doubt a remarkable change of feelings in many quarters, and it is one of the melancholy results of the present depression that both our recent commercial and our recent philanthropic action are being, as we have heard to-day, very largely called in question and that if the depression lasted, speculative objection might take a practical form; but my own impression is that it is not a revival of protectionist theory which is mainly responsible for the efforts being made in various parts of the world to raise tariff. That is still a strong protectionist feeling, but that alone would not have been sufficient. Everywhere Governments are in want of money and the easiest way to get money, and galling your subject least, is to raise it by indirect taxation and when manufacturers want protection by indirect taxation, the Governments and the manufacturers come together and there is force which nothing can resist. If you look around, the sinner who has begun the recent trouble is our very good friend and ally, the Emperor of Austro-Hungary, but it is known there that financial considerations occupy a very conspicuous place in the motives inducing the recent proceeding of that Government. So there is a good deal of talk, and I fear something more than talk, of the growing of indirect taxation in Germany. But there, again, there have been serious deficits to meet, and consequently the Government has wanted money. And the reason why that appears to be a more satisfactory state of things than if we had to attribute it to a change of opinion in the world and in the current of thought in the matter of protection is that it is more remediable. When the world settles down again and the Eastern Question disappears, I hope that Governments will not spend so much of their money as they do in hostile demonstrations and hostile actions, and that peace and quiet will return." Now, what do these words prove? Do they not prove that the import duties are, as a species of indirect taxation, the best means of securing money for the

finances of a country without inflicting any special burdens on the people? Germany and France are weighed over by large military armies, and therefore want money. We, on the other hand, are weighed over by famines, armies, home charges, and enormous expenditure and a war, so that we stand still more in need of money, and that money must be gathered without any amount of trouble and hardship. And what else serves this purpose best but the Import Duties? Lord Salisbury's dictum is strongly in favour of our argument and one would have thought that it would be made to hold good in the case of India. But no; a different policy is pursued here as if the English Ministry think that they can deal with India according to the spirit of the times and party necessities. The recent debate in the House of Commons on this subject shows very clearly that the fate of India was left to be decided by the Manchesterians in concert with the Ministry, and that most of the members of Parliament show a complete apathy to the way in which this country is being dealt with by the influence of Manchester, and all this because India is unrepresented and cannot do a good turn to the Ministry. It appears clear to me, as it must be to every man who has the interest of this country really at heart, that with increasing poverty amongst the people and a steadily increasing taxation our rulers will have serious difficulty in raising revenue sufficient to meet their expenditure and steer clear of bankruptcy. They will then see that the pruning-knife must be used freely in cutting down wasteful expenditure which has been nearly doubled in the last twenty or twenty-five years, instead of throwing away revenue the collection of which was simple and hurtful to none. Gentlemen, I have said, I hope, enough to make my meaning fully clear to you. The time is come for us when it is necessary that we should speak the truth, and let our rulers know our minds freely. In meeting to-day here we are not met to criticise the action of, or to adopt a spirit hostile to, the Government of India. Our object simply is to urge the truth, and an unpleasant and stern truth, on the attention of our rulers, which if concealed or overlooked would involve the State in dangers too difficult to be foreseen. The misfortune of India is, that its Government and its people have no regular means or any facilities of understanding each other thoroughly, and this is the cause of much misunderstanding and many evils. It is hence, I say, that India has been unfairly treated in this import duty

as in many other financial questions. It is on that account the more necessary on our part, as loyal subjects of Her Majesty, to express our thoughts, describe our condition as best we can, assured that in the expression of truth and its appreciation by our rulers, lies the safety of the Indian Empire. That we can gather in such a large assembly and agitate questions on which the interests of the Empire depend, must be a matter of pride and congratulations to the Government no less to the people. If the people sit quiet, brooding over their wrongs and allow the cry of bitterness to grow, the fault lies with them that they have not moved and made the cry heard by their rulers. Disloyalty consists in silent and resentful contemplation of wrongs and not in a frank expression of them. Acting upon this vital truth we have met here to-day to lay our grievances before that august body—the ultimate help of the helpless—the Parliament of England. In acquainting them with those grievances, we are doing what in justice we are bound to do in the interests of the Empire, and let us hope that the genius of the English nation, which has done so much to raise this country from darkness, will prove her support and her strength in these times of difficulty. With these words I beg to propose,—“That in the opinion of this meeting the recent repeal of the import duties on cotton goods cannot be justified on economical or financial grounds, and that it is therefore desirable to petition the House of Commons against the same and against any further remission of those duties.” (Loud Applause).

Mr. NANABHOY BYRANJEE JEEJEEBHAY said that the motion which he had the duty of seconding, stated that the late remission of duties on cotton goods could not be justified on financial or politico-economical grounds. What then was the financial position of India as compared with what it was three years ago when His Excellency the Viceroy took the oaths of office? At that time India Government Paper, four per cents, stood at 102½, and the bonds of their Government stood second only to British Consols; but now though in the meantime the securities of every civilized Government had been rising, owing to the universal tendency of capital, to seek safe investments, the securities of the country had fallen until 4 per cents, to-day stood at only 92. The increase to their debt, including the coming financial year, amounted to no less than 20 millions sterling, though in the meantime they had fresh taxation. Lord Lytton, just before leaving England to take up his high posi-



tion in India told the people of Manchester that he was instructed above all things to avoid deficit debt and fresh taxation, and yet he had given them all these in yearly increasing quantities. To such a position had their finances come that the Government in its Financial Statement just issued stated, as expressed in the petition which they were met to consider that "the difficulties they saw . . . way of fiscal, and commercial, and administrative reform have been greatly aggravated. Nor can it be in any way assumed that the evil will not continue and go on increasing. Under such circumstances it is extremely difficult to follow any settled financial policy; for the Government cannot even approximately tell what income will be required to meet the necessary expenditure of the State;" and also Mr. Stanhope, the Under-Secretary of State, declared in the House of Commons, "their (the India Governments') borrowing powers are exhausted." He had no wish to throw upon the Government the whole responsibility of this state of their finances; but they had a right to ask if this deplorable state of their treasury was one which justified the giving up of any revenue? Was it not true that never, since that country came under the direct rule of their Gracious Empress was India less able to do away with any of her income? If deficit debt and fresh taxation supplemented by war and famine were not sufficient inducements to cling to their revenue, what further inducement could possibly be offered? But the resolution further stated that the remission could not be justified by the principle of political economy. They were not met that day to argue in favour of protection; happily that question has been removed. He did not ask them to take his word for this statement; he had higher authority to give. In 1875, Lord Salisbury said—"If it were true that this duty is the means of excluding English competition, and thereby raising the price of a necessary of life to the vast mass of Indian consumers, it is unnecessary for me to remark that it would be open to economical objections of the gravest kind. I do not attribute to it any such effect." And this was said before the duties on coarse goods were removed. Lord Lytton, too, while addressing the Bombay Chamber of Commerce in March 1876, put the case in the very intelligible shape that as the total import of Manchester goods amounted to about 19½ millions annually, and of this total 18½ millions were of the finer fabrics in which there was no competition, therefore, that portion of the duty might be regarded as simply a duty for re-

venue purposes only and could not in any sense be regarded as a protective duty. By the Government resolution of 18th March 1878, the duty on all protected manufactures was removed. That there could be no doubt of this, he would quote a paragraph from the report of the Tariff Committee attached to the Financial Statement of this year,—"There appears no room to doubt that the notification was sufficient and suitable for the objects the Government had in view. . . . There are thus good grounds for believing that except in a small number of isolated instances the limit of 30s fixed by the notification goes rather beyond what is necessary for abolishing existing direct protection." This report was accepted by Government and its opinion adopted. This being the case, all protection having been removed, on what grounds was this remission made? It had been caused by the agitation in Manchester, and of what do the Manchester people now complain? From the reports of the late discussion in the House of Commons received by the last mail he found they had dropped the protectionary and merely complain that their trade was in a depressed condition and yet it was subjected to a charge of £800,000 on entering India. (Applause.) Was this a reason for removing duties which were not protective? If so, why were not duties removed from Indian products entering the United Kingdom when their trade is depressed? (Loud applause.) If Manchester complained that her depressed trade paid £800,000 on entering India, India complained that her depressed trade paid £2,000,000 on entering England; and the two duties not being either of them protective stood on precisely the same ground. (Applause.) To remit one and not the other proved conclusively that India was not governed in India's interest (hear, hear); that the principles of political economy which were applicable in England were not considered as applicable to India. (Applause.) In 1876, when His Excellency Lord Lytton accepted the position of Viceroy, and when the finances of India were in a comparatively flourishing state, Lord Halifax said in the House of Lords when discussing the same question, "in this state of things surely common sense would suggest that whatever sources of revenue there were, these ought to be preserved just now unless they were obstructive or oppressive." He deeply deplored that their respected Viceroy should have allowed himself to be so completely carried away by the strong agitation of the persevering men of Manchester as to have sanctioned

the repeal of the import duties on cotton goods at a loss to the Indian revenue of upwards of from 20 to 30 lacs, and that at a most inopportune time—a time when the people of India were suffering from the heavy burden of a war which could not but be considered to have been undertaken for Imperial purposes—a time when the country was passing through a commercial crisis of great severity—a time when the repeal of those duties could not but necessitate additional taxation—and direct taxation to the extent of lacs of rupees, which the famine-stricken taxpayers of India could ill-afford to pay. (Loud applause.) The Bengal Chamber of Commerce recently urged upon the Government of India that looking at the discontent which was occasioned in this country by all direct taxes, and the oppression which unfortunately attended their collection, the Government should on the ground of public expediency hesitate before relinquishing any source of revenue of a comparatively unobjectionable kind, if its place had to be supplied by the imposition of additional direct taxation, and the Chamber further forcibly urged that it had hitherto been proclaimed by the Home Government that taxation in India would be levied, and that the administration of the country would be conducted, not in the interests of England—far less a section of it—but in the interests of India itself; and though His Excellency the Viceroy said in reply that he entirely concurred in that opinion, the measure which he adopted, had been a source of no small mortification and disappointment to them all, because it had shown what the Chamber feared, viz., that the opinions and wants of sections of the people of England had more influence in determining the character of the financial legislation of India than the interests and wishes of the people under the Government of His Excellency the Viceroy. (Applause.) It was much to be regretted, that not content with quietly appropriating the surplus of taxation collected from the Indian people to provide a famine reserve fund to other purposes than those for which it was originally intended, the Government of India should have decided to give up these import duties without any regard to the ability of the Indian exchequer to forego the revenue derived from that source. There were other articles which were as useful to the people and as necessary for their comfort and well-being, such as woollens, metals, hardware, &c., which had at least an equal claim to liberal consideration, and though it was pointed out to the Viceroy that a depression in these trades commenced at an earlier

date than that in cotton, His Excellency said that he had decided to exempt cotton goods from taxation although other duties were indisputably allowed to be protective, and injurious in their effect. The remission was ordered by the Viceroy not only in spite of any good grounds on financial or politico-economical considerations, but against the advice of his Council composed mostly of men of long tried Indian experience. (Applause.) It was condemned by the people of India, by the Press of India, and by the leading papers of England, which were hitherto supporting the Ministerial party. They, therefore, were going to the British House of Commons backed by a support which showed that their agitation was not one, induced by petty and local considerations but demanded in the true interests of the British Empire. (Loud applause.)

The motion was supported by Mr. NOWROOZEE FURDOONJEE, who said—Lord Northbrook in his speech on the subject of the Indian Tariff Act of 1875 laid down the following proposition:—"In all financial questions the true interest of the people of India is the only consideration which the Government of India has to regard." This axiom had been disregarded by the present Viceroy, who had changed his opinion since 1875 on the subject of import duties. Three years ago His Lordship did not consider them protective or objectionable. Now he took objection to them, and had resolved to abolish them *in toto*. For whose benefit? Not for the benefit of the people of India, who did not feel aggrieved, and had not complained, but for the benefit of the manufacturing interest of England. The complaint of the manufacturers of Lancashire, though selfish, was so disguised as to make it appear as if it were urged for the benefit of the people of India. But since the removal of the duty on coarse goods, the remainder fell not on the poor people, the masses, but on the well-to-do and middle classes, who did not feel any hardship. The absence of thorough independence, public spirit, and want of combination and perseverance was the bane of Bombay. If they combined and acted honestly and fearlessly, undeterred by the frowns and uninfluenced by the smiles of office, they would be able to do some good to the people. He quoted three recent instances of the "frowns of office," viz:—(1) the British Indian Association of Orissa, accused of ingratitude towards Government; (2) the Sarva-janik Sabha of Poona, accused of sedition by a member of the Government of Bombay; and (3) the refusal of the Town Hall to the public to hold

public meeting by Sir B. Temple. And the last, although the public had contributed a very large sum of money towards the cost of building the Town Hall. If they could get that money now, and the interest on it, they would be able to erect a very fine Town Hall of their own. (Laughter and applause.)

The motion was then put to the vote, and was carried with acclamation.

Mr. PHIROKSHA M. MEHTA then read the petition, which was as follows :—

To the Honourable the Commons of the United Kingdom of Great Britain and Ireland in Parliament assembled.

The Humble Petition of the Inhabitants of Bombay in Public Meeting assembled.

RESPECTFULLY SHewETH,—1. That your Petitioners, in the exercise of their high and valued privilege of petitioning your Hon'ble House for the redress of grievances, venture, *firstly*, to call your serious attention to the grave impolicy, both from a financial as well as from a political point of view, of the remission of the Indian Import Duties on all cotton goods containing no yarn of a higher number than 80s, just proclaimed by the Government of India, which involves a sacrifice of revenue to the extent of twenty lacs and forty thousand rupees, as estimated in the Financial Statement of the Government of India, but which, your Petitioners apprehend, will considerably exceed that amount; *secondly*, to protest at the same time against the contemplated repeal of the whole of these Import Duties on all cotton-goods whatsoever, which at present bring a revenue of upwards of eighty lacs of rupees; *thirdly*, to point out the disturbing influences and disastrous consequences of such a remission on the financial condition of India in its present overburdened and critical state; *fourthly*, to indicate the unfortunate tendency of such a measure carried out under existing circumstances to foster a popular belief that the interests of India are sacrificed to those of a section of the British community; and lastly, to pray that a measure fraught with such mischief to the best interests of both countries should be disallowed and reversed.

2. That your Petitioners are, in the first place, desirous of pointing out that the Import Duties on cotton, as well as all other manufactured goods, have never been entertained by the Indian Exchequer at any time for any reasons of a protective character. This fact was, up till now, fully recognized by all the Viceroy and Finance Ministers who watched over the interests of India; and at the time of passing the Indian Tariff Act of 1875, the Earl of Northbrook, who was distinguished for the general soundness of the principles on which he administered Indian finances, gave the most clear expression to it. "Indian Statesmen,"

he said on that occasion, "have never regarded customs duties as desirable for the purpose of protecting the products and manufactures of India. Mr. Wilson, Mr. Laing, Sir Charles Trevelyan, Mr. Massey, and Sir Richard Temple have all been free-traders. In India, equally as in England protection has been regarded as an exploded doctrine, contrary to the general interests of the country which imposes protective duties." And again, "duties upon imports have not been imposed in India with the object of protecting Indian manufactures or produce, but solely for purposes of revenue." The Import Duties on cotton goods were retained permanently in the Indian Tariff, not for the purpose of protecting indigenous industry, but because they were remarkable for the lightness and equality of their incidence, the easy productiveness of their outturn, and their peculiar adaptability to the feelings and habits of the people of this country. It has been calculated that the duty on cotton goods, falling on a total population of 240 millions, including the population of the Native States, which bear their share of this duty, does not come to more than half an anna, or something less than three farthings per head per annum. At the same time its incidence is so equitably regulated that, while it falls on the poorer classes with the least burden, without allowing them to escape it altogether (the amount realized from coarse goods aggregating about four lacs, with a pressure per head much lower than the average above stated), the richer classes have to pay it just to the extent they are inclined to indulge in the luxury of wearing finer goods. But, above all, their indirect and silent operation, involving no oppressive inquisition, rendered their maintenance almost indispensable in a country where the sources of indirect revenue are by no means various, and where a constant accumulation of experience has shown that direct taxation is oppressive, unequal, utterly discordant with the intensely conservative ways and habits of the people, and a source of much bitter feeling and discontent.

3. That, under the circumstances above described, your Petitioners submit that even if the Import Duties on cotton-goods were of a slightly protective character, it would be most undesirable to repeal them simply on that account. But your Petitioners respectfully submit, that it is by no means established that these Import Duties have a protective character. With respect to the finer class of cotton-goods made from yarns of 19s and upwards, there can be no question that the duty on them does not come under that denomination, owing to the simple fact that the mill industry in India does not yet, and in all probability will not for a long time to come, concern itself with their manufacture. The question, therefore, confines itself only to the coarse goods made of yarns averaging 19s and under, which are produced by Indian mills. It has been clearly shown in the report of the Government of India's Tariff Committee

which sat in 1875, that the whole yield of the Import Duties being so small as 5 per cent. on this class of cotton-goods did not exceed four lakhs of rupees (£40,000). It is difficult to imagine that a duty of so light a character realizing so small an outturn, really operated to any very serious extent as a protective impost. But granting that the duty was protective as regards the coarser goods, all cause for complaint in that respect was removed when the Government of India repealed the duty on that class of goods by the Resolution of 18th March, 1878. In extending the remission this year to all cotton-goods containing no yarn of a higher number than 30s, the Government of India have removed the duty from Manchester goods which have no competition in India. The reason urged for such a step is, that it is unjust to impose duty on certain classes of goods, when goods made from similar materials are exempted from it. The fallacy of this argument lies in forgetting that the object of the remission is to remove a protective impost from goods on which it acted in that manner, and not to exempt any goods on which it may fall simply for the purposes of obtaining revenue. From such a point of view, it is immaterial whether similar goods escape duty or not; and your Petitioners submit that the Government of India by extending the remission in the manner they have done this year, have needlessly sacrificed revenue which was levied without operating as protective in the interests of Indian manufactures. Your Petitioners are aware that it has been advanced, that though this import duty did not operate directly to protect Indian manufactures, it did so work indirectly through the displacement of finer imported goods by the coarser and cheaper locally made articles. But while it does not seem probable that the demand for one class of goods can be met by a supply of another class, when there is a full supply of the class in demand, it is not a little remarkable that even though the Indian mills have recently been over-stocking the market, the import of the finer Manchester goods has gone on steadily increasing. This fact, your Petitioners venture to think, completely outweighs the guess-work of a rather strained hypothesis.

4. That whether these import duties are or are not protective to any extent, it is unfortunately beyond all doubt or dispute whatsoever, that the present state of the Indian finances is so critical and over-burdened, that they can ill afford to sacrifice the revenue derived from the levy of this impost. That the remission of these duties ought to be carried out only when the financial condition of India admitted of it has been acknowledged and laid down on all hands. Both Lord Salisbury, when Secretary of State for India, as well as the present Viceroy of India, so far back as 1876, emphasized this necessary limitation. Your Hon'ble House, also in a resolution passed in 1878, imposed it as a condition of the repeal of these duties that "the financial condition of India must ad-

mit" of it. Now, even in 1875, when the financial outlook was not nearly so gloomy as now, the Government of India were strongly of opinion that the financial condition of India did not permit that these import duties should be given up. In their Tariff Resolution of 1875 they say—"The Governor-General in Council accepted the conclusions of the Committee in respect to the demand made by the Manchester Chamber of Commerce for the total and immediate repeal of the import duties on yarn and piece-goods. The revenue obtained in 1874-75 from these duties was £92,15,388, and even at the valuations as now revised it would have been more than £84,00,000. It would be impossible for the Government of India to give up such a sum without seeking some compensation from other sources. These duties are levied at a very small cost and at a minimum of inconvenience to the people, and they cause no discontent. Had the Government of India found it necessary for the reasons given on behalf of the Manchester Chamber of Commerce, or for any other cause, to abandon these duties, they would have been placed in a position of much anxiety. If necessary, they must probably have resorted to the alternative of an excise on the indigenous mills, rather than give up a large revenue which cannot be spared." But if, in 1875, the difficulty of accomplishing the repeal with due regard for the financial condition, was so great, it is impossible to controvert that that difficulty has now increased to an extent which cannot but entail the profoundest anxiety. Every line of the Financial Statement which the Government of India have just issued indicates a financial pressure which gives the gravest cause for concern for the present and alarm for the future. Your Petitioners earnestly submit that the remission of the import duties at the present juncture is fraught with serious danger. The country has not yet recovered from the effect of the dire famine which ravaged this and the Madras Presidency for upwards of two years, from the scarcity which prevailed largely in the North-Western Provinces last year, from the prevalent distress arising in this Presidency from the enormous rise in the price of provisions, from the scarcity which has again arisen in several parts of this Presidency in the present year. While the effects of these heavy calamities are still telling on the people, while the increase of taxation during the past few years has found the people less and less able to bear it, owing to the decline in the prosperity of the country since the close of the American war, the only resource discovered last year for encountering the periodical recurrence of famines has been obliged to be abandoned, and not only has the fund which Sir John Strachey declared would be religiously set apart for Famine Insurance been appropriated to other purposes, but this provision, the existence of which last year was proclaimed to be of the most vital importance, has been given up, at the same time

that the obnoxious impost for levying it, the licence tax, which produced so much discontent last year in every part of India, is retained. Then, again, it has been provisionally resolved by your Hon'ble House, that the expenses of the Afghan war, which is not yet over, must be borne by the people of this country. The expenses are estimated for the present year at £670,000 and for the ensuing year at £2,000,000. Your Petitioners cannot allow this opportunity to pass without expressing their deep regret at the resolution which your Hon'ble House has already come to on this point, the more especially as they were unable to make any representation on the subject before that resolution was carried. Your Petitioners still hope and trust that, bearing in mind the Imperial character of the war, remembering the scope and intention of the 55th clause of the Government of India Act of 1858 and the declarations of the responsible Ministers of the Crown in relation thereto, but above all, dealing generously with a question, in which, of the two parties concerned, the one is powerful and represented, and the other weak and unrepresented, your Hon'ble House will see your way to declare the policy and justice of making the Exchequer of the United Kingdom share at least a considerable part of the burden of these expenses with this poor country. High authorities on the subject are stated to have declared that the expenses will amount to something nearer 5 than 3 millions. Heavy as this burden is, there is no guarantee that the actual expenditure will not considerably exceed even these estimates in view of the uncertainty of all forecast as to the speedy termination of the war. But the financial condition is disturbed by a still more potent cause—the further fall in the value of silver and the consequent enormous loss by exchange. The Government of India despair in their efforts to grapple with an evil of so gigantic a magnitude. In the estimate of the coming year, it is put down as likely to involve a loss of £8,947,368; it would be £4,142,000 if provision were made for remittances to cover the whole of the current "Home charges." In this year's Financial Statement, the Government of India themselves deplore the embarrassment caused by this enormous loss:—"The difficulties they say in the way of fiscal and commercial, and administrative reform have been greatly aggravated. Nor can it be in any way assumed that the evil will not continue and go on increasing. Under such circumstances it is extremely difficult to follow any settled financial policy for the Government cannot even approximately tell what income will be required to meet the necessary expenditure of the State."

Connected with this question of the fall in the value of silver is the important question regarding what are known as the Home charges. These again, as has been often pointed out, are a great strain on the resources of this poor country. Sir John Strachey himself has in fact admitted this. But your Petitioners are unable to perceive that any serious

attempt has yet been practically made to reduce the heavy burden of that item on the Indian revenues. The list of their burdens is not yet ended. So far as regards the Presidencies of Bombay and Madras, they have to bear the burden of an increased duty, during a period of famine, on salt from £1-8 to £2-8 per maund of 82 lbs.

When your Petitioners seriously regard this fearful list of financial burdens, when they remember that, enormous as is their estimated weight for the present, they are still more threatening in the future, they cannot but deplore that the Government should have thought it their duty to sanction at such a time a remission of taxation which ought only to be carried out when the finances of India admitted of it. The most complete proof is afforded by the Government of India themselves, that the Indian Exchequer is not in a state to admit of any such sacrifice. It is true that no new taxation is imposed for the coming year. But that is simply because the Government of India have so utterly used up every source of Indian revenue, that it has become impossible for them to invent a new impost; and they have fallen back upon an expedient worse than fresh taxation—increase of indebtedness. The ways and means for the coming year, while retaining all the most obnoxious existing taxes, are to be provided by raising a loan of five crores of rupees in India, and ten crores more in England, besides borrowing a loan of two crores from the British Exchequer without interest. Can it be seriously maintained that a year, in which, according to the despairing confession of the Government, "it is extremely difficult to follow any settled financial policy," and in which it is necessary to add heavy indebtedness to heavy taxation, is a year in which Indian finances admitted of the repeal of such a duty as the light import duty on cotton goods to any extent whatsoever?

5. That, while the repeal of the import duties is thus financially indefensible from every point of view, your Petitioners apprehend that the moral and political consequences of such a step taken at the present juncture are likely to be still more deplorable. It is an unfortunate fact that this measure was not spontaneously suggested by the Indian authorities, but was first urged by the Manchester Chamber of Commerce. It was then strongly deprecated and resisted by the Government of India, with Earl of Northbrook at its head, but was at length pressed upon their attention by the steady and powerful agitation of the people of Manchester. Your Petitioners cannot help deploring it as a peculiar misfortune that the Government of India became convinced of the wisdom and necessity of the measure so far as regards Indian interests after the pressure of this Manchester agitation was brought to bear upon them, and that they should have had to select the same year for carrying it out, when the state of the

Indian finances could not but be admitted to be critical, overstained, and unsettled, and when the manufacturing distress in Manchester was importunate in its demand for relief. It is also impossible not to notice that the philanthropic side of the Manchester movement was never urged by its leaders till their own interests seemed to them seriously threatened, and that they bore with equanimity this serious violation (according to them) of Free Trade principles till the decline of their manufacturing prosperity roused their indignation in that behalf. While far from endeavouring to establish it as well founded, it is impossible for them not to be fearful that these circumstances are powerfully calculated to lend colour to the popular belief, that in taking this measure the interests of India are sacrificed to those of the manufacturing classes which form so influential a section of the British community. Your Petitioners cannot but view as most undesirable that such a feeling should ever spring up between the people of this country and any portion of Her Majesty's British subjects. With the people of Manchester, the Indian populations, particularly those of the presidency of Bombay, have reason to feel the strongest sympathy and gratitude. They have been connected with them in close commercial bonds for a long series of years; and in common with the rest of the world, they have always admired the sturdy energy, and independence with which the men of Manchester, in the enlightened perception and promotion of their own interests, fought and won the battle of Free Trade by which such glorious benefits have accrued to themselves as well as to others. It is therefore doubly painful to your Petitioners that any of the descendants of these men should, under the pressure of their own distress, delude themselves into the conviction that the measure which they seek for their own relief will also necessarily result in the advancement of Indian interests. They should know that whether the repeal of the import duties will operate favourably in the interests of Manchester or not, the results, as regards India, are certain. The revenue derived from them will have ultimately to be raised by the imposition of a much heavier and more oppressive tax, and such a change would only leave them worse off by the difference between the burden of the new impost and the saving they might possibly make by the cheapening of the price of cotton-goods. The principles of Free Trade are acknowledged in India as well as in England: it is only when they are used as a cry in behalf of measures which are beyond their province that your Petitioners are apprehensive that they are likely to be regarded with suspicion. And your Petitioners earnestly hope that this question which they have brought before your Hon'ble House will be viewed without any reference to the temporary distress prevailing in any portion of the British Empire, and that it may be disposed of on the

wise and generous principle laid down by the Earl of Northbrook in 1875, viz.:—"In all financial questions the true interest of the people of India is the only consideration which the Government of India has to regard." Your Petitioners confidently appeal to your Hon'ble House, where the policy of governing India for itself has again and again found noble and generous utterance emphatically to affirm that principle by disallowing the repeal of the import duties on cotton-goods ordered by the Government of India at a time of great financial tribulation, and preventing the total repeal of those duties which the Government of India contemplate carrying out next year.

Your Petitioners therefore pray that your Hon'ble House will be pleased to disallow and reserve the measures already sanctioned, and as well as those contemplated by the Government of India in respect of the import duties on cotton-goods.

And your Petitioners, as in duty bound, will forever pray.

MR. KASSINATH TRIMBUCK TELANG said: Mr. Chairman and Gentlemen, I beg to move the adoption of the petition which has just now been read by my friend Mr. Pherozsha, and in doing so, I trust you will permit me, even at this late hour to make a few—and they shall be only a few, remarks. The case which we wish to present to the House of Commons on this question of the import duties, is so fully stated in the petition itself, that I need not go into the details of it. It cannot, however, be too much insisted on, that that case is not based on protectionist grounds at all. (Hear, hear.) We treat this as a question of finance pure and simple, without reference to any protection of indigenous industry. (Cheers.) The House of Commons has already passed a resolution that the import duties in so far as they are protective must be repealed. The prayer of our petition, if granted, does not require the House to withdraw from that resolution. (Hear, hear.) We say that in any case the duties have now ceased to be protective and that therefore as a question of finance, they ought to remain part of our system of taxation. (Cheers.) Gentlemen, in 1870, Lord Salisbury, who was then Secretary for India, in replying to a deputation of the Manchester Chamber of Commerce; clearly declared that he would be no party to a repeal of these duties, if there was to be substituted for them some other mode of taxation. (Hear, hear.) Lord Lytton, too, I believe, made a similar declaration when on the eve of coming out to this country as Governor-General. I venture to say gentlemen, that the promise thus solemnly given to India indirectly through the replies to Manchester, have not been fairly kept. (Loud

cheers.) It is admitted in this petition, that there has been no additional taxation this year. But I think, gentlemen, that that admission must be taken only in a qualified sense. I venture to say, that in truth, there is considerable additional taxation ordered by the Government of India this year. (Hear, hear.) Gentlemen, we all know how the Licence tax was levied last year and for what purpose. Now we have the admission of the Government of India, that the Famine Insurance Fund for which it was announced that tax was to be "religiously" set apart has "virtually ceased to exist," that is to say, that no such fund has been established out of the proceeds of the tax last year, and no provision is made for establishing it out of the tax this year. That being so, I venture to say, gentlemen, that although in name the tax is not a new one, it is in substance a new tax for this year. (Cheers.) The tax levied last year was one for the establishment of a Famine Insurance Fund. The tax levied this year is one for the ordinary current expenses of the State. That is in substance a new tax. To this are to be added the enhanced duty on salt, and the very considerably advanced rates of stamp duty leviable under the new Act. I venture therefore to say, gentlemen, that the claim on that there has been no new taxation this year must be taken with many qualifications. And those qualifications are enough to show that the promises held out to us about the conditions necessary for the repeal of the import duties have not been kept. (Loud cheers.)

There is one other point, gentlemen, in connexion with this matter, which in my view, is of very great importance indeed, and being one of many indications of a new departure in Indian policy. I allude to the fact brought out by Sir George Campbell in the House of Commons—namely, that on this question, the Viceroy has overruled a majority of his colleagues in Council. (Hear, hear.) Gentlemen, I am afraid, we shall not know for a long time yet, if we ever do know, the number of votes for and the number against this repeal. But it has been credibly asserted that the Viceroy had only one of his Councillors on his side. Thus standing in a glorious minority of two against a very large number against him. I say, gentlemen, that this is a most important circumstance. (Hear, hear.) In a recent instance the Secretary of State set at naught the opinion of a majority of his council, and here we have the Viceroy setting at naught an overwhelming majority of his council. This is one, gentlemen, of many signs indicating that we are coming now on bad

days—on the days of personal Government; (cheers) of Government according to the whims and caprices of individual officers, and that the days of Government by Cabinets or Councils is passing away. (Loud cheers.) However exalted the individual officer may be, who sets at naught the opinion of a majority of his colleagues, this condition of affairs, gentlemen, is one which is most unsatisfactory and mischievous. It has been touched on by *Punch* in a recent cartoon—and *Punch* you are aware is remarkable for the accuracy and felicity of his hits. He represents a retired Indian Officer asking a nephew who is in a great hurry where he the nephew is going. The nephew says he is going to the House of Commons for some important debate, whereupon the retired Indian says, "what is the House of Commons still in existence? I thought you had improved it off the face of the earth long ago." I do not remember the precise words, but that is the effect, and it indicates one of the most remarkable tendencies of Indian administration in these latter days. (Cheers.) Gentlemen, I cannot sit down without adding to what has fallen from my friend Mr. Nowrozji a word of sympathy with our brethren in Bengal under the rebuke which was administered to them by the Viceroy in consequence of their action with reference to the subject which we are met to discuss this evening. (Cheers.) That rebuke, gentlemen, I venture to say—though I am but a humble individual, speaking about the most exalted personage in the Indian Empire—that rebuke was most unmerited, ungenerous, uncharitable, unjust. (Cheers.) Gentlemen, we are all pretty familiar with the mastery of English style, the *curiosa felicitas*, which characterise Lord Lytton's speeches and writings. But I make bold to say, Gentlemen, that that mastery of style, that *curiosa felicitas*, were never turned to worse use, were never more mischievously employed, than when they were made the vehicle of that rebuke to the members of the deputation, consisting of eminent subjects of Her Majesty in Calcutta. (Loud cheers.) Lord Lytton's reply to the deputation is exceptionable not merely for its fallacies and incorrect statements, not merely for its spirit and tone, but also because of its being quite unprecedented among the replies of Her Majesty's representatives to Her Indian subjects throughout almost the whole course of British Rule. (Hear, hear.) In that reply, gentlemen, Lord Lytton said, that he was anxious to put an end to a "fruitless and increasingly irritating controversy." (A laugh.) Gentlemen, that passage of His

Lordship's reply reminds me very strongly of a passage in another of Lord Lytton's performances—in a capacity in which, I at all events can give to his genius the tribute of a much more unalloyed admiration, I mean in his capacity of a Poet. In one of his exquisite Fables in Song, Lord Lytton describes man as a paradoxical creature, and after adducing several instances to bear out the view, he winds up thus—

"Height measures be in depth, seeks peace in strife  
And calls all this the poetry of life."

(Loud cheers.)

His Lordship, gentlemen, has undoubtedly sought peace in strife, both in our North-West where under the guidance of his Chief, Lord Beaconsfield, he has gone in quest of a "scientific frontier;" and also in this affair of a domestic administration. For the problematical "peace" in the future of the stoppage of an irritating controversy, His Lordship has resorted to a wide-spread strife in the present. And probably Lord Lytton has by this time seen, that the cinders of that "controversy" have been blown into a vigorous flame by his own breath. (Cheers.) Gentlemen, I shall not detain you longer. I will conclude by moving that the petition now read by my friend Mr. Phirozsha be adopted. (Loud cheers.)

The motion was seconded by Mr. Martin Wood, who in the course of [some observations remarked that he was a member of the old Corn Law League, and therefore the cause of Free Trade was dear to him, and he should not have supported the present movement if it had in any way been a protective movement. The agitation on the part of the Manchester men for the abolition of the cotton duties he characterised as "free trade run mad," and he denied that the cotton duties were in any way protective.

MR. RUGHUNATH NARAYEN KHOTE said:—Mr. Chairman, the proposition entrusted to my care is one, which after your adoption of the memorial under the resolution already carried with such unanimous concord as we have observed to-day, will need but little prefacing on my part, in offering it for your acceptance. You have already agreed to the submission of the memorial to the Imperial Parliament; and you must next cast about for obtaining in Parliament the powerful support to your memorial of some hon'ble member who is distinguished for high independence of character for an anxious, benevolent, and disinterested solicitude for the interests

of our country, for soundness of judgment breadth of mind, largeness of heart,—one, in fact, who will take warm interest in the movement, will advocate our cause in Parliament with unflinching industry, will bring to bear upon the various large and vexed questions of political economy, involved in our memorial, the minute acquaintance of a specialist, and will, in a word, fitly represent the interests of the Indian ryot, in the British Parliament. I am going to propose a name which is entitled to the deepest reverence and the warmest gratitude on our part; and I am sure you will attest my proposal by your approval. I propose that our memorial be placed in the hands of Professor Fawcett. This honourable gentleman has philanthropically striven on behalf of the millions of our country consistently for a number of years past,—he is one of the few men who, without even visiting India, are thoroughly acquainted with the condition of her people, with their wants, their sufferings, their grievances. He has consistently laboured hard to lessen the weight of Indian taxation, to bring about the nomination of Select Parliamentary Committee, and by examining various persons to procure a flood of light upon questions of vital importance to the finances of India. In his hands our interests will be safe and secure, and will obtain representation such as we shall have only too good reason to be proud of. The resolution in my hands does not require more than what I have already spoken to commend it to your acceptance. Nor do I propose to enter into questions of political economy, or into the claims to protection on the part of the Indian mill-owners on the one hand, or the justice or otherwise of the clamour of Manchester, on the other hand, against what it supposes to be the too great favour shown to the Indian mill-owner at the expense of the Indian consumer. Now, I am not one of those favoured few, who pass under the description of mill-owners; and I fear the five shares I hold in one mill that is going and the three shares in another that has sunk do not entitle me to that designation. I claim rather to be regarded as the Indian consumer—and I am prepared to cry, "heaven save me from my friends" at Manchester. It is true, the duties levied hitherto on English piece-goods fell as they must have fallen on the Indian consumer, but I deny first that the hue and cry ostensibly raised on behalf of the Indian consumer against that import duty is either a just or sincere one; and, secondly, that the Indian consumer is benefitted one jot by the remission of that



duty. I could understand that the ryots would be benefitted if the duty was remitted absolutely, and not replaced by other taxation, but when we all know to our cost that the remission of this duty is taken out of us by other taxation, such as the licence tax, the enhanced salt duty, the new stamp act, and such like provisions, we as consumers have little to thank for the remission of the duty on piece-goods. I conceive this remission of duty is a most ill-advised measure, mischievous in its consequences, most unseasonable in the present embarrassed state of Indian finances, and one which places a new and infant Indian industry under a most unequal clog, as compared with the English manufacture. If I had been left here to make a choice between two evils, I should have certainly preferred the levy of an excise duty on Indian mill productions to the remission of import duty on Manchester goods, to satisfy the cravings of the free trade theory, for in that case, the ryot would have been saved from the additional taxation I have alluded to to make up the deficiency arising from this remission. Again, I should have indeed gladly advocated this remission in the ultimate interest of the Indian consumer, if the Indian finances had been recouped by suitable retrenchments in expenditure, for which there is, it will be admitted on all sides, no small room. But as matters stand at present we are quite justified in submitting the concluding prayer we have made in

the memorial, namely, "Your Petitioners therefore pray that your Honourable House will be pleased to disallow and reverse the financial policy of the Government of India in respect of the import duties on cotton goods." As we could not entrust the memorial to better hands than those of Professor Fawcett I conclude by proposing, Mr. Chairman, "That the memorial be forwarded to Professor Fawcett with a request, to present it to the House of Commons." The following is a committee to forward the memorial:—Sir Munguldas Nathooobhoy, the Hon. Morarjee Goolbass, Mr. Byramjee Jeejeebhoy, Mr. Framjee Nusserwanjee, Mr. J. A. Forbes, Mr. Kittredge, Mr. B. N. Khote, Mr. C. F. Gangjee, Mr. Grattan Geary, Mr. Nowroosjee Furdoonjee, Mr. M. de Quadros, Mr. Hormarjee Ardesheer Wadia, with Messrs. Nanabhoy Byramjee Jeejeebhoy, P. M. Mehta, and K. T. Telang, as Honorary Secretaries.

MR. BUDROODEEN TYABJEE in seconding the motion, which was carried amidst applause, said that Professor Fawcett was well-known as the member for Hackney; but here they acknowledged him as the chivalrous representative of a larger constituency, as the member for India, returned by the unanimous voice of its grateful peoples.

Votes of thanks to the Sheriff and to the Chairman concluded the proceedings.

## PROTEST AGAINST THE CONCESSION TO MANCHESTER.

(*Times of India*, May 5, 1879.)

The public meeting on Saturday was a signal success, and well worthy of the important question that called our citizens together; for it was no sentimental grievance, but a grave wrong, that induced the protest which now goes forward to the British House of Commons from the inhabitants of Bombay. It was natural that the Europeans, connected as they are either as officials with Government or as merchants with Manchester, should have kept aloof, but we think the meeting lost nothing of its interest on that account. Indeed, the ability shown by the native gentlemen in their speeches, and in their power of argument, coupled with their moderation of tone, may well

lead the Secretary of State to consider whether it will not be necessary for the Supreme Government to follow the action of the Bombay Government in doing all in their power to restrict public meetings and to place free speech under the same restrictions as our once free native press. The natives of India have heretofore been considered as politically dumb, but dumb animals have feelings, and the education furnished or fostered by Government has made that dumb voice articulate; and it will soon be a question whether it be kind to India or wise for Great Britain to continue that education, if it is to be accompanied by acts of manifest injustice. In 1876 Lord Salisbury said, "It would indeed be criminal in us if we were to sacrifice Indian for English interests;" but what is the extent of the crime when that sacrifice is made at a time when India is suffering from deficit, debt, fresh

and oppressive taxation, famine, and war? And if the natives are to be educated to know right from wrong, and taught how to express their feelings, how long will it be safe to allow them free speech?

The meeting was presided over by Sir Munguldas Nathooobhoy, whose health has prevented him from taking of late that active part in public matters which brought him so frequently and so prominently before the public twenty years ago. His presence at the meeting shows the very general interest felt in this question by the native community. The first speech, after the formal one of proposing the chairman, was that of the Hon. Morarjee Goculdas, and displayed great ability; the tone throughout was thoroughly loyal, and there was not a word at which the most vehement Manchester man could take offence. But at the same time it was thoroughly convincing, and stated with remarkable clearness the fallacy of the argument adopted by the Manchester people that their interests demand the repeal of this duty. We commend his speech to the careful perusal of those who think this remission of cotton duties to be all required in the interests of Manchester. He was followed by Mr. Nanabhoy Byramjee, who, in a forcible speech, supported by facts and figures the position taken in the resolution that the remission could not be justified by the state of the finances or by the principles of political economy. Mr. Nowrozjee Furdoonjee succeeded, and produced a very marked effect by quoting from a letter by Mr. Donald Graham, a partner in a firm which, as he said, imported one-fourth of all the piece-goods that come to Bombay. This letter was addressed to Lord Lytton in 1876, and expressed a decided opinion that Manchester goods paid only a fair duty. After Mr. Phirozshaw Mehta had read the protest, Mr. Kassinath T. Telang proposed the next resolution in a speech which was perhaps the best of the meeting, and was particularly effective from its fluent delivery without

note of any kind. He spoke in terms of the highest praise of Lord Lytton's ability as a writer and an orator, but deprecated his attempts at statesmanship, which he thought best characterised by His Excellency's own lines in one of his charming Fables in Song—

"Height measures be in depth, seeks peace in strife,  
And calls all this the poetry of life."

He referred to the arbitrary power which enabled the Viceroy to override his Council, and he supported also a criticism of Mr. Nowrozjee's on Lord Lytton's undignified reply to the deputation from the British Association in Calcutta, which the speaker characterised as "unjust, uncharitable, ungenerous and unmerited." This motion was seconded by Mr. Martin Wood, who stated that he could not have supported the protest had it been based on protection. Mr. Rughunath Narayan Khote in an amusing speech proposed the resolution that the petition should be sent through Mr. Henry Fawcett, whose name elicited great applause. Mr. Cumroodeen Tyabjee, in seconding this resolution, thought that Mr. Fawcett, besides being called the honourable member for Hackney, should also be styled the honorary member for India. The appointment of a committee and the usual votes of thanks to the Sheriff and the Chairman terminated the proceedings, which lasted upwards of two hours, the interest continuing throughout.

The action taken by the Viceroy in the remission of these duties is, as put by the speakers at the meeting, quite indefensible on any sound grounds, but what makes it still more unpalatable are the expressions of regard for Indian interests, and the well-rounded sentences upon political economy. If we must have the rough hand of Esau laid upon us, let it come and we will bear it, but we do not want the smooth voice of Jacob at the same time. If the Viceroy wishes to enforce measures, to which the people of India object, and contrary to the advice of his Council, then these measures must

be endured, but he can at least relieve us of the sentimental phrases about the "administration of the country being conducted with a view to the interests of India alone." It is, too, more than distasteful to have Lord Northbrook quoted in a financial statement as an excuse for measures which Lord Northbrook had the character to refuse to carry out.

We do not ourselves blame Manchester for her selfishness, for traders are consistently selfish, but we blame her for her shortsightedness; we blame her for professing to believe that the remission of this duty will stimulate a trade which is depressed in India by all the causes which have depressed trade in the west; and, further, by the irritation caused by increased taxation, by war and by famine. Manchester wants customers, but the only way in which she can get them is by doing all in her power to make India happy, contented, and prosperous. A remission of 5 per cent. duty on piece-goods will not restore to life the five or six millions who died during the recent terrible famine; it will not put flesh on the bones and strength in the bodies of the millions whom a very bare pittance has just kept alive; it will not restore the cattle to their fields or the corn to their granaries; and until this be done, until the ravages of famine are past, and prosperity be again restored, it is impossible that a healthy trade can revive, and Manchester ought to be able to see this. But we expect the British statesman to rise above the level of the trader, and also above that of the politician, whom the law, by one of its many strange anomalies, punishes for spending a shilling of his own money, honestly earned, to buy a vote for his party, while it permits him to barter £200,000 of India's revenue for the same purpose with impunity. The men who have hitherto ruled India have been statesmen who recognised that the interests of Great Britain were bound up with the

prosperity of India. One of her best Finance Ministers wrote the following words to Manchester when a remission of import duties was asked for in 1862:—"The import duty is scarcely felt at all, while the direct taxes involve an inevitable amount of oppression, extortion, evasion, alarm, and discontent which make them intensely unpopular. If India is to be retained in peaceful and loyal allegiance to the British Crown, these matters must be looked upon in an Indian as well as in an English point of view, and the interests, wishes, and the feelings of 150,000,000 of inhabitants must be the primary consideration in deciding how to raise the necessary revenue. I believe the Indian Government and the whole Indian community would oppose it, and I cannot for a moment imagine that any Secretary of State would think of sending an order to India for a purely English object overruling in such a measure the unanimous wish of India. If he did he would deserve to be impeached, for it is perfectly evident that he would be a far more formidable enemy to the British Crown than Ferozeshah or Nana Sahib." This was written in 1862; what would he say now to a Viceroy who has made this remission against the advice of his very Council, and in a time of deficit, debt, fresh taxation, war, and famine?

## II.

(*Times of India*, May 6, 1879.)

THE indictment brought against the Government by the public meeting held here last Saturday was of the gravest nature, including instructions disobeyed, pledges broken, sacred trusts violated, revenue misappropriated, and the first principles of political economy ignored. This is strong language, but we will waste no more words of our own on the matter. In contemplating the financial history of India, it is now much pleasanter to look back than to look forward, and retrospection is here absurdly easy. From documents and speeches so recent as to be

in every man's mind, it is the simplest possible task to judge the Government out of their own mouths, and no criticism could well be more effective. The instructions given to Lord Lytton when he was appointed Viceroy were of the clearest kind. Lord Salisbury, in the House of Lords, on the 14th March 1876, said—“We never hinted at new taxes, and in the most earnest language we have warned the Government of India against any conduct that would involve the Indian finances in a deficiency. It is impossible to state, in stronger language than I have done, the importance of guarding the Indian treasury from entering into financial deficiencies. The noble Viscount has accused me of intending to levy another new tax. I can only say that no such intention exists or has existed. If any other tax had been suggested in lieu of the cotton duty, I should have expressed my strong opinion upon it. In proposing to deal with the cotton duties, we warned the Government against running into a deficiency, but we gave no hint of raising a new tax.” Replying to the Manchester deputation on February 24th, 1876, the noble Marquis had already said, “They—the Indian Government—have been told that the paramount importance of maintaining the credit and equilibrium of the finances of the Indian Government must be considered in such an operation. I could neither consent to produce any deficiency in the revenue, nor to the imposition of any new tax for such a purpose.” Lord Lytton, too, accepted these as the principles on which he was to act, for, replying to a Manchester deputation, he said, putting the words in the form of an address by the Secretary of State to himself:—“These are questions which we leave to your discretion, fully recognising the difficulties of your situation and the paramount and primary obligation of every Indian Government to make the two ends meet and avoid as much as possible deficit, debt and fresh taxation. The

Indian Government must, above everything else, pay its way and make both ends meet.” Again, the House of Commons made the remission of duty distinctly dependent on the condition, “as soon as the financial condition of India will permit.” These clear instructions have been deliberately disobeyed.

In using above the terms “pledges” and “sacred trust” we are not applying our own words to the acts of the Government, but words used by themselves as the excuse for asking for objectionable taxation. In the Financial Resolution of March 1878 the following are some of the expressions adopted by Government:—  
 . . . . “The engagements which it has undertaken and the pledges which it has given”  
 . . . . “Thus the pledge that £1,500,000 shall be set aside from ordinary revenues, for the relief and prevention of famine, will be fulfilled.” . . . . “To fulfil its pledge to devote £1,500,000 to the relief and prevention of famine.” Sir John Strachey on December 27, 1877, said . . . . “We consider that these estimates of every year ought to make provision for religiously applying the sum I have mentioned to this sole purpose, and I hope that no desire . . . will tempt this Government to neglect this sacred trust.” But engagements, pledges, and sacred trusts are all thrown to the winds when the Manchester vote is wanted at the coming election. To prove the charge of misappropriation of revenue, we might quote many clauses, but the following will suffice, being the plea of Sir John Strachey on the 9th February 1878, when demanding the means of fresh taxation from the Imperial Council:—“We are merely asking this Council to authorise the imposition of new taxes that it will be able to undertake . . . the duty of preserving the lives of the people in time of famine. These new taxes are required for the sole purpose of giving us year by year a sufficient surplus . . . to meet these

famine charges." And yet the money taken to save life in India is used to destroy life in Afghanistan; and the funds demanded to meet local famine charges are used for the remission of unexceptionable duties which are irksome to no one out of Manchester.

Again, as to political economy, which our Viceroy uses or abuses as best suits his purpose, we give the three fundamental principles as laid down in the financial resolution of last year, and which were thought worthy of being again quoted in this year's resolution:—"1. That no duty should exist which affords protection to native industry, and as a corollary that no duty should be applied to any article which can be produced at home without an equivalent duty of excise on the home production; also that no duty should be levied except for purely fiscal purposes. 2. That as far as possible the raw materials of industry and articles contributing to production should be exempt from customs taxation. 3. That duties should be applied only to articles which yield a revenue of sufficient importance to justify the interference with trade involved by the machinery of collection." Now, as to the first principle, the same resolution (clause 55) states that *all* the Indian duties are protective. This, too, was before this resolution removed the protective part of the duties on cotton goods. It follows, therefore, that on their showing the Government have broken the first of their rules in remitting the duties on cotton goods which are not now protective, and leaving them no other goods which they consider as protected. Their second rule is again contradicted by their acts, as the raw materials of industry, such as copper, iron, lead and steel, cement, and so forth, and articles contributing to production, such as hardware and manufactures of all metals, are not exempted from customs taxation, while cotton goods, which do not come under either of the two classes which

can claim exemption, have the duty remitted. If we test their third rule, we find that duties should be applied only to articles which yield a considerable revenue, and yet they remove the duty from the only goods which yield any considerable revenue. We can understand how a curious blending of ambition and obedience might induce the Governor-General of India to disregard the advice of his own Council, and to barter the imperial revenues for party purposes. But we confess we cannot understand why the Government should lay down rules of political economy, and call attention to them by continuous repetition, at the very same time that they are deliberately breaking them all.

To preach political economy one year, and to ridicule it the next, experience has taught us to expect from this Government. But we did not anticipate that they would ever formulate three rules and break all three in the same breath. Following Mr. Telsing's example, we may perhaps find an explanation in Lord Lytton's *Fables in Song*—

"Man is what I call

The greatest paradox in all creation,

And I can give no other explanation.

One thing he thinks and does another thing."

Then, again, it is scarcely statesmanlike to have hoped to "allay an irritating controversy" by such a partial remission as has only whetted the appetites of the Manchester men, till like the daughters of the horse-leach, they more than ever cry "Give, give!" The Viceroy has afforded no satisfaction to Manchester, while he has raised a bitter feeling of irritation among the natives of India. Had he been a vigorous statesman he would have refused any concession to Manchester in the present state of the Indian finances. It would even have savoured of bold statesmanship to have remitted all the duties and closed the "irritating controversy" so far as one side was concerned. The present remission will, according to some of the best authorities,

cause a loss to the revenue of £400,000, and the total remission would only have cost as much more. With the finances in their present ruined state, half a million more or less is of little moment, if only the irritating controversy could be removed to the satisfaction of Manchester and the benefit of the Conservative party. But the course taken was simply weak ; it was unjustifiable in principle, and as a matter of expediency it has totally failed.

### THE PUBLIC MEETING.

(*Indu Prakash May 5, 1879.*)

LAST Saturday's public meeting held at the Framjee Cowasjee Institute to adopt a Petition to the House of Commons on the Import Duty Question was a decided success. Of late public spirit in Bombay has been slowly dwindling and many questions of public importance have had, therefore, to be neglected as if the interests of the public of this Presidency were not in the least affected by them. Except the monster meeting held in February 1878 to protest against the Licence Tax, Bombay has been able to do nothing but has received most of the wrongs done to the country with an amount of reticence, which is not at all creditable to her reputation. On the present occasion, however, we are glad that there has been on our part a deviation from this mischievous policy of silence and the public meeting of Saturday last shows that there are yet the germs of public spirit left in our citizens and that with a little trouble, self sacrifice and perseverance, they may be brought out so as to make their influence felt. The gentlemen, who spoke at the meeting were full of arguments, wit, sarcasm and enthusiasm. From what each of them said on the occasion, it appeared evident that they had done all they could to strengthen their position and to put their case on as irresistible a basis as possible. It is true that in the question, on which they undertook to

speak, they had the best of advantages in that their arguments were many and authoritative. The Government of India by its own words has placed itself in an unintelligible and, we might even say, miserable position so far as its policy as to these duties is concerned. It has said one thing at one time and another thing at another time ; its action with regard to the Import Duties has also been of a most fickle and inconsistent nature. This, coupled with the fact that the decision as to the repeal of the duties was arrived at by Lord Lytton on his own responsibility, against the protests and opinions of his well-tried and experienced Councillors, reduces the case for the Government to nothing. And when even the leading papers of London have been compelled to confess this, it is hardly an exaggeration to say that the cause for which the public of Bombay met together last Saturday was rendered as strong as one could wish it to be. These circumstances must have a good deal encouraged the speakers at the meeting and it is creditable to them that most of them did thorough justice to the question they handled and stated the case for the public and denounced the wrongs done to it by the Government of India with the warmth, which speaks very highly indeed of the public spirit of Bombay. It was a striking peculiarity of the meeting that each speaker took a line of argument different from that of the other and gave it life and form in his own way. The

attention of the audience was thus kept constantly on the stretch for the long three hours which the meeting occupied. Of the speakers Sir Mungaldas, who presided at the meeting, was vigorous, though brief in his remarks; the Hon. Morarjee Goculdas' speech was forcible and exhaustive, and went over almost all the aspects of the Import Duty Question; Mr. Nanabhoj Byramjee Jeejeebhoy's speech was to the point, impressive and at times cutting; Mr. Nowrozjee Furdoonjee was eloquent and witty; Mr. Kashinath Trimbak Telang's speech was the speech of the day and made a very pleasant and deep impression on the audience; Mr. Raghunath Narayan Khote was practical and bold in his remarks; Mr. Budroodeen Tyabjee was serene, earnest and fluent. Each speaker had thus something to captivate attention.

The most attractive feature of the meeting, however, did not consist in this. Its importance will long be remembered more for the matter than for the manner in which its business was conducted. The Hon'ble Morarjee pointed out that the agitation of Manchester in trying to get the duties repealed was simply misdirected and was calculated to prove mischievous not only to the interests of India but also to the interests of Manchester herself. He said that the object of that agitation, on the confession of Manchester herself, was simply to cheapen the price of her goods in India; that object, Mr. Morarjee pointed out, has not at all been fulfilled as far as the abolition of the duty on coarser goods went; and looking to the fact that the poorer classes of India are content with a *lungoti* to hide their nakedness and that the climate of India dispenses with all the necessities of clothing, Mr. Morarjee was justly of opinion that the repeal of the duty on the finer cloths imported from Manchester would be of no use at all to the consumers of India. If Manchester supposes that the higher classes of

this country would benefit from the repeal, she ought to remember what the financial prospects of India just now are. We have been called to account for the Afghans war expenses; our Famine Reserve Fund has been taken away; the expenditure of the Government is as enormous as it was and since the last year there have been additional taxes, eight times as heavy as the indirect ones abolished. Mr. Morarjee quoted the authority of Lord Salisbury, who on the 6th of March last declared it as his opinion to a Deputation of British Merchants that the Import Duties afforded the best and easiest means of securing revenue, inasmuch as their collection galled the subjects of a Government least. Mr. Nanabhoj Byramjee, who followed the previous speaker, contrasted with much warmth the state of our finances, as it stood when Lord Lytton first joined the Viceroyalty, with the same as it stood now by a reference to the respective values of Government Paper in the two years. He said that Lord Lytton himself had avowed the object of his appointment as Viceroy, to be to put the finances of India on a good basis, so as to secure it from deficits and other troubles and he very trenchantly asked, how far that object had been realized. Mr. Nowrozjee Furdoonjee referred to the self-interested manner in which Manchester carried on her agitation with regard to these duties. Her first cry was "Protection," and when by the abolition of the duty on coarser yarns and goods their protective character has been taken away, she now changes sides and cries not in the name of Protection but in the name of *Free Trade*. Mr. Nowrozjee quoted the opinion of Mr. Donald Graham, of Messrs. Graham and Co., to say that the abolition of these duties was simply unjust and ruinous; and this testimony is rendered valuable by the fact that Mr. Graham, an Ex-Member of the Bombay Legislative Council and an Ex-Chairman of the local Chamber of

Commerce, represents a firm of this city, which imports one-fourth the quantity of the goods imported from Manchester into India. Mr. Nowrozjee then came down on the Government of India for the contempt it has of late more than once shown for public opinion in this country. How public representations are received in this country by Indian officials was, he said, made evident by the three painful circumstances, which are yet fresh in the minds of the Public. The first is the rebuff—"unjust and illiberal," as Mr. Nowrozjee justly termed it—which a Deputation from the British Indian Association received at Lord Lytton's hands in March last. The second is the bluntness with which an official member of the Bombay Government traduced so serviceable a body as the Poona Sarvajanic Sabha as "a seditious" Association; and the third is the way in which the Government of Bombay has denied the use of the Town Hall to the public of this City, for holding the present public Meeting. He laid force on the last of these three instances of the high handed imperialism and said that it was simply cruel to prevent the public of Bombay from enjoying their right over the Town Hall—a Hall raised by them with their money and of which the Government are simple custodians and no more. Mr. Nowrozjee pointed out that it was time for Government either to leave the doors of the Town Hall open to public meetings or to return the money spent by the public for its construction—a sum which if invested in a Bank would, Mr. Nowrozjee very facetiously observed, have it this moment fetched interest enough to raise another Town Hall. Mr. Telang was the next speaker. In a speech, which was *short and sweet*, he pertinently combated the statement that there had been no additional taxation. The Famine Insurance Fund was raised last year to insure the country against draughts; on the confession of Government themselves that Fund has disappeared; and seeing that Government have undertaken

the responsibility of keeping a reserve Fund for famines, and that they shall have for this purpose to fill up the *vacuum* caused in the proceeds of the Fund for the last year. Does not the fresh necessity of raising the Fund this year clearly prove that additional taxation has been levied? Look again to the Stamp Act; what does it signify but fresh taxation; and when all this is seen, how can the conscience take shelter under the comforting idea, that though a portion of the Import Duties has been given up, the Government have repealed it without levying new taxation? The other point touched by Mr. Telang was still more significant and affecting. He directed the attention of the audience to the revelation now made to the world—that the Viceroy has repealed the duties, setting at naught the opinions of his experienced Councilors. When, he said, we are governed in this manner and made the victims of the caprices of one individual—when the Viceroy can act in spite of his Council—and when the Secretary of State can also do likewise and treat his Council as if it did not exist—what does all this show? Does it not clearly prove that we are slowly but surely coming to the days of *personal government*? Mr. Telang forcibly remarked that the tendency in this direction was most mischievous and required to be watched with great care by every well-wisher of the British rule in India. Nor was Lord Lytton's reply to the Deputation of the British Indian Association less inauspicious. Lord Lytton, said Mr. Telang, observed in that reply that by taking some definite action concerning the Import duties he was anxious to put a stop to what threatened to be an increasing and "irritating controversy." But, asked Mr. Telang, what was the real effect of this reply? Has it not enhanced the mischief? Mr. Raghunath Narayan Khote in proposing that the petition adopted should be entrusted to Mr. Fawcett, recounted the services,



which the liberal minded gentleman has rendered hitherto to India. Mr. Budroodeen was very eloquent on those services—and when he styled Mr. Fawcett, the honorary member for India, the apt remark was received with peals of applause and cheers by the audience.

The proceedings of the Meeting was thus full of interest. The mischiefs of *personal Government*, the official tendency to snub public opinion, the inconsistent utterances and actions of Lord Lytton on the Import Duty Question, and the financial shortsightedness of his administration were all insisted upon with vigour and pertinency and the case against the action taken by the Government of India as to the abolition of the duties was very vehemently but respectfully put by all the speakers at the meeting. Every thing, that was necessary to secure the condemnation of the present policy of creating and increasing the fiscal difficulties of the Indian Empire was pointed out, and we are glad that no attempt was made to pass over in silence, the manner in which the British Indian Association were recently treated by the Viceroy. The necessity of establishing a new Association in this City on an organized and permanent basis, to represent the needs of the country from time to time was pointedly brought to the notice of the public. The Poona Sarvajanic Sabha's valuable services were recognised on the occasion and a fitting testimony was paid to them. All this will go far to convince anybody—and the Government of India and the Manchester men especially—that, as Mr. Budroodeen Tyabjee wisely said in his speech at the meeting, there is such a thing as *public opinion* in India and that if Manchester is bent upon ruining India and if the English Ministry feel compelled to back her, through "some unknown pressure which the eye does not detect but the mind can grasp" (as the Hon'ble Mr. Morarjee put it) it will not be—it shall not be without a word of

emphatic protest from this country, which is unrepresented and is at the mercy of a knot of British manufacturers that try to play with her as they like for their own interest. It is the Parliament that has now to decide the question and settle once for all the vexatious point whether India is to be ruled in the interests of Manchester or in her own interests, which are no more than the interests of justice and fair play. Are the assertions of her administrators binding or not? The Import Duties were last year put outside the reach of *Protection*; Lord Lytton and Lord Salisbury have themselves averred that these duties cannot be given up so long as Indian finances are in a crippled state; and that they shall not be given up so as to impose new taxation on the people. Have these assertions been kept up; are these assertions to be adhered to or not? That is the question on which the whole controversy turns. Bengal has asked the question; Madras has followed and now Bombay supports it with all the dignity and boldness of a just but wrongly treated cause. Let Parliament judge between us and the Government of India, and the English Ministry vouchsafe an honest and frank reply. We have done our duty—it is for the British nation to appreciate it and grant our prayer. Truth must triumph in the end.

#### THE PETITION TO THE PARLIAMENT.

(Indu-Prakash, May 5, 1879.)

THE Petition to the House of Commons which was adopted at last Saturday's public meeting is a well drawn document and recounts the grievances of India, as arising from this Import Duty Question in a simple and intelligible manner. The remission of the duties is protested against on financial as well as other grounds. It is first pointed out that the duties have never been levied with the object of affording protection to

the local manufacturing industry. The Petition says :—

"The Import Duties on cotton goods were retained permanently in the Indian Tariff, not for the purpose of protecting indigenous industry, but because they were remarkable for the lightness and equality of their incidence, the easy productiveness of their out-turn, and their peculiar adaptability to the feelings and habits of the people of this country. It has been calculated that the duty on cotton goods, falling on the total population of 240 millions, including the population of the Native States, which bear their share of this duty, does not come to more than half an anna, or something less than three farthings per head per annum. At the same time its incidence is so equitably regulated that, while it falls on the poorer classes with the least burden, without allowing them to escape it altogether, (the amount realized from coarse goods aggregating about four lacs, with a pressure per head much lower than the average above stated), the richer classes have to pay it just to the extent they are inclined to indulge in the luxury of wearing finer goods.

To this circumstance is added the fact that these duties, on account of "their indirect and "silent operation, involving no oppressive "inquisition, are indispensable in a country "where the sources of indirect revenue are by "no means various and where a constant accumulation of experience has shown that direct "taxation is oppressive, unequal, utterly discordant with the intensely conservative ways "and habits of the people, and a source of "much bitter feeling and discontent." As far as the duties were protective, they were repealed last year when a revenue of four lacs of Rupees was sacrificed by making coarse goods under 20s free of import duty. There was therefore no reasonable ground why the duty on counts between 20s and 30s ought to have been repealed. As stated in the Petition :—

"Your Petitioners are aware that it has been advanced, that though this import duty did not operate directly to protect Indian manufacturers, it did so

work indirectly through the displacement of finer imported goods by the coarser and cheaper locally made articles. But while it does not seem probable that the demand for one class of goods can be met by a supply of another class, when there is a full supply of the class in demand, it is not a little remarkable that even though the Indian mills have recently been over-stocking the market, the import of the finer Manchester goods has gone on steadily increasing. This fact, your petitioners venture to think, completely outweighs the guess-work of a rather strained hypothesis."

Then comes the financial part of the question. The Government of India, the Secretary of State, and even the Parliament, have more than once acknowledged the propriety—nay, the imperative necessity—of not repealing these duties as long as the financial condition of India is far from being prosperous. The Tariff Resolution of the Government of India of 1875, distinctly stated that the duties could not even partially be given up in that year, whereas the state of things in 1879 has become tenfold worse than it was four years ago. "Every line of the "Financial Statement which the Government "of India have just issued, indicates a financial pressure, which gives the gravest cause "for concern for the present and alarm for "the future." With famines recurring at short intervals in the land with the necessity which has arisen for additional taxation, with the Famine Insurance Fund diverted for the purposes of an Imperial war, India is at present in a very unhappy situation, which urgently cries for a very tender watch over her finances. With regard to the resolution of Parliament to put the Afghan war expenses on India, the Petition points out :—

"The expenses are estimated for the present year at £670,000, and for the ensuing year at £2,000,000. Your Petitioners cannot allow this opportunity to pass without expressing their deep regret at the

Resolution which your Hon'ble House has already come to on the point, the more specially as they were unable to make any representation on the subject before the Resolution was carried. Your Petitioners still hope and trust that, bearing in mind the Imperial character of the war, remembering the scope and intention of the 55th Clause of the Government of India Act of 1858, and the declarations of the responsible Ministers of the Crown in relation thereto, but, above all dealing generously with a question in which of the two parties concerned, the one is powerful and represented, and the other weak and unrepresented your Hon'ble House will see your way to declare the policy and justice of making the Exchequer of the United Kingdom share at least a considerable part of the burden of these expenses with this poor country. High authorities on the subject are stated to have declared that the expenses will amount to something nearer 5 than 3 millions. Heavy as this burden is, there is no guarantee that the actual expenditure will not considerably exceed even these estimates in view of the uncertainty of all forecast as to the speedy termination of the war."

The attention of the House of Commons is next directed to the confession of Lord Lytton's Government itself made in this year's Financial Statement:—"The difficulties in the way of "fiscal, and commercial and administrative reform have been greatly aggravated. Nor can it be in any way assumed that the evil will not continue and go on increasing. Under such circumstances it is extremely difficult to follow any settled financial policy; for the Government cannot even approximately tell what income will be required to meet the necessary expenditure of the State."

What the effect of this Petition will be it is rather difficult to say—for though Lancashire

is powerful and is represented strongly in Parliament, yet our cause is grounded on so good a basis of facts and principles, and derives its support from so many sources that nothing but the weakness of India should be responsible for our defeat, if that melancholy and most grievous end is at all reserved for us. *Firstly*, the testimonies of all high authorities are on our side and it is highly fortunate that Lord Lytton's own past utterances very heavily weigh in our favour. The gentleman who spoke at last Saturday's public meeting cited the views of so many high officials—and all of them either Viceroy, Councillors or Secretaries of State—that the case was at once shown to be impregnable. *Secondly*, the unanimity of feeling with which the repeal of the duties has been received by the Press of India and farther by the leading organs of public opinion in England is something as gratifying as it is unprecedented. *Thirdly*, there is the pleasant fact on our side that Lord Lytton's Councillors protested against the repeal. *Fourthly*, the Under Secretary of State for India has already told the House of Commons that India's borrowing powers are exhausted, and the bankrupt position of our finances has excited much fear and given rise to much comment in London. And *lastly*, though not the least of all, Bombay, Calcutta and Madras have all protested against Lord Lytton's financial policy of 1879—a policy, which appears to be born of Lancashire pressure and which he has put into practice by angry recriminations and petty carplings at public opinion. A cause like this which is so strongly propped up not only deserves but claims success. Will Parliament deny it? Will the English nation allow India to be thus made the scape goat of official hobbies and financial recklessness? India pauses for a reply.

## AN ACCOUNT OF PROF. J. C. BOSE'S RESEARCHES

[Reprinted From "The Modern Review"]

IN our last number we invited our readers to kindly place us in possession of well-authenticated information relating to all original work done in India by Indian and English professors and their students. Having asked others to do their share of a patriotic duty, we thought we should not fail to do ours. So, having been among the earliest students of Prof. J. C. Bose at the Calcutta Presidency College, we print below our contribution in the form of a brief resume of the great professor's researches in different domains of science. We believe this to be the first list that has been compiled.

It is unfortunate that either through lack of knowledge or lack of opportunity, our countrymen have little definite knowledge of the important contributions that are now being made by India to the stock of the world's knowledge. In the present number we shall only give a list of the more important researches carried out by Prof. Bose. It is our intention to publish in the near future a series of articles giving a popular account of these.

Science is international; but we may perhaps expect a certain characteristic which distinguishes the Indian contribution. The Indian mind is eminently synthetic, and on this account when the Indian physicist undertakes to study the action of forces on matter, he is not satisfied with confining his inquiry into the realms of the inorganic alone, but must include in his broad survey the reactions of living matter also. He annexes to the imperial science of Physics, others which go under the name of animal and plant physiology. This consideration will supply a key to the many-sided scientific activity of our distinguished countryman. The researches which he has carried out in each branch of science will be found of fundamental importance in that branch. How important these have been will appear from the short lists, which we shall make, from the

various scientific notices that have appeared concerning them.

Prof. Bose's first contribution was on his discovery of

(1) *The polarisation of electric ray by crystals.*—Asiatic Society, Bengal, May, 1895.

This supplied a very important confirmation of the identity of electric radiation and light. At this time he discovered the very important property of the crystal *Nemalite* which as regards electric radiation, behaved like Tourmaline to light. His next contributions were :

(2) *On a New Electro-polariscope :* and

(3) *On the Double Refraction of the Electric Ray by a Strained Di-electric.*

These two Papers were published in the *Electrician*, (December, 1895) the leading electrical journal.

The determination of the index of refraction of various substances is of much importance; it has been possible to do this only in the case of substances which are transparent to light. But a very large number of the so-called opaque substances such as pitch, coal-tar, etc., are transparent to electric radiation. The determination of the index for this invisible radiation offered however great difficulties till Prof. Bose devised a method which enabled this to be done with the highest accuracy.

The results of his researches were communicated by Lord Rayleigh to the Royal Society:

(4) *On the determination of the Indices of Electric Refraction.*—Royal Society, December, 1895.

The Society showed its appreciation of the high scientific value of the research, not only by publication but the offer of a subsidy from the Parliamentary grant made to the Society for the advancement of science.

His next contribution was:

(5) *On a Simple and Accurate Method of determining the Index of Refraction for Light.*—1896.

With reference to this it may be said that Dr. Gladstone, F.R.S., the discoverer of Gladstone's law in Optics, spoke in the highest terms of Bose's Refractometer.

His next contribution published by the Royal Society was:

(6) *Determination of the Wave-length of Electric radiation.*—Royal Society, June, 1896.

At this time in recognition of the important contributions made by him for the advancement of science, the University of London conferred on Prof. Bose the degree of Doctor of Science.

During his first scientific deputation to Europe by the Government of India, he read a Paper before the British Association:

(7) *On a complete apparatus for investigating the properties of Electric waves.*—British Association, Liverpool, 1896.

"Among the most interesting features at the British Association this year was the paper on Electrical Waves by Professor J. C. Bose. This gentleman had by his strikingly original researches on the polarization of the electric ray won the attention of the scientific world. His later papers on the Determination of the Indices of Electric Refraction and of the Wave Length of Electric Radiation were published, with high tributes, by the Royal Society. Lord Kelvin declared himself 'literally filled with wonder and admiration for so much success in these difficult and novel experimental problems.' The originality of the achievement is enhanced by the fact that Dr. Bose had to do the work with apparatus and appliances which in this country would be deemed altogether inadequate. He had to construct himself his instruments as he went along. The paper which was read before the British Association the other day 'On a Complete Apparatus for the Study of the Properties of Electrical Waves' 'forms the outcome of this twofold line of labour—construction and research.'—*Times*.

His next paper published by the Royal Society was,

(8) *On Selective Conductivity exhibited by Polarising Substances.*—Royal Society, January, 1897.

The behaviour of crystals like Tourmaline in exhibiting selective power of absorption of light had hitherto found no explanation. Prof. Bose working with electric waves showed that the selective transparency of crystals like Tourmaline was due to selective conductivity exhibited by them.

The fame of the Royal Institution of Great Britain, rendered illustrious by the

labours of Davy and Faraday, of Rayleigh and Dewar, has reached every quarter of the globe. The honour of being asked to deliver a Friday Evening Discourse in this Institution is regarded as one of the highest distinctions that can be conferred on a scientific man. Such a selection is only made in the case of one who has done the most distinguished work in the course of the year. This offer was made to Prof. Bose in the following letter:—

"It would afford the Managers of the Royal Institution very great pleasure indeed to find that you could give a Friday Evening Discourse, embodying the results of some of your original work on Electric Radiation (which has excited so much scientific attention) and illustrated by your apparatus."

(9) *Friday Evening Discourse at the Royal Institution on Electric Waves.*—Royal Institution, January, 1897.

"There is, however, to our thinking something of rare interest in the spectacle presented, of a Bengalee of the purest descent possible, lecturing in London to an audience of appreciative European savants upon one of the most recondite branches of the modern physical science. It suggests at least the possibility that we may one day see an invaluable addition to the great army of those who are trying by acute observation and patient experiment to wring from Nature some of her most jealously guarded secrets. The people of the East have just the burning imagination which could extort a truth out of a mass of apparently disconnected facts; a habit of meditation without allowing the mind to dissipate itself, such as has belonged to the greatest mathematicians and engineers."—*Spectator*.

"Professor Bose's description of the inductive method by which he was led to devise his form of receiver for wireless telegraphy and the reasons of its superiority to other forms of receiver were exceedingly interesting. It is also worth remark that no secret was at any time made as to its construction, so that it has been open to all the world to adapt it for practical and money-making purposes."—*Electrical Engineer*.

That Prof. Bose's researches have materially helped practical application will be seen from the following letter from Messrs. Muirhead & Co., who hold patent for wireless telegraphy in the United States of America:—

"Just a line to say how pleased we were to have the opportunity of discussing with you the bearing of some of the results of your recent researches upon certain practical points in the manufacture of wireless telegraphic apparatus. We have already benefited by your work in the construction of the most important part of such apparatus."

He was next invited to address the scientific societies in Paris.

"Professor J. C. Bose exhibited on the 9th of March before the Sorbonne, an apparatus of his invention for demonstrating the laws of reflection, refraction and polarisation of electric waves. He repeated his experi-

ments on the 22nd, before a large number of members of the Académie des Sciences, among whom were Poincaré, Cornu, Mascart, Lipmann, Cailletet, Becquerel and others. These savants highly applauded the investigations of the Indian Professor.—*Revue Encyclopédique Paris*.

The celebrated physicist, Professor Cornu, President of the Academy of Science, wrote to him :—

"For my own part, I hope to take full advantage of the perfection to which you have brought your apparatus for the benefit of the Ecole Polytechnique and for the sake of the further researches I wish to complete. The very first results of your researches testify to your power of furthering the progress of science. You should try to revive the grand traditions of your race, which bore aloft the torch light of science and art and was the leader of civilization, two thousand years ago. We in France applaud you and wish you every success."

He was next invited to lecture before the Universities in Germany. At Berlin he gave, before the leading physicists in Germany, an address which was subsequently published in the *Physikalischen Gesellschaft*.

(10) *On Electromagnetic Radiation*.—*Physik-Ges. Zu Berlin*, April, 1897.

The Royal Society next published his Paper

(11) *On the Determination of the Index of Refraction of Glass for the Electric Ray*.

In this he showed the unexpected increase of the index of refraction of glass under ether vibration of slow frequency: this explained the theoretical difficulties raised by certain electrical properties of glass.

The thinnest film of air is sufficient for producing total reflection of light with its extremely short wave-length. But with the longer waves, Professor Bose discovered a new phenomenon, an account of which was published by the Royal Society.

(12) *On the Influence of Thickness of Airspace on Total Reflection of Electric Radiation*.—Royal Society, November, 1897.

It was shown that the critical thickness of the air-space was determined by the refracting power of the prism and the wave length of radiation. It opened out a possibility of new methods of determining the index of refraction and also the wave-length.

Certain substances produce rotation of the plane of polarisation of light. Professor Bose discovered similar rotation of the plane of polarisation of electric waves.

(13) *On the Rotation of Plane of Polarisation of Electric Waves by a Twisted structure*.—Royal Society, March, 1898.

He constructed two kinds of artificial molecules, which rotated the plane of polarisation to the right or to the left, analogous to the effects produced by dextrose and levulose. As a result of this research many of the obscurities in the phenomenon of Rotation were cleared up.

(14) *On the production of a "Dark Cross" in the Field of Electromagnetic Radiation*.—Royal Society, March, 1898.

This important research reveals the circular molecular arrangement of various bodies. A disc of wood with concentric rings was shown to produce polarisation effect similar to that exhibited by crystals like Salicine.

(15) *A Self-recovering Coherer and Study of Cohering action of different metals*.—Royal Society, March, 1899.

The effect of electric radiation on fragments of metals has hitherto been regarded as due to cohering action, bringing about a diminution of electric resistance. As a result of Professor Bose's extensive researches on the effect of radiation on inorganic substances, the theory of coherence was rejected. This was due to his discovery that under electric radiation, potassium and other metals not only exhibited an increase of resistance but also an automatic self-recovery.

(16) *On the Electric Touch and the Molecular changes produced in Matter by the action of Electric Waves*.—Royal Society, February, 1900.

Instead of so-called cohering action, the effect of electric radiation on matter is shown to be one of discriminative molecular action; it is further shown that the effect of radiation on metallic particles is to produce molecular or allotropic changes, attended by changes of electric conductivity.

A description of Prof. Bose's apparatus and an account of his researches on electric radiation will be found in the New Edition of the *Encyclopædia Britannica*. Frequent references to his contributions will also be found in the classical work of M. Poincaré, on Electric Waves.

During his researches on the behaviour of different receivers, he was led to the discovery of various reactions in inorganic matter parallel to those of living matter; the result of these researches were given in his Address to the International Congress of Science at Paris, during his second scien-

tific deputation to Europe by the Government of India.

(17) *De la Generalite des Phenomences Moleculaires produits par Electricite sur la matiere Inorganique et sur la matiere Vivante—Travaux du Congres International de Physique, Paris, 1900.*

He read another paper before the British Association

(18) *On the similarity of effect of Electric Stimulus on Inorganic and Living substances.*—British Association, Bradford, 1900.

The investigation of this subject was carried on later by the employment of a method altogether different, but which afforded independent support to his previous results.

(19) *On an Artificial Retina.*—Exhibited at British Association and Royal Institution, 1900.

"Prof. Bose exhibited an artificial eye the interior mechanism of which was such as to enable it to give an electric response to radiation of every description, whether ordinary light, or Hertizian or Rontgen rays. Like all the inventive work of its originator it exhibits a marvellous delicacy and perfection of workmanship combined with a degree of simplicity in which few inventions can rival those of Dr. Bose. As to the mode of action of this eye, we believe that it involves an effect the discovery of which is originally due to Dr. Bose; it may be convenient to describe this as the "Bose effect." The model is not a mechanism capable of merely imitating the phenomena of vision; it goes much deeper and acts in identically the same manner as the living eye acts when sending an impulse to the brain on being exposed to light. Dr. Bose's model, therefore, essentially embodies a physical theory of vision. Such a sensitive receiver of electromagnetic radiation, perfectly prompt as it is also in its self-recovery after stimulus, should serve to revolutionise existing methods of wireless telegraphy and aetheric signalling."—*Electrician*.

Certain characteristics of his artificial retina led Prof. Bose to predict that the human retinae should exhibit binocular alternation of vision—a peculiarity which was quite unsuspected. For detection of this peculiarity he invented a special apparatus by means of which he demonstrated the new phenomenon before the Physiological Society of London.

(20) *On Binocular Alternation of Vision.*—Physiological Society, London, 1900.

His next contributions published by the Royal Society related to the action of light on matter.

(21) *On the Continuity of effect of Light*

*and Electric radiation on Matter.*—Royal Society, April, 1901.

(22) *On the Similarities between Mechanical and Radiation Strain.*—Royal Society, April, 1901.

In his next paper he advanced a new theory of photographic action, which explained many anomalous results.

(23) *On the Strain Theory of Photographic action.*—Royal Society, April, 1901.

At the British Association meeting at Glasgow he described a new method of investigation for determining the molecular change produced in metal by electric variation.

(24) *On the Change of Conductivity of Metallic particles under Cyclic Electromotive Variation.*—British Association, 1901.

(25) *The Conductivity Curvograph.*—British Association, 1901.

The very thorough study which has been given to the curious action of coherer by Professor Jagadis Chunder Bose renders his paper before the British Association (Glasgow) a very important contribution to this branch of electro-physics. In order to study the whole subject from a broad standpoint, the author made a number of experiments with a most interesting apparatus which he terms a curvograph. A number of properties is revealed by the curves drawn by this ingenious apparatus."—*Engineering Magazine*.

Prof. Bose was for a second time honoured with the request from the Royal Institution to give a Friday Evening Discourse.

(26) *On the Response of Inorganic Matter to Stimulus.*—Friday Evening Discourse, Royal Institution, May, 1901.

"The lecture on The Response of Inorganic Matter to Mechanical and Electrical Stimulus which Dr. J. C. Bose delivered at the Royal Institution last Friday Evening, affords a striking illustration of the far-reaching character of the long and elaborate series of researches which the lecturer has been carrying on during the past few years.

"All these researches have rendered invaluable assistance, both in the progress of scientific research into electromagnetic radiation and in the practical improvement of wireless telegraphy and other forms of aetheric signalling. The latest researches, however, which served as the subject for last Friday's discourse, carry us further than the domain of theoretical and applied physics, into the regions of physiology and chemistry. They lead to the discovery of an universal action underlying certain phenomena in both living and inorganic matter. Returning to the actual researches, we may observe that a stupendous problem arises from their indications; the co-ordination between the response of living and that of the inorganic matter is a riddle, in front of which neither physicist nor physiologist should rest until they have obtained the solution; and no one is so well qualified to solve it as

is its originator. The scientific world is immensely indebted to Dr. Bose for the researches he has already completed and presented to it—researches which redound greatly to the credit of India, and more specially, of the Presidency College of Calcutta.”—*Electrician*.

Prof. Bose's next subject of inquiry was whether the ordinary plants were not fully sensitive. The prevailing view was against such supposition. He, however, was successful in devising a new mode of investigation by which the 'universal sensitiveness of plants was fully demonstrated before a special meeting of the Linnean Society.

(27) *On the Electric Response in Ordinary Plants under Mechanical stimulus.*—Linnean Society, March, 1902.

"Prof. Bose performed a series of experiments before the Linnean Society showing electric response for certain portions of the plant organism, which proved that as concerning fatigue, behaviour at high and low temperatures, the effects produced by poisons and anaesthetics, the responses are identical with those hitherto held to be characteristic of muscle and nerve. He drew the final conclusion that the underlying phenomena of life are the same in both animals and plants, and that the electrical responses which he had demonstrated are but the common physiological properties of these."—*Nature*.

Prof. S. H. Vines, F. R. S., President of the Linnean Society, wrote to the author—

"Your experiments make it clear beyond doubt that all parts of plants—not merely those which are known to be motile—are irritable, and manifest their irritability by an electrical response to stimulation. This is an important step in advance, and will, I hope, be the starting point of further researches to elucidate what is the nature of the molecular condition which constitutes irritability, and the nature of the molecular change induced by a stimulus."

The President of the Botanical Section at Belfast in his address said,—

"Some very striking results were published by Bose on the Electric Response in ordinary plants. Bose's investigation established a very close similarity in behaviour between the vegetable and the animal. Summation effects were observed and fatigue effect demonstrated; while it was definitely shown that the responses were physiological. They ceased as soon as the piece of tissue was killed by heating. These observations strengthen considerably the view of the identical nature of the animal and the vegetable protoplasm."

(28) *Sur la Reponse Electrique de la Matiere Vivante*—Society de Physique, Paris, 1912.

(29) *On the Electromotive Wave accompanying Mechanical Disturbance in Metals.*—Royal Society, May, 1902.

He was next asked by the Royal Photographic Society to give a Discourse on his Strain Theory of Photographic Action.

(30) *The Latent Image and Molecular Strain Theory of Photographic Action.*—Transactions, Photographic Society, London, June, 1902.

His next communication was to the Linnean Society giving an account of his discovery of rhythmic electric pulsation in the Telegraph Plant.

(31) *On the Electric pulsation accompanying Automatic movements in Desmodium gyrans.*—Linnean Society, 1902.

His next work gives a complete account of the investigations on the response of inorganic and living substances.

(32) *Response in the Living and the Non-Living.*—Longmans, Green & Co., 1902.

"The responses in plants and metals were shown by Professor Bose, to be modified exactly in the same way as animal tissues are modified, there being not a single phenomenon in the response in muscle or nerve that has not an exact parallel in the response of metal and plant. Just as the response of animal tissue is found to be exalted by stimulants, lowered by depressors and abolished by poisons, so also it is found that under the action of appropriate reagents the response in plants and metals undergoes similar exaltation, depression or abolition. The conclusion reached by Prof. Bose, therefore, is that: capacity for response is not confined to living tissues; the living response in all its diverse manifestations is but a repetition of phenomena exhibited by the inorganic; there is in it no element of mystery or caprice, as is admitted on the assumption of a hypermechanical 'vital force' acting in contradiction or defiance of those physical laws that govern the world of matter; the response phenomena are not determined by the play of an unknowable and arbitrary vital force, but by the working of laws that know no change, acting equally and uniformly throughout the organic and inorganic world."—*Engineering Magazine*.

"Dr. Bose's remarkable experiments on living and dead matter show that there is a continuous transition from the one kind of matter to the other, and that some inorganic materials are capable of being stimulated, fatigued, poisoned and temporarily 'killed.' Thus another function of living matter has been annexed to physical science, or rather, the idea of life has been expanded. Prof. Bose has opened up a field which was hitherto considered absolutely closed."—*Electrician*.

"J. C. Bose, in his *Response in the Living and the Non-Living*, after showing that under electrical stimuli plants exhibit fatigue, etc., and are affected like animals by anaesthetics and poisons, goes on to prove the same properties of tin and platinum wire. These also become fatigued; there is a threshold of response; subliminal stimuli become effective by repetition; response increases with the intensity of stimulus up to a certain point at which another limit is reached; response is affected by temperature and the median range is most favourable to it; some substances act as stimulants upon tin and platinum, others like anaesthetics, others as poison destroying all response. A small dose may increase the response and a large dose of the same abolish it. The resemblance of these results to some obtained in Physiological Psychology



is obvious." *The Metaphysics of Nature* by Prof. Carveth Read.

Herbert Spencer wrote to the author:—

"Notices of your investigations have from time to time excited my interest. The topic is one of extreme interest, and one which in earlier years would not improbably have received due recognition in my book."

During the next three years (1903—1905) Prof. Bose turned his attention to researches into the various responsive reactions of plants. For this he invented a number of original types of recorders which revealed many unsuspected phenomena in plant-life. We give accounts of only the most important of these.

(33) *The Mechanical response of Ordinary plants.*

By means of his delicate instruments he demonstrated that even ordinary plants gave motile response.

"These effects (of contraction) are observable not only in so-called 'sensitive' plants, but in all living parts of plants, and it is a definite advance due to Dr. Bose's delicate experimentation, to have it shown that all radial organs, stems, styles and stamens, shorten on stimulation."—*Nature*.

(34) *Effects of Drugs on Response of Plants.*

In this he demonstrated the remarkable similarities of effect produced by drugs in plant and animal.

(35) *Death-spasm in plants.*

No sign has hitherto been found to determine the exact moment of the death of a plant. Prof. Bose discovered that a spasm passes through the plant at the critical moment.

(36) *The Morograph.*

This instrument records the critical point of death of the plant with great exactness. It also demonstrates the translocation of the death-point under different conditions.

(37) *Polar Effect of Current in Excitation of plants.*

This important discovery by Prof. Bose shows that the excitatory reaction in a plant is determined by the point of entry or exit of an electric current. It establishes the identical nature of excitation in the animal and the vegetal protoplasm.

(38) *Electro-tonus in plants.*

In this the variation of excitability induced by Anode or Kathode, is demonstrated to be identical in the case of animal and vegetal tissues.

(39) *Electro-tactile Response.*

This discovery furnishes a new mode of detecting the passage of excitation in plants.

(40) *Multiple response in plants.*

The discovery of repeated responses in plants under strong stimulation, led to the elucidation of the most obscure phenomenon of spontaneous movements.

(41) *Inquiry into Causes of Automatic pulsation.*

One of the most intricate phenomena in physiology, is the occurrence of spontaneous movement, so-called. No satisfactory explanation has been offered to account for it. As a result of a long course of investigation, Prof. Bose succeeded in tracing the exciting cause.

"This is a most valuable and interesting account of experiments, offering an explanation of autonomous movement, and its relation to multiple response. After a careful perusal of this, one is convinced that 'Automatism' has simply been the name used to cover our ignorance of the reason for movements, which we did not understand, and for which we could see no immediate stimulus. Experiments here described on *Biophytum* and *Desmodium* show how 'automatism', to use the old name for the movements characteristic of these plants, is simply the result of the condition of the plant, and the stimuli to which it has been submitted."—*The Athenaeum*.

Prof. S. H. Vines, F. R. S., President of the Linnean Society, wrote to him:—

"It seems clear that you have revolutionised in some respects, and very much extended in others, our knowledge of the response of plants to stimulus. Spontaneous movements have always been a difficulty, but your work seems to give the clue, to suggest that there is no such thing as an absolutely spontaneous movement, but that every movement is the result of the action of a stimulus which has been stored up. This discovery alone would be a striking result of all the time and labour you have devoted to these researches. However I cannot think, but that there must be a great deal more to be discovered along the lines that you have opened up."

(42) *Influence of Temperature on Automatic response.*

In this is shown the parallelism of effect of temperature on rhythmic plant tissue and the cardiac tissue of the animal.

(43) *Effects of various Drugs on the Rhythmic pulsation of plant.*

"Among the most interesting of the experiments are those dealing with the action of drugs. The identity of phenomena in both the contractile and rhythmic tissues of animals and plants is most striking. The author seems to have demonstrated in the most conclusive manner that there is an essential unity of the physiological effects of drugs on plant and animal tissues; and if this be the case, it is clear that investigations of the utmost value may be carried out on plants for the purpose of getting light on the problem of the auto-

fication of the effects of drugs on individual constitutions."—*Westminster Review*.

He next investigated the important problem of

(44) *The Different Effects of Drugs on Plants of Different Constitutions.*

By subjecting a specimen to certain specific conditions, he was able to make it immune to the action of poison from the effect of which others succumbed.

(45) *The Shoshuograph for Researches on the Ascent of Sap.*

This is a new type of instrument invented to record the suction of liquid by the plant.

(46) *The Growth Recorder.*

Accurate investigation on the phenomenon of growth has been rendered possible by the invention of this apparatus, which records and gives instantaneous measurement of the rate of growth.

"The apparatus and the experimental methods employed show great ingenuity and praiseworthy simple directness of attack. One feels that valuable results are to be got with the delicate optical levers, the Kunchangraph, the Balanced Crescograph and the Morograph. Workers on growth will be forced to abandon their primitive and clumsy method and much good will result from the refinements here introduced."—*Nature*.

(47) *The Balanced Crescograph.*

This instrument based on a novel principle is employed for determining the influences of various agencies on growth.

(48) *Researches on Thermo-crescent Curve.*

This is a long investigation on the effect of temperature on growth, and the determination of optimum point of growth.

(49) *Researches on Positive and Negative Geotropism.*

The outcome of this investigation is to show that the opposite reactions of growth on the shoot and the root are not due, as has been supposed, to two different sensibilities but to the differences in the points of application of stimulus in the two cases.

(50) *Determination of the Laws of Growth.*

Certain important factors in growth discovered by Prof. Bose, had not hitherto been recognised. Taking account of these, a complete law of growth curvature is enunciated.

(51) *Fundamental Responsive action of plant to the Stimulus of light.*

(52) *Researches on Positive and Negative Heliotropism.*

All the various responsive movements of plants under the action of light is shown to result from certain definite and fundamental reactions.

(53) *Researches on Diurnal Sleep.*

(54) *Torsional response under Stimulus of Light and Gravity.*

The conditions which determine this response are traced and a law enunciated.

Prof. Bose next published his exhaustive work on responsive reactions of plants.

(55) *Plant Response as a means of Physiological investigation.*—*Longmans & Co. 1906.*

"A biologically equipped reader will experience dazzled admiration for the logical progressive way, in which the author builds up, not in words, but actually experiment on experiment a complete functioning plant from three simple conceptions. These conceptions are: *Stimulation*, the transference of the external energy to the plant; *Contraction*, the 'direct response' of plant cells to stimulation; *Expansion* including growth the 'indirect response' to stimulation. There are literally scores of special points of the greatest interest in the course of the book. All such experimental cross-examination will make for the progress of knowledge, and we think that Dr. Bose can claim that his book will be an external stimulus to the growth of plant-physiology and the responses of future investigators."—*Nature*.

"This book may be acclaimed as a path-breaking one; for it shows a method of attack and refinement of instrumentation for the study of the phenomena of irritable reactions in plants, that is sure to be of the utmost service."—*Botanical Gazette*.

"Prof. Bose's work is a monument of scientifically directed industry, patient observation, far-reaching ingenuity and logical investigation. While chiefly of interest to botanists, it can not fail to attract the attention of serious biologists, and every student will welcome it as a helpful contribution to the unravelling of the problem of life. The many experiments here described are admirable in conception and in their execution the author has designed many peculiarly delicate and beautiful forms of apparatus. The chief merit of the work is that it demonstrates the fundamental unity of physiological response in plant and animal."—*Medical Review*.

"The work represents an enormous stride in our conception of the vegetable kingdom. It throws light on many problems in general physiology, and is a welcome contribution to our knowledge of molecular physics. It fully and clearly demonstrates, that the various energies of the outside world influence the vegetable like the animal organism, and by a more or less similar mechanism."—*Electrical Review*.

"With the appearance of the important book by Professor Bose, on 'Plant Response,' we have for the first time a conception which embraces all the expressed or unexpressed 'sensitiveness' of plants. We are now presented with a complete theory of their movements.

We may add that it is one which no plant physiologist can afford to ignore, which no student of any branch of botany should overlook, and which should prove suggestive to animal physiologists, possibly even to psychologists."—*The Athenaeum*.

"It may be unhesitatingly said that a careful reader of the present volume must be impressed by the ingenuity of device, and the delicacy of manipulation, obvious throughout the whole of the experimenting. Assuming that the instruments work exactly as described, it is difficult to reach conclusions which differ materially from those stated by Professor Bose."—*American Journal of Science*.

"His theory of the fundamental uniformity of all plant response is certainly most illuminating, and one for which he brings forward a great weight of evidence. The value of his book lies in the general theory put forward, and in the fact that he is the first to apply to the study of plant response, apparatus which he has elaborated to an extraordinary degree. The book certainly marks an epoch in the method of attack on the problems of irritability in plants."—*Journal of Botany*.

In the Plant Response, various excitatory effects were detected by means of mechanical response and recorded by the specially sensitive instrument invented for the purpose. Prof. Bose next turned his attention to discover and perfect other methods of investigation by which the various invisible excitatory reactions in the plant, induced by different forms of stimuli, could be detected and recorded. The methods now employed were electrical, by means of which various response phenomena were discovered in the plant, the existence of which was quite unsuspected. These particular investigations were carried on for the next three years from 1906 to 1909.

(57) *The Electromotive Response of plant.*

This gives an account of the result of research on various effective methods of quantitative stimulation of the plant, and the electric record of the resulting response.

(58) *The Relation between Stimulus and Response.*

Weber-Fechner's law is shown to be applicable to the plant-response as in that of the animal.

(59) *Rheotomic Observation of Electric Response of plant.*

This research determines the time-relation of initiation, climax and decline of electrical response.

(60) *Demonstration of Dual Character of Response.*

In this is given an account of the dis-

covery of the existence of two distinct kinds of response, whose signs are opposite. The discovery of positive response throws light on many physiological reactions which had hitherto been regarded as very obscure.

(61) *Detection of Physiological Anisotropy by Electrical Response.*

An account is given how owing to the differences in the previous history, different parts of an isotropic organ become anisotropic; an electrical method is described to detect such physiological anisotropy.

(62) *Natural Current in a plant and its Variation.*

This investigation was carried out to determine the condition under which there is a flow of electrical current in a plant, and the changes in the current.

(63) *Electrical Investigation on the Action of Drugs on plant-tissue.*

The physiological change induced in the plant-tissue by various drugs is determined by means of variation of electrical response.

(94) *Determination of Variation of Excitability of plant-tissue by Method of Interference.*

This is a new and extremely delicate method by which a slight physiological change is detected.

(65) *The current of Injury and Negative variation in plant.*

(66) *Current of death.*

(67) *Effect of Temperature on Electrical Response.*

(68) *The Electrical spasm of Death.*

This is a remarkable phenomenon discovered by Prof. Bose, of a sudden electrical current generated in the organism at the critical moment of death.

(69) *Multiple and Autonomous Electrical Response.*

It is here shown how the electrical response becomes repeated under a single strong stimulus. This is an independent demonstration of the fact that living tissue can store up, for the time being, the energy of its environment to be given out later in the form of repeated pulsations.

(70) *The Electrical Response of Leaves.*

It has been supposed that the leaf of *Dionaea* was alone sensitive. This research shows that every leaf is excitable and gives electrical response on excitation.

(71) *The Leaf considered as an Electrical Organ.*

It is shown that owing to physiological anisotropy of the upper and lower surfaces of leaves, a feeble electrical discharge takes place across the leaf when certain conducting tissues in the petiole are excited.

(72) *The Theory of Electrical Organ.*

The complex organ of the electrical fish consists of a series of plates. Prof. Bose shows that the electric action of each plate is fundamentally the same as that which causes an electrical discharge in a leaf. In connection with this he shows that the so-called "blaze current" which has been supposed to discriminate a vital reaction, is observed also in certain inorganic preparation made by him.

(73) *Researches on the Electrical Response of Skin, Epithelium, Gland and Digestive organs in plant and animal.*

(74) *Electric Response of plant to the Stimulus of Light.*

The various characteristics of the response of plant to light is shown to be similar to the electric reaction of light on an animal retina.

(75) *Geo-electric Response.*

In this research is described a new method of detecting excitation induced in the plant by the stimulus of gravity.

(76) *The Conductivity Balance.*

The invention of this method enables very accurate determination of the effect of various drugs on the conductivity and excitability of the plant tissue.

(77) *Response by Variation of Electric Resistivity.*

Another new method depending on variation of electrical resistance, is described for the detection of excitatory change.

(78) *The Molecular Theory of Excitation and its Transmission.*

In this the author enters into detail of the molecular aspect of excitatory change induced by stimulus.

(79) *Inorganic and organic Memory.*

"Prof. Bose puts forward an interesting theory of memory as an after-effect of sensory stimulation, and deals with the much more difficult problem of the revival of an image long after it has apparently faded. It has been suggested that this process of revival depends on the existence of some "scar" or fixed impression on the brain, or on a certain persistent disposi-

tion or tendency to movement created there. Prof. Bose gives reason and some experimental evidence to show that such a revival of memory consists of two distinct factors; first, that molecular change with concomitant change of properties; and second, the effect of an internal stimulus, delivered as a blow from within, by an impulse of the will upon the sensitive surface in which the image is latent."—*The Athenaeum*.

His next work is a complete study of various electric responses in plants and their relation to the corresponding phenomenon in the animal, treated according to the comparative method.

(80) *Comparative Electro-physiology.*—*Longmans & Co, 1908.*

We must regard the common divisions represented by the various sciences—say physics and biology—as purely man-made categories, excusable, and indeed convenient for our purposes, but without any ultimate warrant in reality. We shall, therefore, always be prepared to listen when a student of one science introduces his methods into another. It might easily be shown from the history of science that the great steps in our knowledge have coincided with these invasions. It might also be predicated from current inquiries in many fields that the great scientific achievement of our century will be none other than the synthesis of the sciences. The less we recognise boundaries and demarcations, the more we recognise the supreme truth. Notable at the present day, amongst those who see how puny and artificial and cramping are the accepted barriers among the sciences, is the Indian Physicist Prof. J. C. Bose of Calcutta. Seven years ago Dr. Bose began with inquiries into response in the living, and non-living which he has now carried a long stage further in his book "Comparative Electro-physiology."—*Westminster Gazette*.

The electrical physiology of muscle and nerve has undergone many changes both in theory and practice. It has been left to Prof. Bose to take a wide view of the subject and to correlate the electrical changes in the neuro-muscular apparatus of the animals with similar, but less known changes occurring in the botanical world. The author has made a valuable contribution to the knowledge of the extremely difficult subject of electro-physiology. His observations are useful alike to the physiologist (concerned with animals and plants), the physicist and the psychologist."—*The Athenaeum*.

"The book will interest a large circle of scientific readers, dealing as it does with the problems of physics, botany, physiology and experimental psychology. The author, when he was in England, acquired a reputation for the skill and ingenuity with which his apparatus was designed, and in the present volume he has given further instances of this. The book contains much that is novel. His *Sensimeter* will probably become a part of the curriculum of the psychologist. To the physicist, perhaps the most interesting thing is the Magnetic Conductivity Balance. These experiments are of exceeding interest."—*Electrician*.

"In sequence to his books on Response in the Living and the Non-living (1902) and Plant Response (1906) Prof. Bose has published a third volume on Comparative Electro-physiology. Prof. Bose has great ingenuity in device of experimental apparatus, fertility in initiating new lines of observation, and a clear style of setting forth his experimental results. There are in Prof. Bose's book a great many very interesting ob-

servations and ingenious methods of experimentation which repay the reader's attention. In particular his experiment on root-pressure, and the rise of sap; those by which he seeks to demonstrate that not only sensitive plants but all plants respond to excitation by variation of turgescence and electrical state; his comparison of the glandular structures of sundew and pitcher plants with animal glands; his demonstration of "blaze current" in a brominated lead plate and assertion that it cannot be regarded as a sign of life; his demonstration on the motile leaflets of *Biophytum* of the anodic and cathodic effects of constant current, and the velocity of transmission of excitatory waves; his comparison of retentiveness of molecular change in metals with memory, in fact the whole book abounds in interesting matter skilfully woven together."—*Nature*.

After the publication of the *Comparative Electro Physiology*, the Government of India sent Prof. Bose on his third Scientific Deputation to the West (1908-1909). In answer to invitations extended to him by different Universities and Scientific Associations, he visited America and delivered a series of lectures on the results of his own researches. He gave an Address at the Annual Meeting of the American Association for the Advancement of Science held at Baltimore, and lectured before the New York Botanical Society, the Medical Society of Boston, and the Society of Electric Engineers at Chicago. He also delivered a series of post-graduate lectures on Electro-physics and Plant-Physiology at the Universities of Illinois, Ann Arbor, Wisconsin and Chicago.

The United States Department of Agriculture is the largest in the world, controlling as it does, numerous experimental stations and having in its staff a very large number of experts for investigation into the problems of plant-life. He received an invitation from this important centre to lecture before "a large number of scientific men who are keenly interested in your experiments and who wanted very much to make your acquaintance." In compliance with this invitation he lectured at Washington on the results of his physiological investigations.

We have given a list of 80 important investigations carried out during fifteen years, between the years 1895 and 1910—investigations that have profoundly affected not one, but many branches of science. We understand that another very important and extended series of investigations carried out for the last two years has just been brought to a conclusion. An account of this work will be found in Prof.

Bose's forth-coming book, which Messrs. Longmans hope to publish at the beginning of the coming year.

One of the essential conditions for the discovery of new physical or physiological phenomena, is the successful invention and elaboration of apparatus which should combine at the same time an extreme sensitiveness and the highest accuracy. Facilities for this are only available in Western countries with expert mechanics and high class instrument-makers. The lack of such facilities was regarded as one of the difficulties that could not be surmounted in India. Prof. Bose accepted the limitations imposed, and succeeded with the help of Indian workmen in constructing those instruments of exquisite delicacy, which were so invaluable for research, and which have been so highly eulogised in Europe. It must be a matter of much gratification to us that America, which stands unrivalled in her mechanical and instrumental resources, should have to come to India for instruments of research. The following letter from Prof. R. Harper of the Department of Plant Physiology in the University of Wisconsin will be read with much interest in this connection. The letter further shows how Prof. Bose's visit has been a source of stimulus and inspiration to various workers in the Universities of America.

"I wish to express to you once more our very high appreciation of the stimulus and inspiration which you gave our biological work by your recent lectures at the University of Wisconsin. They attracted a great deal of attention in all the scientific departments here. I wish to urge again the very great importance for all the Universities and Agricultural Colleges in which plant physiology is taught, of having your instrument put in the market so that they will be available for all laboratories. In our course in General Physiology, we have for several years repeated and confirmed such of your simpler experiments as can be made with a galvanometer and we are most anxious to extend our work to the whole field of the quantitative study of plant responses which you have opened up. Plant Physiology is a subject of such fundamental significance from the standpoint of agriculture, and the courses in it are being so rapidly developed in the Western Universities, that I am sure that there would be a good demand for such apparatus. It is certainly of first importance for agriculture, that such studies as yours on the seasonal variation of condition in plants, rate and factor of growth and so on, should be developed in our departments of Plant Physiology to the fullest extent, and for this purpose apparatus for quantitative studies is quite indispensable."

—*The Modern Review*, December, 1912.

### Living and Non-Living.

Few of us can realise the difficulties that stand in the way of a pioneer who initiates a new line of inquiry. He has to make tangible what had hitherto remained beyond the cognisance of human senses. But this is not his only difficulty. A new accession of knowledge necessitates the readjustment of the old. Conservatism in science is as rigorous as in any other domain. It therefore takes a long time before the significance of a discovery is fully realised.

In the study of the phenomenon of life, the difficulties met with are so numerous that any attempt at a consistent explanation had been found to be a hopeless task. Hence a hypermechanical vital force was assumed which seemed to act in contradiction or defiance of the physical laws that govern the world of matter.

It was in 1900 that Prof. J. C. Bose announced at the Paris Congress the continuity of responsive phenomena in the Living and in the Non-Living. How widely this discovery has affected different departments of knowledge, will be seen from the following extracts.

Prof. Carveth Read in his *Metaphysics of Nature*, speaks of its influence on Physiological Psychology :

"The differences between the organic and inorganic are much less than we are accustomed to assume. J. C. Bose, in his *Response in the Living and the Non-Living*, after showing that under electrical stimuli plants exhibit fatigue, etc., and are affected like animals by anaesthetics and poisons, goes on to prove the same properties of tin and platinum wire. These also become fatigued; there is a threshold of response; subliminal stimuli become effective by repetition; response increases with the intensity of stimulus up to a certain point at which another limit is reached; response is affected by temperature (the median range is most favourable to it); some substances act as stimulants upon tin and platinum, others like anaesthetics, others as poisons (destroying all response); a small dose may increase the response, and a large dose of the same agent abolish it. The resemblance of these results to some of those obtained in Physiological Psychology is obvious. Inorganic matter is much simpler than organic, and so is its molecular activity; the simpler an organism, the simpler its consciousness."

Prof. Kennedy Duncan, the eminent Chemist, in his *Chemical Interpretation of Life*, after giving a full account of the discovery of Inorganic Response by Prof. Bose, says that it has thus been shown

"that the whole power of an animal or plant to respond to stimuli is a function not of 'Life' but of

matter, and with the out-and-out proof of this has passed away the necessity of postulating for it any unknowable and arbitrary Vital force."

The physiologists have hitherto been, generally speaking, upholders of the *Vitalist* theory. But now one of the leading physiologists has, as a result of his recent work, been constrained to arrive at a different conclusion. Prof. Schafer in his Presidential address before the British Association, this year, (1912) says

"that the dividing line between the Living and the Non-Living substances is not so sharp as has hitherto been supposed; both are governed by the same laws."

This may be regarded as a reaffirmation almost in the same words of the concluding portion of Prof. Bose's Friday Evening Discourse before the Royal Institution, eleven years ago, that

"the responsive processes seen in life, have been foreshadowed in non-life—that there is no abrupt break, but one uniform continuous march of law."

or the concluding sentence in Prof. Bose's *Response in the Living and the Non-Living* :

"These investigations prove to us that these things are determined, not by the play of an unknowable and arbitrary vital force, but by the working of laws that know no change, acting equally and uniformly throughout the organic and inorganic worlds."

—*The Modern Review*, November, 1912.

### Prof. J. C. Bose's Discovery.

By publishing a complete account of Professor Bose's discovery of nervous impulse in *Mimosa* in its Philosophical Transactions, the Royal Society has done him signal honour.

The leading plant physiologists, Pfeffer and Haberlandt, had authoritatively declared that in plants like *Mimosa* there was no transmission of excitation comparable to the nervous transmission in the animal. On account of the eminent position of the German physiologists this view accentuating the physiological difference between the animal and plant has received universal acceptance. Prof. Bose's investigation has, however, upset the hitherto accepted theory, and demonstrated the identical nature of the nervous impulse in the plant and animal. The success of the investigation is due to the invention of a new apparatus of extreme sensibility, by means of which the plant records automatically its perception of stimulus and the speed of its nervous impulse. This new

apparatus, the Resonant Recorder, based on a novel principle, records time intervals as short as a thousandth part of a second, and is far more accurate than the chronographic recorders which have hitherto been employed. The time required for the plant to perceive a blow has thus been found to be 6 hundredth part of a second, a period which is not of a different order to the latent period of the muscle of a frog. The perception period of *Mimosa* is appropriately modified as in the animal under varying external conditions. Under fatigue the perception period is very much prolonged; after a severe shock the plant remains dazed for a considerable length of time. The speed of nervous impulse in *Mimosa* in summer has been found to be

about 30 millimetres per second. This speed is enhanced under warmth and depressed under cold. The nervous impulse in the plant can be arrested as in the animal by various physiological blocks. Thus local cooling induces a paralysis of the plant-nerve. An electrical current can be made to arrest the nervous impulse in the plant. Various anaesthetics and poisons also inhibit its excitatory impulse. The investigation on the simplest type of plant-nerve is expected to cast a flood of light on the very obscure phenomenon of nervous impulse in general and the causes operative in bringing about the degeneration of the normal function of the nerve.—*The Modern Review*, August, 1913.

*Representation by the Government of the United Provinces in regard to rates charged on railways.*

No. 1188, dated 3rd August 1908.

From—The Honourable Mr. R. W. GILLAN, I.C.S., Secretary to the Government of the United Provinces,

To—The Secretary, RAILWAY BOARD.

I am directed to refer, for the consideration of your Board, some questions relating to railway rates which have recently received attention in this province. Several cases of apparent inequality in the rates were reported to the Industrial Conference which sat last year in Naini Tal and Mr. Chatarji, who was placed on special duty to make inquiry into industrial questions, was asked to examine them. He has now written a note on the subject which I am to forward for the information of the Railway Board.

2. The Lieutenant-Governor is far from agreeing on all points with Mr. Chatarji. It is scarcely relevant for instance to compare, as Mr. Chatarji does, the freight to Bombay by steamer from Germany and by rail from Cawnpore; it is impossible so to adjust freights as to enable the products of this province to compete with imported articles at the seaports, and even if it were possible it may be doubted whether the necessary reduction would be desirable as the result would be to increase the effectiveness of the competition of imported articles up-country, where local manufactures should find their best market. In some of his proposals also Mr. Chatarji loses sight of actual conditions which cannot but affect the question of rates. In suggesting for instance that flour is rated too high in proportion to wheat he has not distinguished clearly enough between rates charged at owner's and at railway risk; for flour is more liable to damage than wheat and when it is carried at railway risk, the circumstance must be considered. The difference between the rates for kerosine and vegetable oils again is accounted for by trade conditions and railway competition, and tobacco and oil seeds, between which a comparison is suggested, are commodities differing both in bulk and in volume of traffic.

3. At the same time many of the points discussed by Mr. Chatarji seem to require consideration. The most important question which has been urged on this Government is the possibility of adopting a sliding scale of rates diminishing in proportion to the total length of lead, whether the whole journey be confined to one railway or extend over the lines of more than one administration. The present combined rates, the Government understands, are in nearly all cases merely the addition of the individual rates under the tariffs on the various railways concerned and facilitate rather the accounts work of the railways than confer any benefit on the public. The principle suggested, which goes much further, is one the adoption of which was recommended by Mr. Robertson, but this Government is not in a position to give any opinion regarding its practicability. Of the other suggestions to which His Honour would particularly invite attention, the most important fall into two classes, the first of which is directed to an adjustment of rates to value and the second contemplates an encouragement of local industries and the development of traffic. An example of the first class is to be found in the case of perfumed and essential oils, where values differ largely and there seems to be room for a differentiation in the rates of carriage. Country products again it is suggested, such as toys, blankets, boots and shoes, ought to pay lower rates than imported commodities of the same class which are much more valuable. And an analogous case is that of art metalware and pottery which appear to be rated too high in proportion to value. But the most important matter under this class is the adjustment of rates of raw and manufactured articles, of wheat and flour for example, or of oil seeds and oil. In this connection Mr. Chatarji contends that the rate on the manufactured articles is too high in proportion to the rate on the raw material, and though the railways would have to consider no doubt the volume of the traffic which they would secure if they carried the manufactured flour and oil instead of wheat



and oil seeds, it does appear to the Lieutenant-Governor remarkable that it should pay to carry oil seeds down to the neighbourhood of Calcutta and there to extract the oil. It would seem to be not merely advantageous to this province in particular but more economical on the whole for the raw material to be treated locally and the manufactured products exported, and local manufacture would in one way at least be convenient to the railways since it would tend to substitute for a rush of traffic at particular seasons a steady traffic throughout the year. The suggestions which fall under the second class are in accordance with paragraph 208 of Mr. Robertson's report in which he stated his opinion that sufficient attention had not been paid to the creation of local industries, and pointed out the advantages that may be secured by their encouragement. The suggestions which can be made at present under this head are not of very great importance, but it may be possible to reduce the rates on furniture and matting, to allow special rates for metalware from large manufacture centres such as Moradabad and Benares and to develop a traffic in wood pulp which might ultimately attain considerable dimensions. In these matters we are still at the beginning of things, but they will rapidly become more and more important, and the Lieutenant-Governor trusts that very shortly new industries will be started, which it will be desirable for the railways to encourage.

4. The Lieutenant-Governor is aware that the question of railway rates is an extremely technical and difficult one, and he would have had some hesitation in forwarding suggestions which are not based on expert knowledge and which in many respects will probably be found to be open to criticism. He is convinced, however, that an industrial awakening of the country is in progress which will lead to the most important results, and as he understands that a general revision of railway rates is now being discussed, he desires to put these suggestions for the encouragement of industries before the Railway Board for their consideration.

### RAILWAY RATES.

For facility of reference the usual class rates prevailing on the plains railways for different descriptions of goods are quoted below :—

Special class	.	.	.	Varying rates.
1st	"	.	.	$\frac{1}{4}$ pie per maund per mile.
2nd	"	.	.	$\frac{1}{2}$ " "
3rd	"	.	.	$\frac{3}{4}$ " "
4th	"	.	.	1 " "
5th	"	.	.	1 " "
Explosives	.	.	.	1 $\frac{1}{2}$ " "

There are so many special rates for these two classes of goods between the principal trading centres that the ordinary class rates are practically unimportant for large transactions. The special rates for wheat are usually far more favourable than for *atta*. Wheat and flour (*atta*).  
[Vide my preliminary notes—paragraphs 88 and 89.]

Thus to take the two principal export marts on the East Indian Railway the rates are as below\* :—

	Per maund.	Rs.	a.	p.
Wheat in wagon loads, Cawnpore to Howrah.		0	5	3
<i>Atta</i> in wagon loads, Cawnpore to Howrah.		0	7	11
Wheat, Hathras City to Howrah		0	6	9
<i>Atta</i> " " "		0	9	5

\*Letter of General Traffic Manager, East Indian Railway, to Government, No. 5651, dated 13th September 1907.

The same difference is to be noticed in the rates prevailing over the Oudh and Rohilkhand Railway—

\* Special rate, Circular No. 6 D of 1907, dated the 25th January 1907, issued by the General Traffic Manager, East Indian Railway.

† Letter of Traffic Superintendent, Oudh and Rohilkhand Railway, to Government, No. 01-1-2-07, dated the 11th September 1907.

‡ See appendix, red page XIX of the Oudh and Rohilkhand Railway goods tariff for June 1907.

	Per maund.
Rs. a. p.	
Wheat in wagon loads, Lucknow to Howrah.	*0 6 6
Atta in wagon loads, Lucknow to Howrah.	†0 9 1
Wheat in wagon loads, Bareilly to Howrah, railway risk.	*0 7 4
Atta in wagon loads, Bareilly to Howrah, owner's risk.	‡0 10 0

It is unnecessary to multiply instances.

§ The value of the commodity, it may be mentioned, should never be the sole test of rates. The Belgian railways, which have materially encouraged the industries of that country, early adopted the principle of "net cost" as the chief basis of rate making. See Pratt's "Railways and their Rates," page 291.

There does not seem to be any justification for the rates for *atta* being 50 per cent. higher than the rates for wheat. *Atta* does not take up more space in the trucks than wheat does and the difference in value between the two commodities is not quite so great. § On the other hand, if the milling industry is properly developed in this province the exports for consumption in Bengal, Eastern Bengal, and Burma would take the form of *atta* instead of wheat. The traffic would be regulated and distributed over the different months of the year instead of coming with a rush just after the wheat harvesting season. The railway administrations might be requested to consider the question. It would be a great benefit to the province if we could keep for our cattle the chaff of some portion of the wheat we now export. Moreover, the mill industry must at the beginning look for a market in big towns in the province, and also large ports like Calcutta, Rangoon, and Chittagong. The local rates would also admit of reduction. They are at present on the Oudh and Rohilkhand Railway—

1 Bran.  
W. H. MORRIS.

	Per maund per mile.
For 166 miles or less	‡ of a pie.
" 167 to 288 miles	‡ "
" over 288 miles	‡ "

† East Indian Railway tariff, Part I, pages 38 and 39, October and November 1907.

They are more favourable on the East Indian Railway—

	* Pie.
First 50 miles	‡
Extra distances 50 to 100 miles	‡ (20)
" 100 to 350 "	‡ (14)
" 350 to 600 "	‡ (12)
" over 600 "	‡ (10)

In this connection I would draw attention to what appear to be "protective" rates on the East Indian Railway—

\*\* East Indian Railway General Traffic Manager's letter No. 5651, dated the 13th September 1907.

	Rs. a. p.
Atta in wagon loads, Hathras City to Howrah.	**0 9 5
Atta in wagon loads, Howrah to Hathras City.	**0 9 2

There is no apparent reason for the difference in rates. If anything the downward rates should be higher than the upward rates—because their

prices would be more equalized in the United Provinces and Bengal, and the interests of consumers would be better served.

On a careful study of the rates furnished by the railway administrations or specified in the published tariffs, I have not been able to discover, with one notable exception,\* any figures justifying the statement that had been made to me before I wrote the preliminary notes that differential rates prevailed for glass articles from the ports to interior towns and from interior towns to ports. It appears that certain special rates for wagon loads are conceded from the ports to interior town, and these rates have been extended to traffic from Dehra (probably on the representation of the Rajpur factory). It would seem that special rates have not been granted to the factory at Umballa. I am not certain about this, and as Umballa is outside the province I have not pursued the inquiry with respect to that factory.

The rates now in force however show that it is exceedingly difficult for factories in Northern India to compete with imported articles at the ports or in towns near the ports.

Thus the lowest wagon rate from Dehra Dun to Bombay for bangle-stone or *churi*-glass is Re. 0-14-4 per maund.† The price of average *churi*-glass at the factory is about five rupees a maund. The freight to Bombay therefore comes to about 20 per cent. of the cost at factory. That this is too high for the industry will appear from the fact that the freight (wagon loads) from Dehra Dun to Agra *via* Aligarh for *churi*-glass is Re. 0-5-9 per maund.‡ The rate from Bombay to Agra (Great Indian Peninsula) under similar conditions is Re. 0-9-5 plus a terminal charge of three rupees per wagon.§ In spite of this difference in railway freight, the *churi*-glass of Dehra Dun has not yet completely ousted the *churi*-glass imported from Belgium at the Firozabad market in Agra district. It is therefore evident that the Dehra Dun bangle-glass will have very little chance under present rates in Bombay or the neighbourhood. From the point of view of general policy to which I will advert separately it would certainly be advantageous to the railways to encourage the Dehra industry. It will be a great help to the growing local industry in glass manufacture if the rate of two and a half annas per wagon of 270 maunds or 10 tons per mile which the railways concede to certain classes of goods were extended to bangle-stone booked at Dehra Dun or Umballa for long distances, like Bombay and neighbourhood and Bengal. The rate from Dehra to Bombay will then be Re. 0-10-7 per maund worked out as below :—

Dehra to Hardwar . 32 miles at 3½ annas per mile = 120 ans.	(50 per cent. higher charges are always made on the Hardwar-Dehra Railway.)
Hardwar-Aligarh . 191 „	
Aligarh-Agra . 62 „	
Agra-Bombay . 841 „	
—	
1,094 miles at 2½ ans.	= 2,735 ans.
—	
270 maunds for	2,855 „
or Re. 0-10-7 per maund.	

Glass—Bangle-stone and hollow glass.

[Vide my preliminary notes—paragraph 158.]

\* (The Bombay, Baroda and Central India Railway rates to and from Bombay are however almost frankly protective in favour of imported goods. See the glaring differences in rates quoted on the 2nd page of the enclosure to the letter to Government from General Traffic Manager, Bombay, Baroda and Central India Railway, No. R-1139-09-1, dated the 16th September. These rates affect the Dehra and Umballa factories regarding sales in Ahmedabad and Guzerat but not for Bombay, as more favourable rates are secured by the Great Indian Peninsula to Bombay itself. The attention of the Bombay, Baroda and Central India administration might be drawn to the differential rates in force on that line.)

† Oudh and Rohilkhand Railway Traffic Superintendent's letter to Government, No. 01-1-2-07, dated the 15th October 1907.

‡ Oudh and Rohilkhand Railway Traffic Superintendent's letter to Government, No. 01-1-2-07, dated the 11th September 1907.

§ Great Indian Peninsula Railway General Traffic Manager's letter to Government, No. R-2341-1 of the 12th September 1907.

\* Oudh and Rohilkhand Railway  
Traffic Superintendent's letter No.  
01-1-2-07, dated the 15th October 1907.

† Oudh and Rohilkhand Railway  
Traffic Superintendent's letter, No.  
01-1-2-07, dated the 11th September  
1907.

Similarly in hollow or blown glass (glassware proper), the railway freight from Dehra Dun to the large seaport towns is prohibitive. The lowest rate (*vid* Saharanpur and Delhi) for glassware from Dehra Dun to Bombay is Rs. 2-12-1\* per maund. \*\* Considering that such ware has to be very carefully packed the actual incidence of the freight on the glass itself comes to more than the freight quoted.

Similarly the freight from Dehra Dun to Howrah *vid* Moghal Sarai is Rs. 2-6-10 per maund.† As sea freight from Belgium and Germany to the seaports of India are much lower (I have not been able to get actual quotations for glass, but it cannot be more than fifty shillings a ton) it is difficult for local glass to compete with imported glass in the provinces on the seaboard.

The railway administrations might be requested to reduce the freight on glassware from Dehra and Umballa to the seaport towns, specially in the case of the cheaper grade of glassware (like cheap lamp chimneys, pressed glass salt cellars and dishes, oil flasks, glass bowls for *hugas* made out of bangle-glass, etc.). These latter might be considered 2nd class goods (instead of 4th class as now) considering that empty bottles and phials are carried at 1st class rates.

Bangles or churis (lac or glass.)

Connected with the question of the rates on bangle-glass is that of the rates on the bangles or *churis* made out of such glass or of lac. This is an important industry in this province, supporting a very large number of Musalman *manihars*. The market for superior glass bangles has been practically captured by imported goods. (Saharanpur is the only district where I have seen any glass bangles of superior quality made.) The bangles (glass or lac) now made in this province are very cheap. They are now charged—

Owner's risk . . . 2nd class ( $\frac{1}{2}$  pie per maund).  
Railway „ . . . 3rd „ ( $\frac{1}{4}$  „ „ ).

In view of the fact that empty bottles are charged—

Owner's risk . . . 1st class ( $\frac{1}{2}$  pie per maund).  
Railway „ . . . 2nd „ ( $\frac{1}{4}$  „ „ ).

I venture to suggest that the rate for country-made bangles or *churis* (glass or lac) should be the same as that for empty bottles. The same remark applies to country-made lac or glass beads, which are now charged at 2nd class rates, and ought to be reduced to the 1st class.

Soap  
[Vide preliminary notes—paragraph  
157 (3).]

The present classification of soap in the goods tariffs is—

Soap, country or English bar . . . 2nd class.  
Soap in cakes or scented . . . 3rd „  
Soap in cakes or scented of European or  
English manufacture . . . 3rd „

‡ Great Indian Peninsula Railway  
General Traffic Manager's letter to  
Government, No. R-2341/1, dated the  
12th September 1907.

§ East Indian Railway General  
Traffic Manager's letter to Govern-  
ment, No. 5051, dated the 13th Sep-  
tember 1907.

The rate for toilet and scented soaps from Cawnpore to Bombay is Rs. 2-6-6 per maund.‡ That from Cawnpore to Calcutta is Rs. 2-3-8 per maund.§

In September 1907 Messrs. Latham & Co., of Bombay, informed a firm in this province that steamer freight on toilet soap from Hamburg to

Bombay was about 25s. per ton, which works out to less than a shilling or twelve annas per maund. The freight from Cawnpore to Bombay is therefore more than three times the freight from a German port to Bombay. If the local industry is to have any chance in the seaboard provinces, the freight on country-made toilet or scented soap should be reduced considerably. I would suggest bar soap being rated as 1st class and country-made soap (in cakes or scented) as 2nd class goods.

Perfumery, sandal wood oil, essential oils or *attar* and rose water are all chargeable under the goods tariffs at the highest or 5th class rate (1 pie per maund per mile). Perfumed and essential oils—  
[vide preliminary notes—paragraph  
171 (2).]

The question is not very important for *attar* as the quantity sent by rail in one consignment is usually small, and either the post or passenger trains convey it.

Rose water and perfumed oil stand in a different category. Rose water is manufactured mostly in Ghazipur and the district round Kanauj (Farrukhabad). It is a cheap stuff costing about eight annas to two rupees a quart bottle. It can hardly be considered a luxury, for the middle classes use it extensively all over India—specially during the hot weather months. Perfumed oil is made mostly in Jaunpur and the Kanauj district. It is pressed out of *til* or sesamum seed impregnated with the scent of *bela* or *chameli* flowers by a very crude process of enfleurage. The price is about a rupee a big bottle and is not much more expensive than rose water. There can be no comparison between rose water and perfumed oils on the one hand and the concentrated perfumes imported from Europe on the other. The latter really compete with country *attar* and not country rose water or perfumed oil. At present both classes of goods pay the same freight. The charge from Cawnpore to Howrah is Rs. 3-5-3 per maund,\* and from Cawnpore to Bombay is Rs. 3-8-1 per maund.† These charges are excessive. The result is that there is a large import of rose water into the Bombay market from Persia, sea freights being considerably lower than railway freights.

The sandal wood oil industry of Kanauj has to contend with special difficulties. It has to import sandal wood from the south of India after paying heavy freight and again to export the oil to different parts, the freight on the oil being as high as on the expensively got up concentrated perfumes of Europe and America. Sandal wood oil is now the *basis* of the *otto* or *itr* manufactured in different parts of this province, and is also used in native medicine. There is hence considerable consumption.

Ordinary vegetable oil in *coopas* is charged at owner's risk at 2nd class rates ( $\frac{1}{2}$  pie per maund) by the railways. I think the railways might be requested to charge rose water, perfumed *til* oil and sandal wood oil at owner's risk at 3rd class rates ( $\frac{2}{3}$  pie per maund). This would help the industries considerably and would augment traffic,

\* East Indian Railway General Traffic Manager's letter to Government, No. 5651, dated the 13th September 1907.

† Great Indian Peninsula Railway General Traffic Manager's letter to Government, No. R-2341/1, dated the 12th September 1907.

so that the railways would not suffer eventually. No changes are necessary for perfumery of European fashion made in India or imported.

#### Tobacco.

[Vide preliminary notes—paragraphs 179 and 180.]

The present class rates for tobacco are—

Native tobacco, raw . . . . .	2nd class.
„ manufactured . . . . .	3rd „
European tobacco, raw, manufactured . . . . .	4th „
Country cigarettes . . . . .	3rd „
Imported „ . . . . .	4th „
Country cigars . . . . .	2nd „
Imported „ . . . . .	4th „

Some special rates are in force for native tobacco, but they are not comprehensive enough.

The present rates are very unfavourable to native tobacco, both raw and manufactured. Raw tobacco is largely exported from the Agra and Meerut divisions. It is imported into Benares from Bengal (and also to a certain extent to Jaunpur and Lucknow) to be manufactured into native tobacco. Owing to the competition of cigarettes (country and imported) the tobacco industry is now in a depressed condition. The value of raw tobacco is low (being only slightly higher than the more valuable oilseeds) and there is very little justification for imposing on it the present high tariff. The same remark applies to manufactured native tobacco, which is now charged the same rate as country cigarettes and a higher rate than country cigars. Compared with other articles also the rates on country tobacco appear excessive. Thus colours, paints and dyes (far more valuable and liable to damage than country tobacco, either manufactured or unmanufactured) are charged 2nd class rates at owner's risk and 3rd class rates at railway risk. I would suggest the following classification for the consideration of the railway administrations :—

Tobacco—native, raw—in small quantities . . . . .	1st class.
Tobacco—native, raw—in large quantities . . . . .	Special reduced rates.
Tobacco manufactured, small quantities . . . . .	2nd class.
„ „ large quantities . . . . .	1st „

Oil.  
[Vide preliminary notes—paragraphs 112 et seq.]  
(\* Vide page 4 of His Honour the Lieutenant-Governor's speech at the Naini Tal Conference.)

In view of the enormous export of oilseeds from the provinces, the importance of developing the industry of oil pressing is manifest.\* The present railway rates for oil (other than mineral and essential) are anything but favourable to the industry. Oilseeds are carried at the lowest rates in force in the different railways, but for oil a comparatively high rate is prevalent. We therefore have the spectacle of oilseeds from these provinces being pressed into oil in the vicinity of Calcutta, where labour and land are much dearer. At present oil is charged the same rates as ghi, which are as below :—

In barrels, tubs, iron drums and tins with secure outer cases at railway risk . . . . .	3rd class.
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In barrels, tubs, iron drums and tins without secure outer cases at <i>railway risk</i> . . . . .	4th class
In barrels, tubs, iron drums and tins with or without outer cases carried less than 150 miles, <i>owner's risk</i> . . . . .	2nd "
In barrels, tubs, iron drums and tins with or without outer cases carried over 150 miles, <i>owner's risk</i> . . . . .	1st "
In <i>coops</i> , railway risk . . . . .	3rd "
" owner's risk . . . . .	2nd "

Now, vegetable oils are much cheaper than *ghi* and are not affected so much by exposure to the weather, if properly packed.

The railway charge crude glycerine in casks or drums 1st class rates at *railway risk*. Refined glycerine is charged 2nd class at railway risk. There is no apparent reason for imposing a higher tariff on vegetable oils. Tallow, although more valuable than oil, is carried at more favourable rates.

The railway administrations might be requested to consider whether it would be impossible to charge a rate of  $\frac{1}{4}$  pie per maund per mile for *full wagon loads* of oil to the seaport towns and for other long distances. At this rate the tariff, say, from Lucknow to Howrah (197 + 419 or 616 miles) would be Re. 0-12-10 per maund. Considering that kerosine oil (a substance much bulkier and more dangerous than vegetable oil) is carried from Howrah to Lucknow at Re. 0-10-3 per maund, the rate suggested above does not seem unduly low.

If we succeed in this province in developing an oil industry (exporting the oil instead of seed and keeping the cake for our cattle or for manure) a subsidiary industry will be called into being in the manufacture of iron drums in which the oil for export will have to be packed. As for some time to come the sheets for the drums must be imported, the railways will also gain by the development of this industry.

The present classification of wood and timber in the goods tariffs is very complicated. I suppose this would be remedied by the Tariff Simplification Committee now at work under the Railway Conference. Without a simpler classification much inconvenience is caused to traders.

The rates for furniture are very high—

Furniture, coarse, or rough, securely packed in wooden cases (railway risk)	3rd class.
Furniture, unpacked (owner's risk)	3rd "
" <i>polished</i> or carved, securely packed in wooden cases (railway risk)	4th "
Furniture, unpacked (owner's risk)	4th "
" reed, cane, or bamboo such as sofas, chair, <i>moras</i>	5th "
	(highest rate goods.)

On many of the railways a minimum charge of four annas up to 50 miles and eight annas for distances beyond is made for each chair or *mora*. Considering the very low price of bamboo or cane

Furniture.  
[Preliminary notes—paragraphs 142,  
et seq.]

furniture and also the fact that an unupholstered *mora* of the ordinary kind is worth only a rupee, the present charges seem excessive. Similarly, it is difficult to understand why furniture booked at *owner's risk* should be charged higher rates simply because it is polished. As mentioned in paragraph 147 of the preliminary notes, there is a great future before the furniture industry of the province, specially in moderate-priced goods. With the present prohibitive railway rates, however, there is very little possibility of furniture manufactured in one district finding a sale in another. It is well known how difficult it is to procure decent furniture in the smaller stations in the province. I would suggest a considerable reduction in the freight of furniture, specially when carried at owner's risk.

**Matting.**

[Preliminary notes—paragraphs 67 et seq.]

The rates at present in force for the cheaper kinds of *matting* manufactured in these provinces are—

Common country matting such as bamboo, date and palm at owner's risk	1st class
Common country matting such as bamboo, date and palm at railway risk	2nd "
Matting, coir, <i>munj</i> , jute, and hemp	2nd "

It is true matting is a very bulky article for the railways to carry, but considering the value of the goods, the present rates are much too high. A large quantity of *saun* hemp is now exported from the province in the form of fibre. A beginning is being made in some districts like Partabgarh in the manufacture of hemp matting for export to other districts. The railways will gain instead of losing if, by a judicious reduction of rates, they encourage a traffic in matting made of *saun* hemp.

**Brassware.**

[Preliminary notes—pages 123 et seq.]

The manufacture of brass vessels is a very important industry in many towns of these provinces (*e.g.*, Benares, Mirzapur, Lucknow, Moradabad, Farrukhabad and Agra). For this purpose there is considerable consumption of broken and unserviceable brassware. (It is remelted and remoulded into goods known as *bharat*.) The railway freight on broken brassware is high, and at all the centres of the industry I have visited there is a complaint of the scarcity of the material, showing that there is very little broken ware gathered up from remote and rural tracts.

The present tariff, *viz.*—

Broken brass or bell metal, owner's risk	1st class
" " " railway risk	1st "
	+ 25 per cent.

would, I venture to submit, if reduced, lead to a considerable augmentation of the traffic.

The rates for finished ware, *viz.*—

Brass, manufactured or unmanufactured, including castings.	2nd class
Bell metal or <i>kansa</i> or bell metal ware	3rd "

are also high. Bell metal is only slightly more expensive than ordinary brass, and the difference



in rates is out of proportion to the difference in value. Copper is more expensive than brass but pays the same freight. The East Indian Railway grant some special rates for brass and copper ware. Thus the tariff from Howrah to Delhi and *vice versa* (903 miles) is Re. 0-15-10 per maund, which is less than 1st class rates for the same distance (Re. 1-6-10). These special rates however do not affect our local industries, and I would suggest that the railways might favourably consider the reduction of the general rate for brass and bell metal ware to the 1st class and grant special rates to towns like Benares, Mirzapur, and Moradabad (both for brass sheets and slabs *from* the ports, and for manufactured articles *from* these towns).

Closely connected with the manufacture of **Art metalware.** ordinary vessels of brass; copper and bell metal is the manufacture of artware of brass, copper, german silver, etc. The principal centres of the latter industry are Benares and Moradabad and, to a smaller extent, Lucknow. Art metalware is now charged by the railways the almost prohibitive rate of 5th class (highest allowed by law—1 pie per maund per mile). Fancy brassware is generally sold by weight to dealers, and the price of Benares brassware varies between Rs. 2 and Rs. 4 a seer. Brass locks, which are quite as expensive as artware, are charged 2nd class rates. Machinery (including sewing machines) in small lots is chargeable at 3rd class rates. The art metal industry of Benares now finds its patrons mostly among pilgrims and other visitors to the city. A reduction in railway freight would mean very great encouragement to the Benares and Moradabad workmen. I would suggest art metal from Benares and Moradabad being charged 3rd class rates\* instead of 5th.

\* (3 pie per maund per mile.)

A large quantity of cheap wooden, lac and **Toys.** clay toys are manufactured in various towns in the province. The goods rates for these articles are prohibitive—

Benares and Lucknow toys at owner's risk	3rd class
" " " " railway "	4th "

The expensive toys and implements for games imported from Europe are also charged 4th class rates at railway risk. There is no comparison in value between imported toys and cheap clay, lac or wooden toys of this province. Wooden articles (otherwise not specified) are chargeable at only 2nd class rates. I would submit that country-made wooden and clay toys should be carried at 2nd class rates (railway risk) and 1st class rates (owner's risk).

The same rates prevail as for Benares and Lucknow toys, *viz.*, 3rd class at owner's risk and 4th class at railway risk. The result of these very high rates is that there is very little export of art pottery by rail. The artizans of Amroha told me they carried their goods by road to the fairs at Meerut and Kashipur, because railway freight was prohibitive. This meant considerable sacrifice of time, and they could not afford to take

**Art pottery.**

[Preliminary notes—paragraph 150.]

pottery from Amroha to any distant fairs or exhibitions. Art pottery is heavy and does not take up much space. I may mention that crockery and earthenware of all kinds are carried by the railways 2nd class at owner's risk and 3rd class at railway risk. The art pottery of this country (say, Chunar or Nizamabad ware) is not so light or fragile as good porcelain and is ever so much cheaper. There is no apparent reason for the imposition of a higher rate on country art pottery. If securely packed the railways should be able to carry it at 1st class rates (owner's risk) and 2nd class (railway risk).

**Bark for tanning.**

[See preliminary notes—paragraph 107.]

The difficulty of obtaining an adequate supply of tanning bark is very acute in the leather industry. The railways quote fairly low rates for *wagon loads* of bark, specially to the towns of Cawnpore and Agra. The rates for small quantities are however very high, *viz.* :—

Tanning bark, in bags or bundles, *securely packed* . . . 2nd class.

Tanning bark, in bags or bundles, *loose* . . . 3rd „

Babul jungles are scattered all over the province and there are many localities which would yield bark but not sufficient for a whole wagon at a time. Owing to high freight charges no attempt is made to collect the bark in such tracts. The question of increasing the supply of bark has been specially brought to the notice of Government by the Chamber of Commerce. I think a reduction of freight on securely packed bark from 2nd class to 1st or special class (for small quantities) is likely to widen the sources of supply almost immediately.

**Combs.**

[Preliminary notes—paragraph 186.]

Nagina, in the Bijnor district, has a large industry in the manufacture of wooden combs (not necessarily of ebony wood). Horn combs are made on a considerable scale at Sambhal, in the Moradabad district, and also at Bijnor, in the same district.

Common wooden and horn combs are manufactured at Lucknow, Etawah and many other places in the province on a small scale for local requirements. The industry, specially the manufacture of combs, buttons and other articles made of horn or hoof, would probably admit of considerable expansion.\*

\* (The special inquiry into the matter is not yet complete.)

The present railway rates on combs, *viz.* :—

Horn combs . . . . . 3rd class  
Wooden combs . . . . . 2nd „

are very high, and stand in the way of any great development of the industry in its present centres. The raw material (horn, horn-tips, and hoofs) is charged 2nd class rates for small quantities on the Oudh and Rohilkhand Railway. Specially reduced rates are quoted for wagon loads, but this benefits only those who export abroad. Comparatively poor artizans are engaged in the local industry now and they cannot afford to buy in wagon loads. I would suggest a reduction of the

rate on horn, etc., to 1st class and of horn combs to 2nd class. Wooden combs are made chiefly of odd bits of wood and, in view of their cheapness, should be charged 1st class rates.

Cheap country blankets and *namdas* are among the principal woollen products of the province. *Namdass* are largely made in Bahraich; Muzaffarnagar and Najibabad (in Bijnor) have a considerable industry in cheap blankets. Country blankets and *namdas* are charged 2nd class rates by the railways. European blankets are scheduled at 3rd class rates, but on the East Indian Railway if booked from Howrah they are classed as piece-goods, *i.e.*, charged 2nd class rates. A similar concession is granted by the Great Indian Peninsula Railway for imports *via* Bombay and by the North-Western Railway for imports *via* Karachi. (Some concessions are granted by the railway companies for coolie blankets manufactured at the Dhariwal mills.) The result is that the cheap coarse hand-made blanket of Muzaffarnagar, Najibabad and other places in these provinces pays the same freight as the superior and expensive blankets from Europe. I think country blankets and *namdas* should be removed from the 2nd to the 1st class in the goods tariff.

Carpets of Indian or European make (not including *satranjis*, by which I take it is meant cotton *daris* or carpets) are charged 2nd class rates at owner's risk and 3rd class at railway risk. *Satranjis* pay 2nd class rates (railway risk). Floor cloths pay the same rate as carpets. Considering that piece-goods (pressed and bound) are charged 2nd class rates (railway risk) even for small quantities and much lower rates for large quantities, the tariff on floor cloths and cotton carpets appears very high. Moreover, floor cloths, although lighter than carpets, are made of the coarser kinds of cotton and are comparatively speaking very cheap. There is no apparent justification for placing floor cloths and carpets in the same category. The railways might be requested to remove floor cloths and cotton carpets to 1st class (railway risk).

The present tariff classification is as below :—

Shoes and boots of European make or pattern ... ..	3rd class.
Shoes and boots not of European pattern or sandals ... ..	2nd "
Shoes, country, ornamented with tinsel ... ..	3rd "

There is a marked tendency nowadays among all classes to wear boots and shoes of European pattern in preference to those of native pattern. Consequently the trade in inferior country shoes of European pattern is growing, and such shoes are not much more expensive than native pattern shoes, nor do they take more space for the same weight than the latter. In the circumstances there is no longer much reason for discrimination between country-made shoes of European or native pattern. I submit that all country-made boots and shoes should be rated as 2nd class goods.

Wood pulp is now charged over the railways at the same rate as pasteboard, *viz.*, 2nd class rates.

Blankets and *namdas*  
[Preliminary notes—paragraphs 57 and 59.]

Carpets, floor cloths and *satranjis*.  
[Preliminary notes—paragraphs 55, 26, and 27.]

Boots and shoes,  
[Preliminary notes—paragraphs 100 et seq.]

Wood pulp.  
[Preliminary notes—paragraph 80.]

Owing to the very high tariff, very little wood pulp can be used by inland paper mills (like those at Lucknow). Considering the nature of the stuff it should not be charged at anything more than 1st class rates. The question of the rate on wood pulp will become still more important when, as a result of the inquiries now being made by Government, capitalists are invited to consider the chances of a wood pulp factory at the foot of the hills.

General.

\* See Waghorn's "Traders and Railways," Effingham Wilson, London, 1907.

† Pratt—"Railways and their Rates," John Murray, London, 1905, pages 106 and 107.

‡ *Ibid*, page 88.

§ Report on "The Administration and Working of Indian Railways," Government Press, Calcutta, 1903, paragraphs 193 *et seq.*

¶ *Ibid*, paragraph 208.

A brief reference to the general question of the influence of railway rates on the development of local industries may not be entirely out of place here. The connection between them is conceded by every one. Even in England, where an acute controversy\* has been raging during the last few years regarding the supposed preference shown by the railways towards imported goods, the administrations of the various companies have often admittedly gone out of their way to reduce their rates and provide other facilities for nascent industries. Several instances will be found mentioned by Mr. Pratt,† who has been the literary spokesman of the railways in the controversy. As he says: "In carrying English produce the railway has a double advantage—the direct benefit from the particular description of freight in question, and the prospective benefit that will follow from the carrying of other kinds of freight, in each direction, as the district becomes wealthier and more populous. Other things being equal, a railway company is really much more interested in the development of home than it is in the expansion of foreign produce."‡ Mr. Robertson, who was employed as Special Commissioner of Indian Railways in 1901—3, is equally emphatic. After expressing his opinion§ that before the rates for general merchandise in India can be regarded relatively as even equal to those in England, the former would have to be reduced by about 30 per cent. to 60 per cent., and citing the case of the American railways for evidence that the adoption of such rates concurrently with the earning of a profit would not be impossible, he goes on to the question of the development of local industries: "I do not think sufficient attention is given to the creation and development of local industries. The more numerous the local industries are along a line of railway, the greater always is the prosperity of that railway. They not only give their products to the railway to carry but their presence creates a great deal of traffic in both passengers and goods which, but for the local manufactories, would never come to the railway at all. Every encouragement should, therefore, be given to the opening up of more local industries by offering special facilities in the way of rates and accommodation, at all events until they are fairly started and given more easy terms in regard to the laying down of sidings to the works."¶

Two points require to be specially borne in mind in this connection. The first is the long distances that traffic has to pass in India from the

seat of the industry to find a market. The railways have recognized this difficulty by having a sliding scale for certain classes of goods. This principle ought to be extended much more freely than it is at present. Even in England it is admitted that "merchandise going a long distance will not bear ordinary rates for transport for the land journey, so that if more than a certain charge is made the traffic may be lost."\* On the Continent, where the distances are longer than in the British Isles, the *staffel* tariff, i.e., the system of reducing the charge per ton proportionately with the increased length of haul, is adopted wherever possible. This should be still more the case in India, where we have longer distances than even on the Continent of Europe. Moreover, as pointed out by Mr. Robertson: "On through traffic—that is traffic going over more than one company's line—all fares and rates should be calculated on the *through* distance (this is really expected by the Railway Act, but in practice is rarely done) and the reduction should always be applied on the entire distance and not merely on the local distance of each railway. It is the practice that prevails in India, of calculating rates on the distance to the junction only, which is to some extent responsible for a good many of the high rates now obtaining."†

\* Pratt—"Railways and their Rates," page 187.

† Robertson's Report on Indian Railways, paragraph 195.

The second point is that the industries of India have to compete mostly with foreign goods produced at a short distance from a seaport. Thus the bulk of the imports from Japan, Belgium or Germany have only a short railway transport and then a sea transport to a port in India. Water carriage is much cheaper than land carriage. Consequently in the large markets of Calcutta, Bombay or Madras the industrial products of these provinces are handicapped in competition with goods from abroad. It may also be noted that in some cases the imports from foreign countries come as the ballast of ships that are meant to take back the produce of India—mostly raw materials. I believe this is specially true of Belgian glass.‡ A low tariff for long distances on Indian railways, specially to the *ports*, is therefore particularly wanted for the industries of these provinces.

‡ See Pratt—"Railways and their Rates," page 290.

Two or three other matters may also be brought to notice in connection with the subject of railway rates. The bewildering complexity of the present goods tariffs of the various railways causes great difficulty and occasionally loss to traders, specially to Indian traders unacquainted with English. The rates vary from railway to railway and the ascertainment of a correct rate for any long distance traversing two or three different lines of railways is almost the work of an expert. The matter is, I believe, already engaging attention and the Railway Conference have appointed a Tariff Revision Committee. I would also suggest that all changes in rates should be notified by the railway administrations as widely as possible in English and in the vernaculars of the districts which are affected by such changes. At present

traders are very much in the hands of subordinate railway employés in this matter.

The agreements entered into by neighbouring railway administrations regarding the carriage of traffic over junction stations often cause inconvenience and loss to private traders and manufacturers. An instance was given to me by the Secretary of the Lucknow Paper Mills. The mill annually imports about 5,000 maunds of American resin through Calcutta. The freight from Howrah to Lucknow *viâ* Moghal Sarai is Re. 1-2-2 per maund. The freight by the Cawnpore route would be Re. 1-0-8 (Re. 0-14-5 + Re. 0-2-3) per maund. The East Indian Railway, however, decline to book through *viâ* Cawnpore, the mill was informed, owing to a compact between the East Indian Railway and Oudh and Rohilkhand Railway. The mill therefore suffers a loss of Re. 0-1-6 for every maund of resin imported. The difficulty here instanced would not probably have occurred if the sliding scale applied to the whole of the through distance from Howrah to Lucknow instead of separate calculations being made for the distances on the East Indian Railway and the Oudh and Rohilkhand Railway.

\* Robertson's Report on Indian Railways, paragraph 210.

I must also briefly advert to the terms of the risk note in force in Indian railways. The old risk note form was strongly condemned by Mr. Roberston\* and the forms have recently been amended under the orders of the Government of India. The present conditions are much more favourable to the trader, but even now, under the terms of the risk note, form B, a trader obtains no satisfaction unless a complete consignment or one or more *complete* packages forming part of a consignment are lost. The petty pilfering that takes place on the railways has not therefore stopped. On talking to intelligent tradesmen and enlightened zamindars about the fruit, poultry farming and dairy industries in these provinces, I have been invariably told that these conditions of the risk note which have to be signed in the case of consignments of such goods are among the chief obstacles to a development of these industries.

A. C. CHATTERJI.

*The 17th May 1908.*

No. 1505 R. T., dated 14th August 1908.

From—The Secretary, RAILWAY BOARD,

To—The President of the Indian Railway Conference Association.

I am directed to forward to you a copy of a letter from the Honourable Mr. R. W. Gillan, Secretary to Government, United Provinces, and 50 copies of Mr. Chatarji's note referred to therein. It will be seen that Mr. Chatarji was specially deputed by the Local Government to examine into the question of existing railway rates as affecting the development of local industries, the question having arisen at an Industrial Conference held at Naini Tal last year. I am desired by the Railway Board to say that in their opinion Mr. Chatarji's note is one that deserves the very careful consideration of Railway Administrations and is well worth the attention of the Conference at their next meeting.

The two main points for consideration appear to be—

- (a) The quotation of reasonable through rates by railways for items of traffic which at present are not of much importance, but which may tend to grow in importance if suitable rates are quoted.
- (b) The careful attention of railways to the quotation of rates that will assist in the development of local industries.

2. A practical suggestion which the Railway Board would like to make in order to ensure that the present reference from the United Provinces Government is effectively dealt with is this :—

Assuming that the Conference as a whole are inclined to agree with the Railway Board that the question of the quotation of rates suitable to develop local industries is a proposition deserving support, the railways serving the United Provinces should jointly form a small local Committee of traffic officers, and the Local Government would be invited to refer in the first instance to this Committee any proposals regarding reduced rates or the quotation of through rates which might be put forward as being likely to assist in the development of any particular local industry.

3. This Committee, dealing with the proposal in the light of local knowledge, would submit a joint recommendation to their respective Agents and Managers and the particular railway most interested would then move in the matter on such lines as might be thought expedient. A Committee of this local character is suggested because it could be more readily and personally consulted than a Committee of a non-local character, by the representative of the Local Government, and a suitable head-quarters for it would be Cawnpore, where four railways meet.

4. This suggestion has reference to the particular case of the railways in the United Provinces, but if the Conference Association as a whole accept the principle on which it rests, Railway Administrations generally might feel disposed to take, in concert with their neighbours, such steps as might be found to be expedient to admit of their forming Committees of a similar character to that suggested above for the United Provinces.

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No. 1506 R. T., dated 14th August 1908.

From—The Secretary, RAILWAY BOARD,

To—The Secretary to the Government of the United Provinces, Industries Department.

I am directed to confirm the despatch of the telegram as per margin which referred to the report on railway rates by Mr. Chatarji, sent to the Railway Board with your letter No. 1188, of the 3rd August 1908.

Copy of telegram to the Secretary to the Government of the United Provinces, Industries Department.  
Your letter No. 1188 of 3rd instant. Could you kindly send 60 copies of Mr. Chatarji's note on railway rates.

I am desired to say that the Railway Board have read your letter and Mr. Chatarji's report with great interest, and they think the points raised are of much importance.

To a large extent the Railway Board are not in a position to issue any orders in the direction of adjusting rates for certain items of traffic which they consider might fairly receive the assistance that Mr. Chatarji's note indicates they require. The course is open to them, however, of bringing both your letter and the note prominently to the notice of the Railway Administrations of India, expressing at the same time the opinion that these papers deserve the most careful consideration of railways in the interests both of themselves and of the industrial development of the country.

This course the Railway Board have adopted, and I am to enclose a copy of a letter which has been addressed to the President of the Indian Railway Conference Association.

No. 2078, dated 14th October 1908.

From—The Secretary, Indian Railway Conference Association,  
To—The Secretary, RAILWAY BOARD.

I am directed to refer to your letter No. 1505 R. T., dated the 14th August 1908, with which you forwarded letter from the Government of the United Provinces and a note by Mr. Chatarji, on special duty, on the subject of the quotation and adjustment of railway rates for the encouragement of local industries.

2. I am to say that the question has been most carefully considered by the Tariff Simplification Committee, who have dealt with the questions raised in a special report, copy of which I enclose, and that the Conference Association have passed the following resolution that—

“ A reply be given to the Railway Board in terms of paragraphs 1 to 7 of the Committee's report with an explanation of the objections which it was anticipated would be found in practice against giving effect to the proposal to establish a local Committee of Traffic Officers to deal with rates questions.”

3. It will be observed from paragraphs 1 to 7 of the enclosure that the views of the Committee as endorsed by the Conference are shortly that—

- (i) The suggestions in regard to particular rates have been carefully considered by the Committee in framing the draft General Tariff, and the annexure to the report deals with the questions raised by Mr. Chatarji in detail;
- (ii) that Railways have been and will continue to be always ready to given sympathetic consideration to any question of rates calculated to assist in the development of local industries;
- (iii) that the establishment of local Committees would not tend to facilitate the quotation of new rates when required, as local officers could not be given the power of quoting rates and other questions might be involved of which they were ignorant and they could do nothing which could not be done more quickly by direct communication with the head office.

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*Report No. (1) of the Tariff Simplification Committee on Subject No. 59 on the Agenda of the Association for September 1908.*

*Subject No. 59—Railway rates as affecting local industries.*

1. The Committee considered letter No. 1505 R.T., from the Railway Board, to the President of the Indian Railway Conference Association, dated the 11th August 1908, enclosing a communication from the Secretary to the Government of the United Provinces, and a note by Mr. Chatarji, who had been deputed by the Local Government to enquire into the question of existing railway rates as affecting the question of local industries.

2. The various paragraphs of Mr. Chatarji's note have been dealt with *seriatim* by the Committee, and in a memorandum annexed they have replied on each item in the classification referred to by him.

3. They have now to offer their remarks on the main points submitted for consideration which they venture to suggest have been effectually summarised from Mr. Chatarji's report by the United Provinces Government and the Railway Board, *viz.* :—

- (a) The quotation of reasonable through rates by railways for items of traffic which at present are not of much importance but which may tend to grow in importance if suitable rates are quoted.
- (b) The careful attention of railways to the quotation of rates which will assist in the development of local industries.
- (c) The advisability of forming local Committees to consider questions bearing on the points referred.



4. The Committee feel that the points raised are of great importance to railways and to Government and question (a) has therefore been very carefully weighed during the consideration of the revised tariff; the proposal to quote station to station rates grouped in circles, together with certain suggested modifications in the classification, *vide* annexure, if adopted, will, it is hoped, go far to provide for what is considered necessary in this respect.

5. Regarding point (b) the Committee venture to state that Railway Administrations in India have invariably given earnest consideration to application made to them for the quotations of rates to develop local industries, and the large number of specially reduced rates which appear in their tariffs establishes this fact.

6. (a) Regarding point (c), the suggestion to establish local Committees the Tariff Simplification Committee think that better results will be attained by civil officers and manufactures continuing to deal direct with railways, but this point might be specially discussed in full Conference.

(b) Three railways have head-quarters in the United Provinces and are in close touch with the Local Government, while most of the railways running into the province are members of the Cawnpur Chamber of Commerce and in close touch with the mercantile community.

(c) Again, as the centre of Local Government in the United Provinces is at Allahabad, communications from that Government to the head-quarters of railways concerned in particular industries would not be longer in transit, than if addressed to a local officer at Cawnpur, who would have to communicate with District Officers not resident in Cawnpur, and, after assembly of a local Committee, submit its proposals to head-quarters for confirmation.

(d) The Railway Board have already simplified matters considerably by authorizing railways to deal direct with Local Governments, and, in the opinion of this Committee, nothing further seem necessary for the present.

7. In conclusion, it may be stated that, while considering their main report, the Committee had their attention drawn to the fact that even in England local industries cannot obtain as low rates as foreign imports, owing to sea-borne traffic being usually offered in greater volume and in more safe and convenient packages.

#### **Annexure to Tariff Simplification Committee Report No. 1 on subject No. 59.**

*Remarks on some questions relating to railway rates contained in a note written by Mr. Chatarji, on special duty, United Provinces Government, and forwarded to the Railway Board by the Secretary to the Government of the United Provinces.*

**Wheat and Flour (Attah).—**The revised classification submitted by the Committee places Grain in the 1st (or lowest) class and Attah or Flour in the same class, at "Owner's risk," which is justifiable owing to difference in risk and value, Wheat being not so easily damageable as Attah.

The rates for Flour and Wheat on the East Indian Railway and the Madras and Southern Mahratta Railway have been assimilated, except in the case of Grain, for export. Moreover, especially from where there are mills despatching large consignments, the Great Indian Peninsula and other principal railways have already quoted special rates for the conveyance of Flour, these reduced rates being in force over long distances such as from Delhi to Southern India.

**Glass—Bangle stone and hollow glass—**Mr. Chatarji's suggestion is that the freight on glassware of the cheaper grades from Dehra and Umballa to the seaport towns should be 2nd class, but it is known from experience that rates quoted on the basis of value lead to misdeclarations, and although such a course is occasionally necessary it should be avoided as much as possible. As regards special quotations from stations where glass is manufactured locally, representations will doubtless be considered, when made to the railways concerned, for long distance despatches to seaport towns.

**Bangles or Churies (lac or glass).—**In the revised classification Bangles and Churies of lac or glass are in the 2nd class, but when in wagon loads

will be chargeable at the 1st class (or lowest) rate at owner's risk. This is the same as the rate for empty bottles.

*Soap*.—The suggestion is that country Soap "in cakes or scented" should be reduced from 3rd to 2nd class. The inference conveyed by Mr. Chatarji's remarks is that foreign Soap should continue to be charged 3rd class as at present. Foreign Soap occupies no more space than country Soap, and some of the imported Soaps are less expensive than the country-made Soaps. Moreover, if the rate for country Soap were reduced from 2nd class to 1st class as proposed, the difference in freight would probably be so small that it would have no appreciable effect on the retail price.

*Perfumed and Essential Oils*.—Representations have already been considered by some railways as to whether the rate for Rose and Keora water should be reduced, the ground for the representation being the difference in the prices of Attar and Rose water but the value alone of an article does not determine its rating.

*Tobacco*.—Mr. Chatarji says that the rates for native Tobacco, both raw and manufactured, are unfavourable. The classification has had careful consideration by the Tariff Committee, who have already proposed revisions on these commodities which place the different articles in the following order:—

Tobacco, imported . . . . .	4th class.
„ manufactured, country . . . . .	3rd „
„ unmanufactured, country . . . . .	2nd „
Cigars or cigarettes, imported . . . . .	4th „
„ country-made, including biddies . . . . .	3rd „

This gives a distinct advantage to the country article or industry, and the traffic can well bear these rates.

*Oils*.—The suggestion is that the rates for Oil should be reduced because Oil seeds are carried at a low rate, and therefore are sent to Calcutta for pressing or export. But the Committee point out that the bulk of the Oil seeds carried to Calcutta and other seaports is for export, only a fraction being used in India for extracting Oil which is mostly consumed locally in the mills. Any reduction in the rates for Oil would not assist in retaining the seeds produced in the United Provinces for the extraction of Oil for Indian consumption, except in the immediate locality. Manufacturers in other provinces have for a long time been extracting Oil for European export, and, if their example be followed in the United Provinces, there will probably be no difficulty in obtaining cheap railway rates for large quantities.

Vegetable Oils are classified at the 3rd class rate railway risk or 2nd class owner's risk, and this is a fair charge.

*Wood and Timber Furniture*.—The Tariff Committee have already proposed revisions in the classification which will remove any complications in the rates and conditions for wood and timber.

The revised classification of Furniture will be as follows:—

Furniture unpacked . . . . .	4th class.
„ packed in cases or crates . . . . .	3rd „
Household effects (not for sale) in wagon loads at owner's risk . . . . .	1st „

This classification will remove the anomaly as regards "polished furniture" pointed out in the note. There will also be no minimum charge for future. Furniture required by the mass of the Indian people, such as wooden bedsteads (Taktposts), Indian chowkies, stools, etc., are manufactured locally by the village carpenters and the railways only carry very small quantities of such goods.

Other furniture, such as tables, chairs, almirahs, etc., etc., are not desirable articles for carriage from the carrier's point of view, in that they take up much space in a wagon, and are difficult to be loaded compactly, and under these circumstances the proposed rates are reasonable.

*Matting*.—The classification of matting will, in future, be as follows:—

Matting, China . . . . .	3rd class.
„ country . . . . .	2nd „
„ common, country . . . . .	{ 2nd class, railway risk.
	{ 1st class, owner's risk.

Coir, Munj, Jute and Hemp will come under the head of Matting, country, and charged 2nd class.

Railways concerned will doubtless immediately consider local representations to meet special cases.

*Brassware.*—Mr. Chatarji proposes that the railways should reduce the rate for Brass to the 1st class and further grant special reduced rates for Brass sheets and slabs from the ports and for manufactured articles from the towns. The Committee are of opinion that, considering the value of Brass both in its manufactured and unmanufactured state, the 2nd class is a sufficiently low rate, and that there is no good reason adduced for any reduction.

*Art Metalware.*—It is most difficult to differentiate between the values of different articles classed as Art Metalware, and in the event of reduced rates being conceded, articles of high value would be tendered for despatch at the lower rate.

*Toys.*—The Tariff Committee recognizing that country-made Toys of clay or wood should have a separate and lower classification than imported Toys, have recommended the following :—

Toys, country . . . . .	{ 2nd class, railway risk. 1st class, owner's risk. 4th class, railway risk.
„ imported . . . . .	
	{ 3rd class, owner's risk.

*Art Pottery.*—This is another instance in which it is difficult to differentiate between what should be charged at a higher or lower rate, for instance, the Art Pottery made in the Schools of Art, or at Moradabad, is as valuable as much of that imported, while it is admitted that the rough pottery of Chunar and Nizamabad is not so. The railways on which the traffic originates will doubtless consider the advisability of proposing special reduced rates for rough and lower priced pottery of this description.

*Bark for Tanning.*—The revised general classification contains the following which it will be seen provides for wagon loads :—

Tanning, loose . . . . .	3rd class.
„ packed . . . . .	2nd „

In minimum wagon loads of—

300 maunds for broad gauge . . . . .	{ 1st class.
100 „ for metre gauge vehicles . . . . .	

Tanning bark is a light and bulky article. The traffic usually originates at roadside stations which do not receive import goods in wagon loads and empties have often to be specially worked in one direction to load this bark. It is not considered that the ordinary traffic would pay the railways at a lower rate than is now charged. Special reduced rates are quoted for long leads where necessary by most railways.

*Combs.*—Mr. Chatarji suggests that the rate for horns (all sorts) be reduced from 2nd to 1st class and Combs (Horn or wooden) from 3rd to 2nd. The Tariff Committee had already recommended the 2nd class rate for Combs, but does not consider any alteration necessary in the rates for Horns, which are light and bulky, and in small quantities can well bear the 2nd class rate, while in wagon loads they are carried at the 1st class rate.

*Blankets and Numdahs.*—The question was fully considered by the Tariff Committee, who came to the conclusion that some of the country-made Blankets are as expensive as the imported ones, for instance, country Blankets manufactured in the mills at Cawnpore and Dhariwal. Numdahs on the other hand are of different values, and in calculating charges it will be impossible for the staff to say whether the Numdahs tendered are inferior in quality.

*Carpets, Floor Cloths (Cotton).*—Sattrangies or Daries or Farash will in the new classification be chargeable at the 2nd class rates, and it will be arranged for country Floor Cloths to be included under the same head.

*Boots and Shoes.*—The Tariff Committee have already recommended the following entries against—

Boots and Shoes, Europe	.	.	.	.	.	3rd class.
„ Country	.	.	.	.	.	2nd „

The entry of shoes ornamented with tinsel is to be removed, and all country Boots and Shoes rated as 2nd class goods.

*Wood Pulp.*—The Tariff Committee have recommended that this be charged at the 1st class rate.

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No. 1948 R. T., dated 29th October 1908.

From—The Secretary, RAILWAY BOARD,

To—The Secretary to the Government of the United Provinces, Industries Department.

In continuation of my letter No. 1506 R. T., dated 14th August 1908, I am directed by the Railway Board to forward herewith, for the information of His Honour the Lieutenant-Governor, copy of a letter No. 2078, dated 14th October 1908, and enclosures, from the Secretary, Indian Railway Conference Association, on the subject dealt with in Mr. Chatarji's report on railway rates.

2. I am to express the disappointment of the Board that the Association were unable to initiate any practical steps in the direction desired by His Honour. At the same time, I am to say that the Board feel sure that the consideration which the Members of the Association have given to the subject will not fail to have a beneficial effect in the treatment of rates by Railway Administrations as the subject arises from time to time in the ordinary course of business, and I am to add that the Board will, in any specific case in which His Honour may consider that a revision of rates is indicated, use their best efforts with the Railway Administrations to obtain it.

आगरा ।  
व्यापार समिति ॥

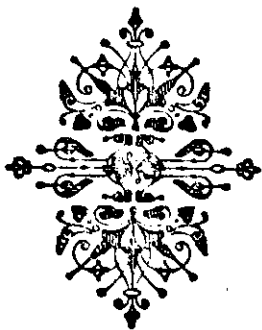
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AGRA

Dated 20<sup>th</sup> April

No

*The Hon'ble Lachar Krishna Gokhale  
Additional Minister of Govt.  
Pune.*

Sir,

I beg to enclose herewith a copy of the Memorial submitted by the traders of Agra to His Honour the Lieutenant-Governor of the United Provinces of Agra and Oudh asking the redress of their grievances in municipal matters for your perusal and information.

I have the honour to be,

Sir,

Your most obedient servant,

*K. K. K.*

Secretary,

Agra Trades Association.

**MEMORIAL**  
FROM  
**THE CITIZENS AND TRADERS**  
OF  
**AGRA**  
TO  
The Honourable  
**SIR JOHN PRESCOTT HEWETT**  
**K. C. S. I., C. I. E., I. C. S.**  
*Lieutenant-Governor,*  
OF THE  
*UNITED PROVINCES OF AGRA AND OUDH.*



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**1908.**

To

The Honourable,

Sir, John Prescott Hewett K.C.S.I., C.I.E., I.C.S.,

Lieutenant-Governor,

OF

The United Provinces of Agra & Oudh.

ALLAHABAD.

May it please your honor,

We, the citizens and traders of Agra most respectfully venture to approach your honour with this humble memorial in the sanguine hope that your honour will be graciously pleased to vouchsafe a favourable consideration to it and take early steps in view of redressal of the grievances therein set forth.

1. The Agra Municipality has been for sometime past a vehicle of hardships and annoyances to us through its unsympathetic and unduly harassing methods of working both in Octroi and Refund Departments and is out of touch with those tendencies of modern civilization and enlightened administration which aim at affording all facilities in view of industrial and commercial development of the city and ensuring the maximum of public welfare with the minimum of trouble.

2. The principles for Octroi and Refund in Chapter III. Part II. of the Municipal Manual Vol. I, lay down that 'octroi taxation shall be confined entirely to the *consumption of the town* in which and for whose benefit it is levied,' that 'it is a cardinal principle that octroi must not be allowed to degenerate into a tax on through trade,' that 'the articles taxed are the main staples of local consumptions and are as few as possible,' that 'the powers of taxations conferred should be exercised in such a way as to consult the *wishes and feelings* of the inhabitants,' that through trade be protected and that 'articles from the schedule be weeded out for which the proportion of refunds to gross receipts is excessive and of which the incidence of consumption is so high as to indicate that refunds are not freely given on exports and from which the income is inconsiderable' but the Agra Municipality has been endeavouring all along to somehow increase its octroi income by charging duty on almost all articles under some head or other of the schedule, which is very vague and general on several of its items as will be shown later on, and reducing its refunds by devising various methods of harassment, quaint procedures, grotesque and queer interpretations of Refund rules.

3. The figures of Octroi and Refunds of the last seven years given below in Table 'A.' will illustrate the above statement. Strenuous efforts are being directed at reducing the refund percentage somehow which means depriving the people of legitimate refunds. A comparison of the figures of average consumption of articles per head as given in column 9 of Form No. 107 for the year 1906-07 in the Annual Administration Report of the Agra Municipality for 1907, with figures set down under the heading of standard of consumption of articles liable to octroi in Chapter III. Part II. of the Municipal Manual Vol. I. will show that almost under all articles, the average figures of the Municipality are much higher than those prescribed by Government. Under sugar and cloth, the difference is abnormally high (Vide Table B.) A rough calculation of the difference shows that more than Rs 60,000 were less allowed in refunds. This is in addition to the fact that no refund is allowed for less than 2 annas while octroi is taken upto 1½ pies. Any amount which the Municipality realizes by the levy of octroi duty of less than 2 ans. is justly liable to deductions on account of refunds. Both items added together would amount to no less than Rs. 80,000 or thereabout a year, and in view hereof the refund amount of last year which was Rs. 2,05,000 ought to be at 3 lacs provided that the principles enunciated in the Chapter above alluded to, are carried out as they ought to be, in the liberal spirit in which they have been written.

**Table "A."**

*Statement showing octroi income and refund disbursements for 7 years  
(1900-01 to 1906-07).*

Years.	Octroi.	Refunds.	Percentage.	Net Octroi.	Remarks.
1900-01 ...	4,64,374	229,521	49.42	234,853	
1901-02 ...	4,66,076	188,040	40.34	278,036	
1902-03 ...	4,19,980	177,791	42.33	242,189	
1903-04 ...	4,19,155	176,764	42.17	242,391	
1904-05 ...	4,53,895	183,855	40.50	270,040	
1905-06 ...	4,61,053	173,930	37.72	287,123	
1906-07 ...	4,99,649	205,059	41.04	294,590	

NOTE.—This statement is based on figures taken from printed Annual Reports of Agra Municipality for seven years.



Table "B".

*Statement showing particulars of average consumption of articles.*

Articles.	Govt. prescribed Standard. 1	Actual incidence. 2	Less refunds. 3
Grains ...	7 mds.	7 10 2	A rough calculation based on these figures shows an amount of over Rs. 60,000.
Sugar ...	33 srs.	2 11 6	
Ghi ...	From 3 to 4 srs.	0 5 s. 3 ch.	
Drugs etc. ...	From Re. 1 to 1-4-	0 5 as. 3 p.	
Tobacco ...	4 srs.	0 3 7 ch.	
Cloth ...	From Rs. 5 to 8	13 3 9	
Metals ...	From Re. 1½ to 2	2 3 10	
Total ...	.....	.....	

NOTE.—Column 1 of this statement is based on the consumption figures given in Chapter III. Part II of the Municipal Manual Vol. I and Column 2 on Form 107 Column 9, as given in the Annual Administration Report of the Agra Municipality for 1907.

4. A Municipality whose octroi receipts are about Rs. 5 lacs and refunds, if justly allowed, Rs. 3 lacs, and the cost of collection not less than Rs. 30,000 or 40,000 a year giving a refund ratio of about 60 p. c. has little justification to continue levying octroi, as it makes a clear case for a very voluminous **through trade** which cannot but be materially hampered under the circumstances.

5. Table C. given below will show that on commodities therein mentioned, the refund percentages for years past have been abnormally high and even the Government officers whose views are quoted in Appendix I. have held that some of them should be weeded out of the schedule of octroi.

6. The whole class VII principally covering cloths of all kinds has been constantly showing for years past, a very high percentage of refund and has no justification for being retained on the schedule. Delhi and Cawnpore have already afforded all possible facilities for the trade of cloth and the result is their prosperity, and if similar facilities be offered in this Municipality, the trade will grow by leaps and bounds. Similarly is the case with sugar in which there is immense *through trade* as is amply illustrated by high percentages. In fact all the commodities specified in Table C deserve to be removed from the schedule, for the octroi on them is simply handicapping their *through trade* and thus the *prosperity* of the town.

Table "C".

Statement showing refund percentage of certain commodities for 4 years.

Class.	Articles.	1903-04	1904-05	1905-06	1906-07	Average.
I	Rice ... ..	60	59	56	61	59
	Barley and Gram ...	10	16	43	49	29½
	Other food grains ...	44	61	59	46	52½
	Refined Sugar ... ..	8	59	53	62	45½
	Unrefined Sugar ...	208	68	77	70	105½
V	Chemicals Drugs and Spices.	39	101	46	39	56½
	Gums ... ..	109	98	62	67	84
VII	Native Cloth & articles made of it.	63	71	68	60	65½
	Other Cloth & articles made of it.	59	59	49	52	54½
	Other articles ... ..	46	118	55	49	67
	Total of Class VII ...	57	58	51	52	54½

NOTE.—This statement is based on figures taken from the printed Annual Reports of Agra Municipality for 4 years.

7. While there is a strong case for the abolition of octroi duty on all articles or at least on certain important items and classes as shown above, for which we pray and to which favour we are entitled according to rules, we are, by an irony of fate, expected to undergo a series of harassing and troublesome restrictions in Octroi and Refunds. We fail to understand how in the light of the above facts, the municipal authorities think that more refunds are allowed, and that in defiance to the laws of economics, endeavours are being made to crush down trade by strangling refunds.

8. \*In order to minimise refunds, the Municipality has gone through a series of harassing procedures as described below.

(a) At first separate authority in writing for those who present Refund Rawanahs was wanted, and applications on one anna stamp paper were demanded from the public stating the names of those who went with the goods for refunds.

(b) Certain merchants who had been taking refunds for years past were prohibited from taking refunds under excuse that they are Commission Agents.

(c) Exporters were required to show their accounts of purchase and sale for the goods entered in the Refund application before they were considered entitled to take refunds.

\*NOTE.—After submission of our telegram to your Honour on the 3rd March 1908—the date of on which a public protest meeting of the citizens and traders of Agra was held on the subject, some of the procedures stated in para 8 were suspended by the Municipality but we are not sure that they will not be revived. A written order is required by the public to restore confidence.

(d) It was ordered that men presenting the Refund application should produce a Power of Attorney on 5/- Rupees paper under the Stamp Act, unless the exporter himself came with the goods for verification.

(e) Soon after Refund applications of respectable firms and merchants were thrown away under the excuse that they were not from the exporters saying that the exporter means the owner of goods.

(f) Production of letters ordering purchase of goods were demanded before the exporters were considered eligible for refunds.

(g) Then it was ordered that the proprietors of the firms should themselves come with the goods and accompany the carts to the exit barrier after verification.

These orders are as queer and unjustifiable, as harassing.

9. The difficulty, inconvenience and hardships may be perceived in the following cases. Suppose some goods are exported by Messrs Ralli Brothers' Branch at Agra and refund is claimed on them. The refund officer will demand that if refund is wanted, Messrs, Ralli Bros. should themselves come and present the Rawanah, and not only do so but accompany the carts to the barrier. In the same way, respectable traders of the city some of whom are not only Municipal Commissioners but also Honorary Magistrates should perform this humiliating task in order to secure refund on their goods. The refund rules do not require the execution of Power of Attorney for the representatives of exporters—far less for those presenting Rawannas. The Refund Rawannas themselves provide a separate column for the person who is to present the Rawanah and also contain printed directions authorising the exporters to name any one for receiving payment of refund money.

10. Railway, Postal and Bank officers deliver goods, Money Orders, Value-Payable articles, even cash to servants named in writing on a slip or a printed form by the owner, without demanding any Power of Attorney. But in case of refunds which is a much less important affair, a servant is required to show Power of Attorney at the time of presenting Rawannas with goods for verification and this in opposition to the rules and the special provision made in the Rawanna under column 3 (a blank Rawanna is enclosed for reference) The absurdity of this can be better imagined when for receiving money of the refund Rawannas, Rule 85 most distinctly says that the exporter or person *authorised on the application* to receive payment shall present the application at Head Octroi Office and refund shall be paid to him.

11. Hours of transit of refund goods have been at a jump reduced from 8 hours to one for some of the most important barriers, and any goods reaching the barriers even a minute later are not passed and thinking lest the exporter might take advantage of Rule 84 under which he can take the goods back to the Head refund office and get them re-verified and have the hour of second examination entered on the same, the Secretary has ordered the Moharrirs to take Rawannas away from exporters and send them

direct to him at the Club where he always stays, seldom attending office, and he pays Re. 1 as reward for each rawanna thus snatched and sent to him. The staff under such temptations has been over-zealous in the performance of this duty and has been liberally rewarded by the Secretary for this arbitrary and oppressive practice. The action is entirely against rules.

12. It had been a well established procedure in this Municipality for over 25 years that goods for refund on which duty is levied per maund were not called for examination at the Head Office but the examination and endorsement of the barrier moharirs and the Railway Receipts of the despatch of the same goods showing weight thereof were considered sufficient for purposes of refunds because the essential point is the ascertainment of the weight and the description of the goods, and these were fully established by the comparison of the endorsement of the barrier moharirs and the Railway Receipts. But some how the suspicion arose without any enquiries and detection of any case that refunds might have been wrongly taken and goods not despatched, and accordingly orders were issued that goods should always be brought to Head Office for examination. This entails additional expense for cartage and labour, and besides a lot of trouble. The rules do not mention any where that the refund applicant should take the goods, on the other hand mention that they need not necessarily be brought to the Head Octroi Office and that every convenience and facility should be given to the exporter and that no unreasonable delay and damage to goods be caused. In connection with the verification of goods at the Head Office one fact is worth noting. Goods are examined at Head Office and then left to exporters to find their own way to the barriers without any escort or watch whatsoever during the transit by the Municipality. At the barrier they are again examined and this examination is considered final according to which refund is allowed, and the examination of the Head Office is not taken into account. Is it not natural to ask what is the good of the first examination under such circumstances? If the goods examined at Head Office were sent under Municipal escort to the barrier there would have been some justification for it, but as it is, it is of no use. The goods should be once examined as at the time of octroi assessment, and any system involving a series of examinations for goods is far from being satisfactory. The rules to be just and equitable should have similar tendencies both in Octroi and Refund.

13. The procedure involves a lot of unnecessary annoyance, botheration, delay, and additional expense for cartage, labour etc to the merchants. This applies with undoubted force in case of goods liable to maundage duty whether exported by *Railway* or outpost barriers. The troubles of the exporters may be imagined when it is taken into consideration that the Municipality has neither provided a suitable and spacious place for the examination of goods and passing of Rawannas nor provided loading and unloading staff for such examination. Bales of valuable and superior piece-goods and other articles are opened on the public road which is the Municipality's Refund Examination place, unprotected from sun, wind or rain and no Municipal coolies load or unload, pack or unpack goods. Carts

when standing loaded with goods on the public road are not unoften prosecuted by Cantt. authorities who fine people for trespass on their land. The refund staff is dispersed over several places and no Municipal peons are provided,—the exporters themselves running from place to place to have the Rawanna duly verified, registered, numbered and signed by the proper officials. While there is no mention of invoices for goods being produced at the time of refund, the refund officer not only insists upon the production of such invoices but also demands their bona-fide copies which he retains with him. This causes extra inconvenience to merchants. Mere declaration of value in the refund application is sufficient for the purpose and in absence of any specific direction to the contrary in the Municipal Account Code under Refund rules, is rightly presumed to be what is intended by them. This practice should at once be stopped. There is a prevailing tendency to confound sugars of superior qualities charged to duty at annas -/5/- per maund with those of inferior qualities at annas -/3/- for the purposes of allowing refunds. There is no sugar expert to discriminate between several qualities, nor is there any superior officer supervising, to judge and decide the question properly. All this is left to verifying moharirs not getting more than Rs. 25/- a month to arbitrate the fate of the exporters. The question of different scales of duty is a highly puzzling one and the merchants have signified their wishes on more than one occasion for the adoption of a uniform rate for all kinds of sugars and until or unless the rates are unified, no half-hearted, patching up and tinkering devices will answer the purpose. Not only the Moharirs under-value the superior sugar and thus allow less refund but also memoes of sale in the handwriting of the sellers are demanded and kept by the refund officers. The exports of Bura are subjected to a peculiar treatment. Bura is shown in the schedule at Item 8 as chargeable to duty at annas 5 per md., but the rate allowed at refund is only 2 as. that is lower than that for all kinds of inferior sugars as Putri or Potli, Doma and other semi-refined sugars which are charged at annas 3. While for all other articles the Municipal Standard of a maund is of 40 seers which is the Government Standard, for Bura it is of 35 seers, that is Bura weighing 40 seers according to Government Standard is considered as weighing only 35 seers according to the Municipal Standard, according to which all Bura consignments are treated for purposes of refunds. In this manner the Bura exporter loses refund for every 5 seers in a maund in addition to his being given a rate which is in open defiance to the schedule rate. In other words, refund is allowed on Bura at the rate of 0-1-9 per md. Similarly is the case with Misri which is taxable at /7/- per md. but is allowed a refund of /2/- only—thus crippling local industry in it. For this arbitrary procedure no justification exists. While *Tak Patties* or memoes of weighment of goods by the sellers are demanded and taken, no refund is allowed on Durries, Gota, Topies, Silver and Gold Jewellery and wearing apparel which are all charged to duty. Refund on silk, satan, embroidery work etc., is granted in rare cases and this after much annoying scrutiny and production of proofs in the shape of original invoices, octroi receipts, account Books etc.

14. On articles subject to assesment according to prices current, refund is not so given unless the matter is much heckled over. While duty is

charged on empty bags imported for Bardana, refund is not given on them and much trouble is caused when such refund is claimed. Sulphur is not allowed to be sold more than 10 seers at a time but the amount of refund on this quantity is below two annas and therefore never allowed. It means that no refund is allowed on sulphur while duty is taken on it. The trader naturally suffers much from this anomaly, and it is requested that it should at once be removed.

15. Whereas payment of refund Rawanna is declared barred only by the law of limitation as stated clearly in Note to Rule 88 of Municipal Account Code, the Refund Officer never allows refund on a Rawanna after 20 days and even when such cases are sent up to higher Municipal authorities, they sometimes entertain them and sometimes not, and when the Municipal authorities choose to pass such Rawannas, it takes months together to receive the money. The Agra Merchants have suffered much from this anomaly and even now hold many Rawannas which the Municipality considers time-barred but which the law of limitation does not declare so.

16. Refund is not also allowed in cases where all evidence of despatch of goods exist and where even the coupon of the Rawanna is available in the office but the Rawanna itself is partly torn or destroyed. In rare cases such refund has been given but this after much unnecessary trouble and delay and most Rawannas on which the Municipality did not allow refunds considering them time-barred under 20 days but which are not time barred by law have been kept by the Municipality and not returned to the merchants, so as to enable them to claim their remedy in the law court if they so choose.

Octroi barriers are of 2 kinds (1) those situated at the Ry. Stations and (2). those where there is no Ry. Station or out-post barriers. In the case of out-post barriers, refund is allowed on the endorsement of the Moharir on the refund Rawanna unsupplemented by any other evidence. This is considered quite sufficient to entitle the exporter to claim and take refund but in the case of Ry. barriers this endorsement of the Moharirs is supplemented by a Ry. receipt showing the despatch of the goods and until this is done, no claim for refund is considered valid. Although the treatment is unequitable, the merchants do not complain of it so long as things are not carried to extremes as they are, in this Municipality. The Ry. Receipt is to all intents and purposes, intended to be an evidence of an independent department to show that the goods have been exported out of the town and to this extent, its use is legitimate. But the refund officer insists upon the perfect identity of all details in the Rawanna and the Ry. Receipt and whenever there is the least discrepancy in address or name of the station or number of pieces though identical in weight caused either by the oversight of the Ry. clerk or justified by the peculiar laws of any particular Ry. line, the Refund Official throws away the Rawanna and does not consider that if the particulars of description, weight kind, quantity of goods on which the refund question hinges, are right, he ought not to raise other trivial objections which are irrelevant to the refund question. It is therefore requested that the checking of Ry. Receipts should

be ordered to be exercised within the limits that concern the refund question and that Rawanna be not invalidated on mere trivial and irrelevant objections.

17. It is a curious fact that the Municipal authorities seem prone to suspicion that some of the goods exported by Railway barriers may not have been exported and taken back fraudulently to the town taking refunds thereon in spite of the fact that every Rawanna passed for such goods has on its back, copy of the Railway Receipt and that the essence of payment of such Rawannas, consists in the testimony of the Railway Receipts leaving no room whatsoever for suspicion as to non-despatch of goods, and under such suspicion all the 3 inspectors of the Municipality who formerly inspected barriers and perhaps did more useful work have been posted in addition to the existing staff at the Railway barriers to watch the refund goods while at the out-post barrier where room for any such suspicion may possibly exist no such supervision is provided.

18. It is also respectfully urged that no refund for less than annas -/2/- is given while octroi duty is charged even to  $1\frac{1}{2}$  pies. This is against the principle laid down in section 2 Para 1 Part II of the Municipal Manual Vol I. "It is essential that this form of taxation (octroi) shall be confined *entirely to the consumption of the town* in which and for whose benefit it is levied." For all articles charged to duty up to annas -/2/- no refund is allowed and in that, the Municipality unfairly appropriates to itself the amount whatever it may be in a year, which would have gone to the public under refunds. The matter deserves all the more careful consideration especially in view of the fact that this duty falls entirely upon the poor people, who have no chance of taking refund while paying duty. Merchants send for large consignments and they generally pay duty much more than -/2/- annas and have the chance of taking refund but the poor half-starved villager who brings in his donkey load of fuel or the milkmaid bringing in her pitcher of milk for sale into the town pays duty on his or her articles but has no chance of claiming refund if by ill-luck he or she takes back the things or purchases and takes to the village other petty things in return. The lot of the poor from this unequal treatment deserves to be redeemed and this can be done in either of the two ways. (1) By reducing the minimum limit of refund to  $1\frac{1}{2}$  pie which is the limit of octroi assesment and allowing the barrier moharirs to make refund up to -/2/- annas or (2) by raising minimum limit of octroi to -/2/- annas so as to be on par with the refund limit. While resorting to the first remedy, there may be some difficulty and inconvenience both to the management and the people concerned, there is no difficulty whatsoever in the adoption of the second course.

19. The total amount of octroi realized up to -/2/- annas, we believe, is not much and whatever it may be, is justly liable according to principles laid down to deductions on account of refund and the balance left will not be such as could not be recouped by economy exercised in expenditure. There are certain minor barriers which exist simply to realize this duty and there are certain other superfluous barriers which could with advantage be amalgamated with the adjacent posts. Much more saving in expenditure is

expected if better supervision is exercised and the petty loss of the impost will not at all be felt. When the poor think that your honour has in their interests abolished all bridge tolls and other similar petty taxes which certainly yielded better income and which pressed less heavily upon them they are not unjustified in expecting that your Honour will be graciously pleased to take this necessary item of reform into your early consideration.

20. Rule 75 lays down that all refund claims should be promptly dealt with and that the refunds are to be made on demand even at the risk of budget allotment. But this facility is not the lot of the people. On many occasions people have to wait from day to day for payment and although the office is open up to 5 o'clock, no refund is paid after 3 o'clock. At the time of payment the treasurer takes signature of payees in a separate book inspite of the bonafide signatures being given on the Refund Rawana as directed by rules.

21. As required in Rule 80 the verifying officer is neither a Member nor any responsible Officer of the Board but Moharirs on Rs. 25/- a month who verify the goods. Neither as referred to in Rule 77 there is any Officer or Member appointed to be incharge of the payment of refunds. Neither Secretary nor Assistant Secretary nor any member of the Board ever attend the refunds either at the place of the verification of the goods or the payment of the refund and both these important duties have been entirely left over to clerks or treasurer who are mostly vernacular knowing men. They do as they please and when the people complain of their high-handedness, the Municipal officers without taking personal pains to come and see the things themselves—without which the elaborate system of refund and its working and evils arising therefrom can hardly be fully understood, listen more to the subordinates and their onesided versions than to the representation of the public. An illustration of this is that a number of respectable merchants and other people went in a body to personally represent their grievances to the Municipal authorities on more than one occasion and also did so by writing but they were not only not given an interview but treated far from courteously. The Secretary is an old man, seldom attends the office and even when he does so avoids the people while he totally refuses to see them at his lodgings. The subordinates when approached simply say that they carry out the orders of the Secretary and that they would not hear unless they secure anything in writing from that officer.

In this way responsibility is shifted from head to head and we are left to suffer without any fault on our part.

22. Trade is immensely suffering and people are being subjected to molestation and harassment under these infringements of rules and unwarrantable novel procedures based more on personal vagaries than on any commonsense interpretation of rules, and it is against these hardships that we unitedly protest and for which solicit an immediate redress so that our daily losses and unnecessary molestations be stopped.

23. As in the Refund department the prevailing tendency is to reduce the refunds, the dominating rage in the Octroi is to increase octroi income.



As a strong condemnation of this tendency, the extract under Appendix II from the speech of Sir A. P. Macdonell a former Lieutenant Governor of these provinces is worth perusal. His honour characterised such a tendency as 'killing the goose that lay the golden eggs.' Almost all articles whether shown or no in the Schedule are assessed under some head or other, or under two or three heads at the same time. There is no mention in the Schedule of such articles as Silver or Gold ornaments, Jewellery, Photographic materials, Spectacles, Talking machines such as Gramophones etc. and many others yet they are assessed and assessed at different rates; sometimes the ornaments and Jewellery are assessed at 3-2-0 p. c. as articles made of metal and sometimes at 1-9-0 under fancy goods.

24. Sugars are generally assessed at 5 and 3 annas per md. but the tendency is to charge at 5 annas even when the sugars are of inferior quality just in contrast to the contrary tendency in the Refund Dept. to rate them at 3 annas. The importers are, contrary to all rules, made to write in the assessing office in declaration slips (formerly printed slips were provided for this purpose) that the sugar is worth so and so in spite of the fact that the interests of the municipality are amply provided in the Rules in the check of the barrier moharrir of the goods. The schedule shows 'Stone for building' but under this head even slabs of soft black stones or other pieces of soft stone imported for the special purpose of making toys and other fancy ware are also charged to duty. Items 70, 71 and 84 are largely resorted to for covering all sorts of assessment; Item 4 imposes duty of 1 anna on wheat, flour and suji which is unjust.

25. The Schedule is vague and general on most Items and does not fully suit Rule 28. In contravention of the direction in this rule that the Board shall not collect octroi or at any rate not so entered, the Municipality is charging duty on almost all things. Item 70 i. e., 'all other spices and drugs' is a source of constant trouble because no list of articles chargeable under spices and drugs is given, and most things that are neither spices nor drugs in the proper sense of the word, are charged under it; for instance Tulsi seed under a sonorous name of Tukhm Rihan which is a seed of a wild plant is charged under it. Equally troublesome is the Item 84 'Fancy goods' under which all imaginable things are charged. Gilded frames of pictures sometimes come under it and sometimes under Item 56. Timber, stone for building, canvas, jute, lime, furniture and articles made of wood are charged at 4/11/- p.c.—rates which are nowhere shown in the Municipal Manual Vol. I. under Chapter III. of Part II. and are in opposition to the liberal directions contained about the Schedule making in the Chapter. Metals and articles made of metals which are generally sold in the market according to weight, are charged advalorem duty of 3-2-0 p.c. which is heavy and crippling the trade. Item 22 i. e. 'oil-mans stores and imported confectionary' is very confusing and it is left to the imagination of the low paid moharrirs to decide what falls under it and what not, and almost everything that is eatable is taxed under its pretext. The confusion, vagueness and embarrassing nature of the Schedule as sufficiently illustrated by above instances, becomes very significant when the following principles laid down in Chapter III. of Part II. Vol. I. of Municipal Manual are taken

into consideration. "An Octroi Schedule should be drawn up so as to leave as little doubt as possible as to the exact amount of duty leviable on any consignments of goods imported. The precise rates should be fixed by the Schedule wherever practicable, and as little discretion as possible left to Octroi officials to adjust them in individual cases. Differential rates for similar classes of goods should therefore be very sparingly resorted to; and fixed duties should be substituted for duties levied on an advalorem scale, as far as may be practicable. The Schedule should contain no articles from which the income will be trivial or will have mostly to be paid back in refunds."

26. At no barrier nor at the central office loading and unloading staff is provided yet both the moharirs and Head office men insist upon a minute examination of goods involving packing and unpacking of bales, taking up and down articles from the cart, which is all done by the importer or his men at additional expense. The difficulty of examination is very much enhanced when boxes and bundles containing thousand and one kinds of fancy articles are opened up at the barrier. The process takes sometimes 5 or 6 hours. In opening out and spreading all the different articles and then re-arranging and re-packing them, it often happens that some of the petty things are lost or stolen away by the staff. In explanation II. of Rule 27 Railway especially E. I. Company stores are exempted from payment yet duty is invariably charged on all goods auctioned at the Railway Station near the octroi barrier and brought into the city. There is no provision for the opening of the trunks of passengers and unnecessarily inconveniencing them by detention, and the personal luggage and even the house-hold effects of a traveller are exempt yet the Municipality keeps an elaborate system of examining all the passengers and giving them lot of trouble by opening their packages and sometimes sending them with their luggage to the Head office with an escort. The inconvenience of the passengers may be imagined when at the end of a long journey and after all the troubles of travelling, they are molested, detained and unnecessarily subjected to duty on some thing or other.

27. Another instance illustrating unusual inconvenience and loss to the traders is that when fresh fruits are imported, Barrier Moharirs donot take duty on value exceeding Rs. 50 and send all such consignments of higher value to the Head office which is open only from 10 a.m. to 3 p.m. for assessing purposes but when there is a holiday and the office consequently closed, the importer has to suffer a great loss by the detention of his perishable goods which in this interval become rotten and mostly useless. The Barrier Moharirs should be ordered to assess all such goods.

28. A very serious irregularity exists in that the Rule 39 (3) is extended to cover Railway goods under Rule 54. A mere glance at page 2 chapter III. of the Municipal Account Code will show that Rule 39 occurs under the heading of Assessments and collections at outpost barrier for which it is meant and Rule 54 occurs under the heading 'Goods imported by Railway.'

29. The Agra Municipality in case of goods imported by Rail for which procedure is clearly laid down in rule 54, accepts invoices only on goods

falling under classes 4, 5, 7 and 8 and assesses goods falling under all other 4 classes according to prices current. Even when it accepts invoice in case of these goods it does not accept written declarations as substitutes as mentioned in this rule; when no invoice is presented and the importer presents a declaration according to this rule it charges all articles according to prices current in total disregard of the fact that this procedure is against the rule. For Railway goods, Rules 52 to 60 lay down a procedure for goods but throughout these rules there is no mention of prices current, yet out of 8 classes of goods, 4 classes are assessed according to them which causes so much loss and inconvenience to the importers by Railway. Prices current are chiefly meant for barriers and not for Head Office and even for goods coming by outpost barriers. Rule 39 (3) provides that the importer can claim assessment according to invoice value on goods under class 4, 5, 7 and 8. It seems that this Rule 39 (3) which is only meant for goods from out-post barriers has been confused with Rule 54 which is intended for Railway goods, and this confusion should at once be done away with. Rule 53 lays down that goods on which the octroi does not exceed Rs. 2/- shall be dealt with at the Railway barrier in accordance with rules for observation at outpost barrier and registration of the Ry. Receipt shall not be required. Rule 39 (1) and Note lay down the limit of Rs. 50/- up to which value the Ry. barrier moharir can assess duty. These two directions are contradictory, for instance, stone is charged at 4/11/- p.c. according to rule 53 (1) the moharir can charge octroi up to Rs. 2/- which extends only to the value of Rs. 43/-. But rule 39 (1) authorizes him to assess to the value of Rs. 50/- which he cannot do under this case unless in opposition to Rule 53 (1).

30. Piece goods are taxed at 1/9/- p.c. and according to rule 53 (1) he could take 2/- as octroi on the article, which raises the limit of value to Rs. 128/-. But this he cannot do under rule 39 (1) without breaking it because there the limit is only Rs. 50/-. For this confusion in rules and the observance thereof, it is the importer who suffers unnecessary inconvenience; he is practically driven from post to pillar. If he goes to the Hd. Octroi Office with an invoice of piece-goods worth 70/- for payment of duty, the assessing officer drives the man away to the barrier saying that, duty on Rs. 70/- worth of cloth is only 1/1/6 and that the moharir can take duty up to Rs. 2/- and when he goes to the moharir, he is told that he (Moharir) could not deal with the case as the value limit for him is only 50/-. The assessing officer defends his action under Rule 53 (1) the moharir does his under Rule 39 (1) and while both are right both are utterly wrong and the poor importer whose fate is concerned, is in a dilemma. Ultimately the moharir sends up his goods when he has taken delivery of them from the railway with a report and a peon to the Hd. Office under Rule 58, where his fate is decided. At first when the importer called at Hd. Office he was refused because the technicality of Rule 58 was not observed. This is very very bothersome and the wonder is how these two Rules 53 (1) and 39 (1) are allowed to stand as they are in the book. Tax on thread and yarns is very unamalgous. It should be abolished on these grounds (1) Cloth is already taxed; thread of which it is made should not separately be taxed (2) Agra made yarn is generally taken away to neighbouring villages by arti-

zens who bring it back into the city in the shape of coarse cloth which is subjected to octroi whereas no refund on the materials was paid at the time of export under excuse that the thread was made in Agra (3) The income of octroi on thread after refund is presumed to be inconsiderable, the figures are not separately shown in the Annual Report of the Municipality.

31. While no rule in the Municipal Account Code mentions or prescribes the authority of assessing officer, or even of the Superintendent or the Secretary to send for goods for examination at the Hd. Office which are dealt with under Rule 54, it is almost a daily practice in the municipal office that instead of taking duty on presentation of Ry. receipt together with the invoice, the assessing officer or supdt. sends for goods for examination before duty is taken though ample safe-guard is provided in Rule 57 against suspicion. These orders re sending for goods for examination are not only not warranted by any rule in the code, but are sources of unnecessary trouble, expense and delay in as much as they require him to bring the goods from the barrier to the Hd. Office.

32. Neither in Rule 45 nor in 60 taking of goods to the Hd. Octroi Office in case of suspicion by the Inspector is mentioned although the importer is enjoined to accompany the Inspector who is required immediately to report the facts of the case, but on mere baseless suspicion as it suits the freaks of the Inspector, goods as well as the importer are dragged to the Head Octroi Office. Had the sending of goods been intended it could not possibly have been omitted in a book which is Law.

33. Rule 68 permits persons to compound on the basis of net import, and also to compound for the payment for octroi, but the operation of the Rule is generally restricted to Europeans and Natives are seldom allowed to take advantage of this rule.

34. Rule 129 in view of the convenience of petty traders who attend Hata and marts in the neighbouring villages, authorises the barrier moharir under resolution of the Board to issue Extraordinary Passes but this authority is sedulously kept to the octroi Superintendent at the Head Octroi Office. In a large city like Agra which has many neighbouring villages where Hata are frequently held and to which petty city traders are constantly going with their goods for sale, this power must be given to the barrier moharirs and these men be saved all the trouble, expense, delay and disappointment they incur in going with their goods to the Head Office especially when there is a holiday. It is not only this but the issuing of these Extraordinary Passes is very troublesome. Neither Rule 130 nor 131 which regulate the procedure of the passes for petty traders prescribes any limit of period for which they should be issued, but the Municipality invariably issues these Passes for one month and if the goods return even after a day after that period, duty is taken on them. There is no justification for this levy of duty in the rules.

35. Marriage parties when returning with the necessary luggage are put to much inconvenience if they have not availed themselves of an Extraordinary Pass and duty is taken on these goods, and sometime for this purpose the persons and goods are dragged to the Head Office.

36. No Branch Offices for convenience of assessment of goods and refunds as provided in the Manual code are established in the Municipality although it is one of the biggest Municipality in the province and the work at the Head Octroi Office is overwhelming and means delay and inconvenience to the public. Branch Offices should be opened at once.

37. The Head office for assessment of Octroi and Refunds should remain open throughout the day and no holidays in these sections should be kept as is the case at the barriers. If this principle of convenience to the public has been recognized in the case of barriers why it should not be extended to the Head office where most income on Octroi is realised.

38. The tale of the greivances both in Octroi and Refunds as given above is enough to convince every one to what an amount of botheration, molestation, unnecessary losses the public are subjected by the Agra Municipality and the *through-trade* on which hinges the commercial prosperity of the town is seriously handicapped.

39. Correspondence of the public even on ordinary business and complaints is rarely answered and when done, it is after unreasonable delay and series of reminders. The answers when given are generally vague and unsatisfactory provoking further correspondence.

40. Octroi receipts are generally issued in scribbling Urdu, in which they cannot sometimes be read even by the Municipal officials—far less by the public—but in the case of Europeans, they are generally done in English. The traders of Agra as a whole keep their accounts in Hindi or Sarafi. Even Mohamedan traders resort to this practice and it would be a great relief to all if the receipts are ordered to be issued in Hindi or English or in both in which latter language all the work of Railway and Postal Depts. is done. English figures are more easy to read than Urdu—especially those used in denoting value. This reform is very necessary and it should extend to all other Urdu correspondence and records of the Municipality.

41. The irregularities we have drawn attention to above, are not restricted to Octroi and Refunds only but extend to other departments under the Municipality as well. Over the Water rate assessments there is at present a perfect nuisance. In some cases warrants have been issued and property attached even for the period for which payments had been made and for which municipal receipts were held by the public. The counterfoils of water rate receipts are not fully examined in the office before warrants are issued. The fact is that the Secretary wants increase of money somehow or other for squandering over his pet projects, and pets the subordinates who accomplish this task by some means or other.

42. The wishes and feelings of the people of the city are never taken into consideration when the Municipality undertakes even most important schemes. This is fully illustrated by the fact that though such an important scheme as that of Free Gunj involving expenditure of lacks of rupees and affecting the best interests of the people especially the traders has been undertaken, the people have not been taken into confidence and their interests scarcely taken into consideration. In fact the people know very little about its present shape. No scheme setting forth details in full as to the

*Modus Operandi* and the nature of the demand which is to be made upon the public was first issued for public opinions as is generally done when Government proposes any project or scheme, and even the Municipal Commissioners who of all the persons ought to know about it, profess their ignorance when asked as to the details of the thing in its present aspect. We look upon the pusillanimous conduct of some of the members with regret but as the cause of this is deeper we would prefer to request for the removal of the cause and for an assurance that the member will be allowed to breathe in the free atmosphere of independent action untainted by any under-hand policy or pressure. We have no sympathy with the Freegunj scheme as it is. From what little we have heard about it we find it does not suit us and is on the other hand opposed to our interests-based as it is on disregard of local conditions and circumstances peculiar to the trade of Agra.

43. The Law regarding Bonded Ware houses as laid down in Para 4 Chapter III. Part II. Municipal manual Vol. I. is.

"The important point is to ascertain and follow the interests of the traders in the matter."

"The duty of the Board is to provide a place where wholesale dealings in octroiable articles can be carried on without the annoyance involved in payment and refunds of octroi.

It is not necessary that there should be a pretentious building for the purpose."

44. The Agra Freegunj scheme seems to run tangent to these principles and the principal object seems somehow to increase the income of Municipality by charging high rent for the buildings therein to be constructed irrespective of the consideration whether the owners of houses in the city will suffer or no by fall of value in their property or whether the city trade will be dislodged or no or whether the people will be induced to forgo their interests in the city and settle down at the Freegunj under the conditions to be imposed. They were under an impression that sites will be assigned to them for private buildings if they chose to erect them but this seems to be impossible under the present arrangements. The best justification of the scheme lies in the maintenance of octroi system but when a case is made out as it is in the case of this Municipality for abolition of duty if not on all articles but at least of such as enter most in trade and the *through-trade* wherein has been severely handicapped, and no solution short of this will meet the wishes of the people and tend to the prosperity of the town, the whole fabric falls to the ground. It is requested that immediate steps be taken to stop the progress of the Freegunj scheme until our side of the question has been fully taken into consideration and decided so as to avoid the necessity of taking loans by the Municipality which will ultimately fall upon the people in some shape or other. It is therefore urged that if the scheme is carried out against the wishes and feelings of the people they will no more be responsible for it.

45. It was expected that with the European Secretary things would be more systematically and efficiently managed and a su-

perior knowledge, experience and intelligence and better ideals of purity would be brought to bear upon the work and that the Municipal taxation in all forms would be stripped of its attendant evils to the least perceivable degree and that trade would enjoy all facilities for commercial development bringing in its train prosperity of the town but in that hope the Agra public has been badly disappointed, and our difficulties have increased and things have gone from bad to worse. We have therefore no confidence in him and have no sympathy with the arbitrary methods being adopted to harass the public and as a preliminary step to the genuine reformation of this Municipality, the removal of the present Secretary is urgently required.

46. In conclusion we most respectfully crave that your Honor, who is far-famed for efficient administration, sympathetic famine policy and prompt plague arrangements and who brings his unique personal experience, superior knowledge and statesmanship coupled with a lively sense of justice and a kindly and feeling heart to bear upon the government of these provinces, will be graciously pleased to redress all our grievances, after making thorough and independant enquiries into them.

47. We also humbly request that a copy of the orders that may be passed in view of redressal may kindly be granted to us for information and record. We also respectfully venture to request that the Agra Municipality may be ordered to furnish a catagorical explanation in regard to our complaints and not a vague and general report and that copy of this may kindly be furnished to us so as to enable us to ascertain that the matters have not been misrepresented and confounded.

This is requested especially in view of the fact that the Agra public, having been long subjected to hardships which have now come to a breaking point have resolved to represent their grievances on consitutional lines for which purpose they have established a Biapar Samiti or Trades Association with a well-equipped office to carry on systematic correspondence in English, and keeping the people well-informed of the orders of Government. Reply to this may be sent to the Secretary, Agra Trades Association, Agra.

And as in duty bound we shall ever pray.

AGRA.

*Dated 1st April 1908.*

} We respectfully beg to subscribe ourselves as  
Your Honor's most obedient servants  
Citizens and Traders of Agra.

## Appendix 'I.'

### I.

*Extract from Commissioner's review on Agra Municipal Administration  
Report for 1907.*

Para 6.

From your octroi statement it appears that the consumption incidences approximate closely to the Government standard as fixed for Agra though the sugar incidence was 2 mds., 11 seers 3 chataks against a prescribed standard of 1 maund 25 seers. On this result you are to be congratulated. Through trade is clearly not taxed and your refund arrangements are satisfactory, at the same time the statement illustrates clearly the defects of your tax. You paid away in refunds 41.04 of your gross takings and under the following articles the proportion of refunds was excessive Unrefined sugar (70 per cent), refined sugar (62 per cent), rice (61 per cent), native cloth (60 per cent), foreign cloth (52 per cent), barley and gram (49 per cent), miscellaneous articles class VII (49 per cent). These proportions are not a special feature of the year under report. They are normal. The Freeganj which has now at last been started should soon operate to relieve them.

—:O:—

### II.

*Extract from Commissioner's review on Agra Municipal Administration  
Report 1906.*

About 38 per cent of the gross octroi income was paid back in refunds against 40 in the last year but the amounts refunded in several cases call for special notice.

As in the last year the refunds paid on rice, other food grains, sugars, gums, and cloth are disproportionately large and in the case of native cloth and unrefined sugar they amounted to 68 and 77 per cent respectively of the gross receipts. Under most of these heads the net income is too large to part with, but in the case of unrefined sugar where the Board takes Rs. 30220 only to pay back Rs. 23346 it is open to doubt whether it would not be wiser to give up the balance of Rs. 6874 and so reduce their refund work and free both the octroi Mohurrirs and importers from the trouble and inconvenience of collecting the money.

—:O:—

### III.

*Extract from Commissioner's review on Agra Municipal Administration  
Report for 1905.*

Para "7."

Of the gross octroi receipts Rs. 183,854 or 40 per cent were paid back in refunds against 42 per cent of the last year. In several cases such as rice, other food grains, sugar and cloth refunds are disproportionately large and exceed 60 per cent in each case; and in the case of drugs the refunds exceed the octroi levied.



## IV.

*Extract from Local Governments review on Agra Municipal Administration Report for 1905.*

## Para " 4."

The octroi system is not yet satisfactory. The very high refunds, particularly on grain, sugar, spices and cloth and the apparent inequities of the Sugar duties, are matters which need notice.

## V.

*Extract from Commissioner's review on Agra Municipal Administration Report for 1904.*

## Para 5 and 6.

5. The amounts refunded in some instances, call for special notice. As in 1902-03, no less than 57 per cent was paid back on piece goods. Greater care in classification in future may reduce this figure. Under the sub-head of "Gums" in class V. the amount spent in refunds exceeded the octroi recovered by about 10 per cent. Of the total duty paid on "Rice" as much as 60 per cent was returned. But the chief cause of anxiety is found under the head of Sugars. The figures in column 5 of form 107 are admittedly incorrect, refined sugars (as you explain in para 8) having evidently been misclassified with unrefined sugars. Whatever the correct figures may be, the fact that 69 per cent of the amount realized in duty on import of sugars had to be returned to exporters calls for the earnest consideration of the Board. The amount refunded on Sugars came to well over one third of the entire refunds for the whole year. In the case of articles such as the above, in which there appears to be a considerable through trade, the opening of the Freegunj contemplated by the Board ought to provide valuable relief.

6. The incidences of consumption vary little from those of the preceding year. In respect to food grains, ghee, (the special standard for Agra is 5 seers) and cloth, the average consumption tallies closely enough with the prescribed standards. The usual variations occur under sugars, and metals. The falling off under tobacco, the consumption of which dropped considerably below the Government standard, is already engaging the attention of the Board.

NOTE.—This appendix is based on the printed reviews of Commissioners and Local Government as attached to printed Annual Reports of the Agra Municipality for the years mentioned therein.

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## VI.

*Extract from Commissioner's review on Agra Municipal Administration Report for 1903.*

## Para 6.

Of the gross octroi receipts, Rs. 1,777,91 (or 43·3 per cent), were paid back in refunds, leaving a net income of Rs. 2,421,89. The Agra traders compare their position unfavourably with that of traders in other large marts near. I do not know what the refund figures at Hathras are—but when 42 percent of the merchandise imported is only brought in with a view to being again exported, it clearly hampers trade badly to give the

merchants all the trouble of paying octroi on this and then claiming and recovering refunds. The establishment of a Free Ganj will be a palliative in some degree but the area being limited it can not of course afford a complete remedy even if it were constructed on the lavish scale spoken of in para 31 of your report. The Board should continue to bear in mind the advisability of lightening the burden of octroi as directed in the Government order passing orders on your last year's report.

On unrefined sugar for instance this year your refunds exceeded the octroi levied. This article might probably be struck of the schedule with advantage both to the trade and to the municipality and is necessary a tax on sugar refiners substituted. The same remarks apply with almost equal force to foreign cloth and leather and it was with respect to these articles that your Board's attention was specially called last year.

Para 7.

Notwithstanding the payment of Rs. 60,000 as refunds the incidence of sugars calculated on the prescribed system amounts to 3 Maunds 4 Seers 14 Chataks against the special standard of 1 Maund 25 Seers sanctioned for this Municipality.

## Appendix 'II.'

*Extract from speech by the Lieutenant Governor Sir Antony Mac'Donnell  
delivered at Agra on the evening of 14th January 1899 (taken from  
'Peoples Herald' Agra.)*

His Honour regretted to find, from enquiries he had made, that the trade of Agra was handicapped in comparison with other centres by want of trade facilities. No doubt Cawnpore and Delhi were first in the field with industrial enterprises on a large scale: but still, there is no reason why, with reasonable facilities, trade should not be attracted to Agra: and the products of the local mills sold locally instead of being exported for sale to Cawnpur or Delhi. Instead of offering every facility to trade, the Municipal imports have driven it from their town to such small settlements as Achnera, thus adopting the suicidal policy of "killing the goose that laid the golden egg." If they could levy a lower impost on articles received here there would be an easy flow of money to their exchequer. His Honour made these remarks, he said, with the best intentions towards themselves and the prosperity of their city, because it would not redound to the credit of their or his own administration if the trade of their Imperial city were to decline. Agra was a city of Historical interest the welfare of which every Lieutenant Governor must have at heart. His Honour in conclusion, hoped to find on his next visit that their city was enjoying greater prosperity.

A MONOGRAPH  
ON  
PAPER AND PAPIER-MACHE  
IN BENGAL.

BY  
D. N. MOOKERJI, M.A.,  
DEPUTY COLLECTOR ON SPECIAL DUTY.



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# A MONOGRAPH ON PAPER AND PAPIER-MACHE IN BENGAL.

## INTRODUCTORY.

PAPER consists of a compacted web or felting of vegetable fibres usually, as we know so well, in the form of a thin flexible sheet. The fibres are reduced to a pulp by grinding, beating, etc., and are diluted with water in a vat. Pulp from the vat is then dipped up in a mould from which the water drains away leaving a felted sheet which is then pressed and dried.

Papier Mâché is made of paper-pulp reduced to a paste and then boiled with a solution of gum Arabic or of size to give tenacity to the paste. Articles such as trays, picture-frames, jars, boxes, etc., are shaped by moulding and then ornamented and varnished. Sometimes instead of paste several sheets of paper are glued together and given the required shape. There is no papier mâché industry in Bengal.

The chief difference between hand-made and machine-made paper is that while the former is made in separate sheets of limited sizes, machine-made paper, though limited in width, runs off from the machine in long rolls frequently more than a mile in length without a break. Although the use of machines is all but universal now in Europe and America for ordinary papers, some of the more costly descriptions—drawing paper, for instance—are still hand-made.

Esparto grass, straw, and wood are now largely used in the fabrication of pulp suitable for printing paper; bagging, canvas and old rope are used for brown, and other coarse papers; but hitherto no substance has been found to supersede or even to satisfactorily displace rags for the finer kinds of paper (writing and drawing).

In China and Japan even to the present day paper is made by hand. The Japanese paper is chiefly made from the bark of a kind of mulberry (*Morus papyrifera sativa*), and is known as *kadji*. In China almost every province, if not every district, is said to have its own peculiar paper material.

## HISTORICAL.

In ancient times various materials were employed in India for writing. Stones, bricks, wooden boards, chips of bamboo, metal plates (especially those of copper), and above all palm-leaves and birch-bark, *bhurja* (*Baetula bhojpatra*) were all in use. The last is even called *lekhanā* or "The writing material," and written documents go by the name of *bhurja*. The art of preparing the bark for use has now been lost. But birch-bark manuscripts are said to be still common in the libraries of the Kashmir pandits. They are, however, very rare in the Khatmunda Library in Nepal, where most of the ancient manuscripts are found written on palm-leaves.

Skins of animals so common in other countries were not much in vogue in India, probably on account of their being ritually impure. Alburini, who visited India with Mahmud of Ghazni and gave a detailed account of the manners and customs, science and literature, arts and industries of the people of this country, expressly says, "The Hindus are not in the habit of writing on hides like the Greeks in ancient times." A reference to this practice is implied in the reply given by Socrates when he was questioned as to why he did not compose books: "I don't transfer knowledge," said he, "from the living hearts of men to the dead hides of sheep."

The use of well-beaten cotton cloth as a writing material by the Hindus is mentioned by Nearchus who was one of the generals of Alexander the Great. The Kanarese traders still use for their books of business a kind of cloth, called *kadatam*, which is covered with a paste of tamarind seed, afterwards blackened with charcoal. The letters are written with chalk or steatite pencils, and the writing is white on black (Mysore or Coorg Gazetteer, 1877, J, 408).

The paper-reed or rush *Cyperus Papyrus* (*Papyrus antiquorum*) afforded to the ancient Egyptians and through them to the Greeks and Romans a convenient and inexpensive writing material. The reed is almost extinct in Egypt now but still abounds on marshy river banks in Abyssinia, Palestine and Sicily. The papyrus was prepared by cutting the central pith of the reed into longitudinal strips which were laid side by side with another layer of strips laid at right angles. The two layers thus prepared were soaked in water, then pressed together to make them adhere, and dried. For books the papyrus was formed into rolls by cementing together a number of sheets.

It will be seen that the fundamental difference between old papyrus and true paper, as we now know it, is that in making paper the raw material is first reduced to pulp, that is, the natural structure is thoroughly broken down so as to separate the component fibres which are then re-arranged to form a new web.

Though as Pliny truly says, "the remembrance of past events depends upon paper (papyrus)" with the irony of fate paper has failed to record its own origin, and much of the early history of the art is matter only for conjecture.

While papyrus was of African origin true paper, in the modern sense of the term, was essentially an Asiatic invention. In China and the neighbouring countries of Eastern Asia, paper was used certainly before the Christian era. The reduction of the natural materials to pulp was done partly with hand tools and partly by soaking or boiling them in lyes. The process of preparing the pulp has undergone much modification in Europe and America, but is essentially the same as was originated in the East some 2,000 years ago.

The manufacture of paper in Europe was first established by the Moors in Spain. In Italy also the art of paper-making was no doubt in the first place established through the Arab occupation of Sicily. Paper, however, continued to be made by hand till at the close of the 18th century. Louis Robert, a clerk in the employment of Messrs. Didst, of the celebrated Essonnes paper-mills near Paris, invented machinery for making the process continuous. This was the greatest advance in the history of the industry and modern paper-making may be said to date from that time.

The first authentic account of paper-making in India dates from the time of the Emperor Akbar, when the art is said to have been introduced into Kashmir. It spread rapidly all over India and displaced the birch-bark and palm-leaves that were previously used for writing. The Persian word for paper, *kagaj*, has been adopted in most Indian languages. This also points to the Mahomedan introduction of the industry. The Sanskrit word for that which is used for writing upon is *patra*, the same as *pātā* in Bengali. The word occurs in the compound *bhurja patra* which does not mean the leaf of the birch tree, for we know that it was not the leaf but the bark of the tree that was used for writing. The word *bhurja patra* simply means the writing materials made of *bhurja* or birch bark.

It is probable, however, that the art of paper-making came from China to the inhabitants of Eastern Himalaya long anterior to the introduction of the paper industry into Kashmir by Akbar. Rajendra Lal Mitra asserts that a "letter-writer" by king Bhoja of Dhāra proves its use in Malwa during the 11th century A. D. (Gough's papers, 16). This king, it may be mentioned, reigned from 1106 to 1142 (?) and was one of the Hindu Chiefs who fought Mahmud of Ghazni. At any rate paper had not yet become common in India, unlike in Mahomedan countries, at this time. Alburini, who has already been quoted, notices the absence of paper and speaks only of *bhurja* bark and palm-leaves as used by the people for writing. He was familiar with paper and expressly says that it was in China that paper was first manufactured. "Its fabrication was introduced into Samarkand by Chinese prisoners and thereupon it was made known in various places to meet the existing demand." This was at the beginning of the 8th century A.D.

Paper manuscripts, dated Vikrama-Samvat 1384 and 1394 (A. D. 1327-28 and 1337-38), the leaves of which are cut according to the size of palm-leaves, have been discovered by Peterson at Anhilvād Patan. It is very doubtful if any of the ancient manuscripts from Kashgar, which are written on a peculiar paper, covered with a layer of gypsum, are of Indian origin; Dr. Hoernle

believes that all of them were written in Central Asia. (Indian Paleography by Johann Georg Bühler, Indian Antiquary, volume XXXIII.) During his recent visit to Khatmunda Pandit Haraprosad Shastri acquired a Sanskrit manuscript belonging to the 11th century A. D. written on Nepal paper.

It may be interesting to mention that paper is made in Nepal partly from bamboo and partly from the bark of a small thorny shrub known as Mahadeva's flower (*Daphne cannabina*). The surface is made glossy by rubbing with a smooth piece of stone. The Daphne paper is generally very thick and is made thicker and stiffer by being coated over with a paste made from the boiled kernel of tamarind seed. It is coloured yellow on one side, probably with turmeric. Thus prepared the paper becomes very hard and looks almost like a piece of hide. But the use of the paste from tamarind seed makes the paper unfit for the transcription of sacred texts. As we shall see later on, in Bengal and perhaps elsewhere in India, a solution of starch made by boiling sunned rice is used for sizing paper. This operation is called *tulai*. Paper which was subjected to this process was avoided by the old pundits for writing their *pothis*.

Excepting in the case of correspondence with the outside world, the Nepal Government never uses any machine-made foreign paper.

The Daphne paper, though commonly known as Nepal paper, is really mostly made in Bhutan. But the Bhutias also use the bark of another plant locally known as *Diah* for paper making. The process followed is just the same as in China and Japan.

#### PRESENT CONDITION.

Paper making is a dying industry in the province. Only a generation ago it was still in a flourishing condition. Within this short period it has completely disappeared from many districts. At present the industry, such as it is, exists only in three districts in Bengal: in Hooghly, Howrah and Murshidabad. In Howrah the industry is confined to a single village named Mainah, three miles from Amta Railway Station in the Uluberia subdivision. In Murshidabad it is confined to two villages named Kristapur and Srirampur, in thana Samserganj in the Jangipur subdivision. In the Hooghly district it is made at Manad and Gossainmalpara in the Polba police-station, at Neala in the Pandua police-station, at Shabbazar and other villages in the Dhaniakhali police-station and at Bali Dewanganj in the Arambagh subdivision.

It is in the hands of a class of Muhammadans known as *Kagjis* or paper-makers. The sight of a Kagji village is most melancholy. So far as the paper industry goes the crude hand tools in use in this country have apparently no chance whatever against machinery. At Mainah near Amta in the Uluberia subdivision, Howrah district, out of 100 families that carried on the industry 30 or 35 years ago, only half-a-dozen families still desperately stick to their old profession, the rest having either turned cultivators or labourers or having left the village. The Kagji villages in the Hooghly district are, if possible, only in a worse plight, having been devastated by malaria in addition to the havoc caused by the competition of machine-made paper. Paper-making used to be carried on at Nasriganj in the Shababad district, but the industry ceased to exist some years ago. The Collector of Cuttack reports that about 30 years ago a small paper-making industry was carried on by some Muhammadans of Hariharpur. There are still 7 men who can make paper, but the industry is dead. The paper was made from straw and though rough and coarse was formerly used in the Collectorate Record-room for fly-leaves, but its use has been discontinued for some years.

At Shabbazar near Tarkeswar (district Hooghly) in place of 70 *dhenkis* (as the mortar-and-pestle arrangement for producing the pulp is called) only two are still in use. The large pieces of stone that once served as mortars for the *dhenkis* lie scattered about, sometimes serving only as steps for their houses. The people sorrowfully point to the large tanks their forefathers had excavated from the profits of paper and which have now become silted up containing only a little dirty water.

The only material now used by the Kagjis of Hooghly and Howrah for making paper is waste or refuse paper. Book-binder's shavings are a particularly valued material. Formerly old *sau* sacking and old fishing nets



were also used for the manufacture of brown paper, but it has ceased to pay and is no longer used. In the Jangipur subdivision, Murshidabad district, however, jute cuttings are still used for making a kind of brown paper.

But if the essence of the art of paper making be, as already mentioned, the minute subdivision of the raw fibrous material with a view to obtaining the pulp the small industry as still carried on in the province hardly deserves to be called paper making at all. It is a mere recasting of the old material like the production of glassware from broken glass.

The paper produced is a kind of coarse stuff used by Indian merchants and zamindars for keeping their business accounts. This paper is almost exclusively used, for instance, in the office of the Maharajadiraj of Burdwan. It is also used by astrologers for writing people's horoscopes. For, though coarse, it is believed to resist the ravages of insects and climate better than machine-made paper. Towards the close of the Bengali year, when new account books are prepared for the coming year, this paper is a good deal in request. After this during the rest of the year, the demand is small. It appears that the new *swadeshi* movement has done very little to stimulate interest in this industry. The Kagjis think that while people are to a large extent patronising handloom products in the matter of clothing, so far as paper goes they content themselves with the products of the European factories in the country.

An explanation may lie in the fact that unlike clothes a good deal of the paper in ordinary use is devoted only to a very ephemeral purpose where the quality of long endurance has no place to warrant the payment of the much higher price demanded for hand-made paper. Besides, the supply of hand-made paper is too small at present to meet the demand. But soon the present race of work-men who still know the art will be gone, making a revival of the industry or its improvement impossible.

The Kagjis declare it would be very easy for them to produce thicker or thinner paper than they now make if there was a demand. Paper, a little thicker than what is now known as Baleswari, would be very suitable for being made into post-cards and tramway or even railway tickets. Again if the paper is left unsized, it would make good enough blotting paper. The mats upon which the wet sheets are put out to dry, being of very uneven surface, produce a corresponding unevenness in the sheets, but with a slight improvement in the arrangement for drying this could surely be most easily remedied.

#### MANUFACTURING PROCESS.

The process of manufacture is as follows:-

Waste paper is mixed with lime and steeped for a week or ten days in a large earthen vat. The lime used is at the rate of three or four seers per maund of waste paper. When sufficiently softened, the mass is pounded under a *dhenki* over a stone mortar. The *dhenki* used for this purpose is very much like that used for husking paddy, only somewhat larger and heavier and the head of the pestle is more strongly bound with iron. The stone mortar is only slightly grooved and consists of a large piece of basaltic stone, some three feet long, one and-a-half feet broad and a foot high.

The paste produced after pounding with the *dhenki* is next kneaded thoroughly in another vat by trampling under feet like potter's clay.

The paste is now washed thoroughly in water over a piece of cotton cloth till all impurities are got rid of and a soft pulp obtained. This is now diluted with water in a large vat. The contents of the vat are constantly stirred with a rod to prevent the pulp settling down, and a little is dipped up at a time in a rectangular skeleton mould, called *decle*, resting on a fine sieve. This sieve is made of very thin bamboo slips strung together with horse-hair. The sieve is known as *chhapri*, measures 23" by 18," and looks something like a piece of ordinary verandah *chik*, only very much smaller and finer. The *chhapri* or sieve is stretched over a wooden frame and is held firmly in position by the *decle* or rectangular mould pressing on its four edges. On withdrawing the mould from the vat in a horizontal position the water within the *decle* drains off, leaving the *chhapri* covered with a thin film of fibres, the operator meanwhile shaking the mould so as to evenly distribute the film.

The chhapri covered with the thin film of paper is now taken off from the frame and inverted over a slanting piece of stone covered with a piece of gunny cloth. The chhapri is now rolled away, leaving the film of paper on the stone. The process is repeated and film after film laid down one above another forming a pile. This work is generally done in the morning and the pile is left untouched for the water to drain away till the following day when the sheets still wet are taken up one by one and laid separately on mats to dry in the sun.

After their edges have been trimmed the sheets are next sized or starched one side at a time, and again dried. The starch is obtained by boiling sunned rice in water and is applied with the spongy fibrous shell of a *dhundul*, *nenua* or *vurul* (*Luffa ægyptiaca* with the outer skin removed. Some blue stone or copper sulphate is dissolved in the starch to improve the lasting quality of the paper. The starching being light work is generally done by women.

After the sheets have been dried, they are exposed to the night dew to soften them slightly, and next morning they are pressed over a plank with the help of a piece of smooth stone or a conch shell. This, too, is generally done by women. The paper is now ready.

The paper produced is generally white, but is sometimes coloured blue or yellow. The blue colour is imparted with indigo dissolved in the pulp vat from which the films are dipped up with the chhapri. The yellow colour is given by dissolving turmeric in the starch. Yellow paper is only produced in the Hooghly district.

The implements used, it will thus be seen, are of the crudest kind possible; they consist of some earthen vats, a dhenki for pounding the waste paper, a wooden mould, a bamboo sieve (chhapri), a wooden frame for supporting the chhapri, some mats for drying the sheets, some dhundul fruits for applying the starch, and a piece of plank and a smooth stone for pressing the paper. The chhapri alone is a rather delicate thing. It is procured from Serampore in the Hooghly district where it is made. It costs from Re. 1-1 to Rs. 2, and each piece lasts from  $2\frac{1}{2}$  to 3 months.

The dipping up of the pulp with the chhapri is an operation requiring some skill. One man can on an average produce 175 to 200 sheets per day (7 to 8 quires). One woman can size one side of 16 or 20 quires and polish about 12 quires of paper per day. The workmen receive from Rs. 6 to Rs. 10 or Rs. 12 per month according to their skill and outturn of work.

One maund of waste paper makes about 30 seers of country paper.

Paper is made in several sizes:—

	Price per Re.
<i>Bara rukhi</i> (the width of 12 fingers laid side by side) ...	12 quires.
<i>Sola rukhi</i> or <i>jangri</i> (the width of 16 fingers laid side by side).	4 or 5 ..
<i>Biara</i> (generally used in zamindari <i>sarishtas</i> ) ...	8 or 9 ..
<i>Baleswari</i> white or blue (a thick paper only made at Amta, district Howrah.)	2 ..

#### CONCLUSION.

In this country hand-made paper has apparently no chance against paper made by machine. But in England the most expensive writing and drawing papers are still made by hand. Some 60 or 70 tons of it are said to be made in every work in Great Britain, and on account of its superior strength there is a steady demand for it. In America, however, papers of great strength are manufactured by machinery and not much hand-made paper is produced.

Even in the case of hand-made paper the pulp is always made with machine, only the finest qualities of rags being used for the purpose. The *chhapri*, instead of being made of bamboo slips, consists of a fine wire cloth. The sheets of paper as they leave the mould, instead of being filed up in direct contact with each other, are separated from each other by felt placed between one sheet and the next. The sheets are dried with particular care and the sizing is done with gelatine. The glazing is done by machine as in the case of other paper. The greater strength of hand-made paper is supposed to be due partly to the time allowed to the fibres to knit together and partly to the fire expansion permitted them during drying.

But in China and Japan common paper is said to be still made by hand. It would be interesting to ascertain under what conditions this has so long been possible, and what the prospects of the industry may be. It is superfluous to say that there is a good deal in common between the industrial conditions of those countries and India, for instance, the low wages of labour, the simplicity of tools, the general absence of the factory system, etc. Some of the students lately sent to Japan by the Society for the Industrial and Technical Education of Indians, might look into the problem. Government might also obtain a report from some authoritative agent on the subject. Poor, ignorant and broken-spirited, it is hopeless to expect the Kaggis to make any improvements in their time-honoured ways without some help from outside. It is impossible to say without an enquiry abroad whether the industry has any chance of being saved at all. The few men who are still engaged in it will soon disappear and their descendants will be forced to betake themselves to other lines of life as best as they can. And then it will be too late to make any effort to revive the industry.

## APPENDIX.

### SABAI GRASS.

Though not used in the manufacture of indigenous paper this wild grass is extensively used in the paper mills of this country where European machinery has been set up. At one time it was proposed to export it to England as a paper material but it could not compete with Esparto grass obtained from Spain.

It is also used for making ropes. Sabai ropes are not very strong, being inferior even to jute in this respect; but they are very cheap. The best sabai is said to be grown in Nepal, but by far the largest quantity is produced in the Rajmahal subdivision of the Sonthal Parganas district, and is exported from Sahebganj.

The quantity annually exported from this railway station is between three to four lakhs of maunds. Monghyr and the districts of the Chota Nagpur Division, especially Singhbhum, also produce this grass in the hills and jungles, but it is nowhere systematically cultivated to any extent except in the Rajmahal subdivision of the Sonthal Parganas district. The area under sabai grass in the Rajmahal subdivision is estimated at between 20,000 to 25,000 acres.

Like many other grasses sabai produces a feathery ear consisting of minute seeds with hairy appendages. These last are nature's device for the wide dissemination of the seeds by winds, etc.

Sabai rejoices in a dry weather and a high open situation. In a year of heavy rainfall the growth is too poor and what is worse, the fibre is too soft. The grass does not grow on the level ground where the soil is water-logged. It is often found growing luxuriantly on steep hill slopes which are practically unfit for ordinary crops. It does not thrive under shade.

The hill sides are thoroughly cleared in the dry season by felling and burning, and the seed is scattered broadcast in the rains without any preparatory ploughing or spading. The seed must be sown from Jeth to Sraban—Bhado is too late for sowing. As the jungle comes up again, two weedings are given, one in Sraban and the other in Aswin.

The plants should be about 18" apart from each other. If the seedling is found to be too thick in any place the plants should be thinned out. If, on the other hand, the stand is anywhere too poor, the gaps should be filled up with seedling taken from where they are too many.

All this is done in the first year. The grass comes up only a foot or eighteen inches high. This first year's growth is of no value and is not cut, care should also be taken that the field is not burnt this year.

In the second year, too, as in the first, the fields receive two weedings. The grass grows three feet high, and is used to some extent both for paper and for ropes, but it is still very weak.

It is in the third year that the grass attains its maturity. It becomes strong and grows six to seven feet high. From now the fields receive only

one weeding every year—any time between Jeth to Sravan. Nothing must remain in the fields but *sabai*, no trees or scrub jungle nor any other kind of grass. Beyond this annual weeding the fields receive no other attention.

The grass is cut only once a year, any time from the end of October to the end of January. After it is harvested the grass remains dormant, so to say, till the rainy season sets in, when in about a couple of months it shoots up to the height (as already mentioned) of six or seven feet.

The outturn varies a very great deal, some fields giving only 2 or 3 maunds per bigha ( $\frac{1}{2}$  acre), while others giving no less than ten times as much. But 12 maunds per bigha may perhaps be taken as a fair average. (See below. Fifteen maunds would probably be nearer the mark.)

In the dry season every year after the grass has been cut the fields are burnt. But this practice should be condemned, as it reduces the outturn of the next year. It is best not to burn the fields at all.

Cattle are very fond of *sabai* and must be kept off the fields from Asarh till the grass is harvested and removed.

A *sabai* plantation practically lasts for ever. Many fields are quite fifty years old. In fact once established the grass takes such a hold of the land as to defy eradication. But the outturn continues good for 15 or 16 years only and then gradually falls off. When the yield becomes so small as to be no longer worth troubling about, the fields are abandoned. And it is only when in the course of time from want of weeding a jungle re-establishes itself that the *sabai* dies out and a fresh plantation becomes possible.

*Sabai* is grown in the hills which belong to the *paharias* or hill tribes. They pay no revenue to Government, but receive rent from men who cultivate the lands under them. These cultivators are known as *sabai mahajans*. They are up-country men who have to pay Rs. 10 every year to Government before entering the hills and who are debarred from acquiring any right to the lands they cultivate under their *paharia* landlords. The rent is settled by annual agreement, though its amount is practically fixed. After the agreement has been renewed and the rent paid, the *mahajan* has the fields weeded and watched, and when the crop is ready has it cut and carried away to Sahebganj. There the grass is made over to certain balers who bale and deliver it to the various paper mills under contract. The baling is done with the help of hydraulic presses, each bale being  $3\frac{1}{2}$  maunds in weight. The balers or contractors have nothing to do with the cultivation of the grass. They pay to Government a royalty of one anna per maund of the grass exported out of the district.

The rent the *mahajan* pays to the *paharia* varies from Rs. 4 to Rs. 8 per bigha ( $=\frac{1}{2}$  acre) depending upon the quality of the field and its distance from Sahebganj. The average may be taken as about Rs. 5 per bigha.

Taking the outturn of the grass from a bigha of land as 12 maunds, the *mahajan's* expenses and profits are said to be as follows:—

	Rs.	A.
Rent paid to the <i>paharia</i> ... ..	5	0
Cost of weeding ... ..	0	8
Do. cutting ... ..	1	0
Do. tying into bundles and carrying to Sahebganj ... ..	1	8
Total ... ..	8	0
Price of 12 maunds of grass at 12 annas per maund ... ..	9	0
Net profit per bigha ... ..	1	0
Ditto acre ... ..	3	0

Calculated per maund the *mahajan's* net profit comes to 1 anna 4 pies only.

This account obtain from a man who was himself a *mahajan* (although the largest *mahajan* at Sahebganj) was frankly given as showing the minimum profit the business would yield. Obviously it does not err on the side of showing the profit too high. The average outturn of the grass per bigha should probably be taken as 15 maunds instead of 12 maunds. Else, to use a popular saying, the game would hardly be worth the candle.

The contractors deliver the grass at the paper mills on an average price of from Re. 1-3 to Re. 1-4 per maund. Allowing for the price they pay to the

*mahajans* and the cost of cleaning and baling of royalty and railway freight they make a net profit of 2 annas per maund.

The Collector of Singhbhum reports :—

*Sabai* grass is not at all cultivated in this district except rarely by villagers in Dhalbhum for the purpose of converting it into ropes. But it grows naturally in abundance in the valley between two adjacent hills. The Government forests and the forests of the Thakur of Anandpur are full of it. It should be burnt in the hot weather, and then it grows abundantly in the rains. But it cannot be burnt in the reserve forests without risk to the trees. Again in the reserved forests the object is to get the area stocked with trees which kill out the grass altogether.

Hence the *sabai* revenue is a diminishing quantity in the reserved forests of their district. The present lessee has undertaken to pay Rs. 51,000 for the three years ending 30th June 1909, against Rs. 1,10,000 paid for the three years ending 30th June 1906 and Rs. 1,26,000 paid for the previous triennium.

As *sabai* grass is dying out fast in the reserved forests, it is expected that when the present lease expires so little will be offered as to render it undesirable to grant another lease owing to risk of fire to the forests by the coolies who cut the grass.

In the forests it is only found scattered here and there and causes much waste of time in collection. The grass should succeed admirably cultivated on the bare hills all along the railway. Under cultivation it will be easily and cheaply harvested. The planting of *sabai* for profit by villagers is well worth cultivation.

D. N. MOOKERJI,

*Deputy Collector on special duty.*

" They dare not devise good for man's estate,

" And yet they know not that they do not dare."

Shelley, "*Prom. Unb*"

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# **The Cotton Industry of India**

AND THE

## **COTTON DUTIES.**

*With an Introduction by the Editor of the "Times of India."*

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## INTRODUCTION.

1. The present paper is founded on an inquiry into the condition of the Mill Industry of India, the origin of which is thus explained in the last Report of the Bombay Mill-owners' Association :—

“ Mr. Jamsetjee N. Tata, who has constantly taken keen interest in the mill industry of India and in the efforts to obtain the repeal of the duties levied by Government on Indian manufactured cloth, addressed the Committee on 11th May 1901, asking for their co-operation in a statistical investigation which he had undertaken for the purpose of accurately determining the effects of the duty on the mill industry of the country. With this object in view, Mr. Tata addressed a Circular letter to the agents and owners of cotton spinning and weaving mills in India desiring information on the following points :—

“ Paid up capital; number of spindles and looms; expenditure on land, buildings and machinery; total amount set aside for depreciation of buildings and machinery; reserve fund; total of depreciation reserve and other funds held by the Company and used on the mill; interest credited to these funds during the year; value of stock; including shipments and goods in shops; cash and investments; liabilities—debenture debts, deposits, loans on security of stock; expenditure on cotton consumed during the year; value of yarn and cloth produced; value of goods on which excise duty was paid; amount of excise duty; commission paid to agents; total amount of interest paid during the year (including amount credited to the reserve and other funds held and used by the Company). Net profit after deducting agent's commission; distribution of profits—dividends, depreciation fund, reserve fund; approximate division of net profits on yarn and cloth; if profit or loss unusual, cause of the same.

“ In compliance with Mr. Tata's request, the Committee addressed a Circular to members of the Association inviting them to co-operate with him and furnish him, as far as possible, with the particulars he desired.”

2. The object of the inquiry is correctly stated in para 1, (Part I) of the paper as a study of the *facts* of the Mill Industry, particularly as modified by the Cotton Duties. The animating motive of the study, no doubt, was the pinch supposed to be gratuitously inflicted on the industry by the Cotton Duties in hard times which had arisen independently of the Duties; nevertheless there was no desire to criticise the policy of the Duties as a whole, and no hope of securing the reversal of that policy. Had there been any such hope, it would be promptly dissipated by the following paragraph from the Report of the Mill-owners' Association for 1901 (p. 20) :—



" The reply of the Bombay Government to the Association's further representation, dated 5th March 1901, urging the abolition or suspension of the excise duties on Indian manufactured goods, did not reach the Association until the end of May, and it was therefore too late to do more than include it in the printed appendices to the Report for last year. It was explained in the reply of Government that, so long as the Customs duties on cotton goods were maintained, it was not possible to abolish the excise duties ; that the Customs duties on cotton goods formed part of the general Customs duties imposed after much deliberation ; and that the Governor-General in Council could not entertain a proposal to abolish the duties on cotton goods while retaining the other duties. It was further stated that the abolition of all the duties, including the Cotton duties, would be the only means of meeting the wishes of the Association, and that, with regard to that large question, the policy of the Government of India was to maintain the *Customs Duties as a permanent part of the fiscal arrangements* of India.

" This reply was so explicit and final in its statement of intention to retain the Import and Excise duties conjointly as a " permanent part of the fiscal arrangements of India " that the Committee did not consider at that time that any useful purpose would be served by approaching Government again in the matter.

" For this reason the Committee did not see their way to support the Upper India Chamber of Commerce when that body, on 8th April 1901, addressed the Association suggesting a joint memorial to the Government of India for the entire repeal of the duties, or at least a remission of them in cases where it could be demonstrated that a mill had not conducted its weaving at a profit. (Appendix D.) "

3. The real result of the inquiry, then, can only be a systematic study of the facts relating to the mill industry, derived from an analysis of the balance sheets of the Mills for the 10 years closing the 19th century. It seemed to Mr. Tata that impressions were prevalent relating to the profits of the Mill industry as a whole which deserved to be verified or refuted by comparison with the balance sheets. The methods of analysis and the conclusions are explained in the body of the paper, and need not be reproduced here. All that need be stated here is that no claim is made that anything is conclusively *demonstrated*. The limitations of the statistical method are throughout borne in mind, and only indications of *tendencies* are presented. Perhaps it would be more accurate to describe the paper as a statistical verification, so far as such verification was possible, of an *a priori theory* of the incidence of the Excise Duties on cotton goods.

4. The present publication is the second edition of the paper, a first edition of 200 copies having been previously circulated confidentially among Mill-owners and competent critics. At the suggestion of one of the latter the paper was submitted to expert criticism which is annexed to this second edition (p. 39) and at the suggestion of Mr. Noel Paton, Secretary of the Bombay Mill-owners' Association, a further study was made of the condition of the Mills on a sterling basis on the lines of the argument in para 3 (Part I). The result of this is also given separately in this edition (pp. 36—8). Further attention has been paid also to the problem of the relative profits of spinning and weaving, and the conclusion of this investigation is briefly adverted to at the end of para 27 (Part II) and in the foot-note.

5. So much by way of explanation. It is not claimed that the statistical portions of this paper are absolutely accurate; the difficulties involved in the collection of the information have been too great for more than approximate accuracy. Nor is it claimed that all the deductions based upon them are infallible; for my own part, I differ from the author upon the subject of depreciation, though I do not profess to have expert knowledge of such a complicated question. But this I can say with confidence, that the statistics have been prepared with laborious care and patience and have involved work extending over many months. I know something of the diligent sincerity of the author, and I am sure that his figures deserve acceptance. It has been suggested that the Bombay Mill-owners' Association should organise a series of committees to investigate some of the controversial points raised in the paper, such as, for instance, that of depreciation. Upon this point I do not feel competent to offer any suggestion, though it is permissible to emphasise the principle that the cotton mill industry in India needs reorganisation upon a more systematic basis. Such a basis can only be reached after preliminary investigations conducted in a strictly scientific spirit.

6. But the real reason why I have consented to write this preface—which is necessarily largely explanatory—is because I understand that the paper is to be widely circulated among English politicians. An opportunity is thereby presented to direct attention afresh to the political aspect of the broader question which lies at the back of the paper. The principles upon which the British Parliament interferes in questions of Indian finance need reconsideration. The story of Parliamentary intervention during the last few years reveals glaring anomalies. In deference to the representations of Lancashire mill owners, India was compelled to impose an excise duty upon her own cotton manufactures. That is to say, she was forced to tax an internal industry, at a peculiarly inopportune time, for the benefit of Lancashire. She was practically sacrificed to

the political exigencies of the moment. The British Parliament has now imposed a duty—not large, but enough to be felt—upon imported corn. India sends corn to England, just as Lancashire sends piece-goods to India. If the British Parliament really desires to render that justice to India which it so frequently professes, its only logical course must be to place an excise duty upon its home-grown corn. Such a proposition is naturally impossible, but it serves to throw into strong relief the essential injustice of the present treatment of the Indian cotton industry. The British Parliament is willing enough to thrust taxation upon Indian mill owners for the benefit of their Lancashire brethren; but it places a protecting arm around the British farmer as against India. Again, when the Indian tea growers and traders protest, through the Viceroy, against the suggested imposition of an additional tax upon tea, they are curtly reminded that the British Budget is no concern of the Government of India. The logical converse of this doubtless excellent principle is cynically forgotten when the Lancashire vote is endangered. Finally, the British Parliament, cheerfully forgetful of its desire to do justice to India, has actually proposed to impose a great additional charge upon the military expenditure of this country, to enhance the pay of the soldier, without even going through the preliminary formality of consulting the Government of India. I will not allude to the miserable question of the charges for the Indian Coronation guests, because it is difficult to believe that the notion of saddling India with the cost of British “hospitality” would ever have been approved by the bulk of the members of both Houses of Parliament. The incident is only noted here, because it helps to illustrate the attitude adopted at Whitehall towards the finances of India.

7. It is hoped that this paper will convince those who take the trouble to examine it that the excise duties levied for the benefit of Lancashire really constitute a serious additional burden upon an industry which is already handicapped by many disabilities. If it produces renewed discussion of a signal injustice, the continued existence of which the British Parliament seems only too anxious to forget, the object of its industrious author will have been served.

8. Discussion is asked for, because in India we are daily receiving fresh evidence of the benefit that ensues from the free discussion of Indian questions. The obsolete tradition, which flourished so long in the Indian Administration, that the utmost secrecy and reticence are inseparable from successful government, has been finally shattered. At home, Mr. Chamberlain has frankly explained his plans and ideals, and has aroused in England an interest in the Colonies never before witnessed. In India, Lord Curzon has consistently pursued the same course. Ever since he entered upon the Viceroyalty, he has systematically taken the public into his confidence whenever circumstances permitted. The conse-

quence is that his luminous expositions of the policy of the Administration are now eagerly read and constantly discussed. It is not too much to say that by this effective innovation, the Viceroy has furnished India with a valuable substitute for Parliamentary institutions; and it might even be contended that if adhered to and judiciously developed, there might be evolved from the practice a system by which popular views would gain just that amount of hearing which an Oriental country like India needs in its present stage of development. A strong central bureaucracy, keenly sensitive to public feeling, discriminating enough to be selective, and wise enough to wish to be popular, is perhaps the best form of rule which India can receive to-day. No symptom of public life in India just now is more remarkable than the keenness, the vigour, and the ability with which each fresh project of reform is taken up and debated by the public in all its aspects; unless it be the constant responsiveness of the Government of India to the views and desires of the various communities, whenever those views present points and ideas which are reasonable, and are possible of adoption. In this way a profound and vitalising influence has been at work among the non-official section of Indian public men, with the best possible results to Government and to the country.

9. Only last week Lord Northcote, the Governor of Bombay, who has always been keenly desirous of establishing closer relations between the rulers and the ruled, made a remarkable announcement tending in the same direction. Speaking at Ahmedabad, His Excellency said that during the troublous times through which the Western Presidency has recently passed, Government have learned "the need for taking the people more fully into their confidence, and of making an effort to spread abroad some conception of the principles underlying the actions of Government." Those who are familiar with the Indian system will recognise the novelty and the importance of this candid and statesmanlike avowal. And as free discussion is now encouraged and approved in India, with results that have proved highly beneficial, so it is hoped that this paper may undergo some discussion in Great Britain, and that the principles it is written to support will obtain recognition at no distant date. In the matter of the Cotton Duties, India asks for that justice which has been hitherto denied her.

THE EDITOR OF THE "TIMES OF INDIA."

*Bombay, November 28th, 1902.*

# *Memorandum by Mr. B. J. Padshah on the Profits of the Textile Industry of India.*

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## **PART I.**

1. The present paper proposes to study the Mill Industry of India with the view of determining (a) the profits of spinning, (b) the profits of weaving, and (c) the abatement of profits, if any, consequent on the Cotton Duties Legislation of 1896. It is not expected, and therefore it is not suggested, that the outcome of this study shall be the repeal of the duties imposed in virtue of considerations entirely extraneous to those dealt with in this paper. The present memorandum does not discuss whether India should be an independent fiscal and economical entity, or whether it should submit to its economical interests being treated as a part of the economical interests of the British Empire; nor does it concern itself with the discussion of Free Trade as a suitable policy for the Indian Empire, or the further controversy whether a true interpretation of the doctrine of Free Trade invariably necessitates, against a Customs Duty for revenue, a countervailing excise duty. These questions must no doubt be debated before a correct judgment on the Excise Duties on cotton goods can be given. But it is the object of this study, not to pass judgment upon the Cotton Duties, but to investigate the general condition of the Mill Industry, and the effect of the Cotton Duties on its profits. These are questions of fact rather than of policy, and lend themselves all the more to an exact treatment.

2. At the time when the Cotton Duties were sanctioned, two impressions appear to have been generally prevalent :—that the average profits of the Mill Industry are high; and that the Cotton Duties would be really paid by the consumer of cotton goods and not the producer. It is probable that both impressions co-existed in the minds of the same individuals; nevertheless, it is demonstrable that if the profits of an industry are much higher than the average of other industries, a burden on the producers in that industry cannot be transferred to the consumer.

3. The impression of very prosperous times for the Mill Industry appears to have been shared by the general public, and to a large extent justified by the rapid increase in the number of looms and spindles, and the building up of considerable reserve Funds by the good mills. But to some extent, at least, this prosperity must have been apparent only, the appearance arising from a depreciating currency. Had there been an obligation to pay the dividends in gold, as

on the capital of the guaranteed railways, the rosy tints would have seemed more subdued than they did in the later eighties. Currency changes continue to complicate the problem in the nineties ; but they have been omitted from any consideration.\* The purchasing power of money is a formidable problem ; it may here only be observed that sterling exchange was about 18s. in 1890, and is stable round 16d. since 1897.

4. But whatever was the condition of the Mill Industry in the eighties, in the closing decade of the last century its profits taken as a whole were certainly not extraordinary. The average earnings of 58 mills examined in the second part of this memo. are found to be just 6 per cent. ; the borrowings of the mills are also obtained at about that rate : even for such a mill as the Central India, the average dividend is about  $7\frac{1}{4}$  per cent. of the *market value* of the shares.

5. This figure of 6 per cent. is, moreover, obtained by taking a set of mills whose average position is better than that of all the mills of the country. The omission of *one* good mill (whose profits are miscellaneously derived from spinning, weaving, ginning, dyeing, financing, and trading by the establishment of shops) pulls down the average earnings to 5 per cent.

6. This last figure of 5 per cent. is rather what *would be* the income if the Agents' commission had been taken not at the amount actually paid, but at about 60 per cent. of this sum, corresponding to what popular opinion appears to pronounce to be just. If the *whole* commission actually paid had been debited to profits, this memo. would have recorded an average earning of 4 per cent. only.

7. These earnings are the averages of profits ranging from 20 per cent. per annum to negative figures. The mills have been divided into 4 classes ; 3 mills in the first class on an average earn 16 per cent., 13 mills in the 2nd class earn 10 per cent., 19 mills in the 3rd class earn less than 6 per cent., 23 mills of the fourth class earn nothing at all. In the three years (1897-99), the first class earned 17, the second 7, the third 1, and the fourth *lost* 7 per cent. per annum.

8. The last paper in the Parliamentary Blue-book on the Cotton Duties is a statement about 63 Indian Mills, from which Mr. Whittaker, a Lancashire Manufacturer, deduces the conclusion that "the owners of Indian Cotton Mill shares have been enriched by no less than Rs. 1,600,000 by this advance which

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\* But see Appendix F added in this second edition.

has occurred." The advance referred to is in the market-value of Mill shares between April '94 and June '95. The years 1895-96 were exceptionally booming for the Spinning Industry, chiefly owing to the extraordinary demand for yarn from China ; but the real condition of these mills is studied in the table below. One mill became a private concern in 1894 ; one was stopped in 1896 ; the particulars of a third cannot be obtained. Of the remaining 60 mills, the Central India is shown apart for reasons explained in para. 5. It will be seen that the dividends of the remaining 59 mills are less than 7 per cent. of the paid-up capital ; and that the market value was 80 per cent. of the fully paid-up capital in 1890, 110 per cent. in 1895, and 68 per cent. in 1900 ; the average market value in the decade being 91 per cent. of the fully paid-up capital. Taking the difference between the paid-up value and the market value in 1900, there is a loss to the shareholders of nearly 2 crores of rupees in capital. Moreover, these figures are derived from newspapers whence it may be presumed Mr. Whittaker took his. The figures are quite unreliable ; out of these 59 mills, it was possible to test the statement about dividends in the case of 40 mills from their published reports. The newspaper statement (confusing in many ways, but as interpreted in the table) would give a dividend of 7.7 per cent. ; whereas the published reports give only 6 per cent. If the mills for which no reports are available for this memo. be corrected similarly the dividend actually paid would be, not 7 per cent. as stated above, but only 5 per cent. And probably the market values, entirely taken from the newspapers, are similarly exaggerated. The truth is that in the case of the less paying mills, the market quotations are only nominal, and probably those who prepare the Commercial Intelligence columns of newspapers do not trouble to correct the old statements of dividends.

TABLE.

	Paid-up Capl.	Average (90.99) Market Price of the Total No. of Shares.	Market Price of the Total No. of Shares (1890.)	Market Price of the Total No. of Shares (1895.)	Market Price of the Total No. of Shares (1900.)	Total amount of Dividend supposed to have been paid (90.99)	Dividends Estimated as actually paid (90.99.)
	(in lakhs)	(in lakhs)	(in lakhs)	(in lakhs)	(in lakhs)	(in lakhs)	(in lakhs)
59 Mills	506	520	445	625	387	392	287
Central India,	15	94	40	123	132	62	68

9. It is not quite clear whether Sir James Westland had any illusions about the high profits of the Mill Industry. He was quite explicit that the producer would pass the duty on to the consumer. " We discuss the question on false lines," he said, " when we deal with it as a question how much Manchester mills will pay, and how much Indian mills. The real payer in each case is eventually some person quite different from both. In fact, it is quite

unnecessary for revenue purposes to call in the Indian Mill-owner at all. . . .” The public meetings in Bombay and elsewhere which protested against “ the proposal to re-arrange the Cotton Duties in such manner that the poorer classes hitherto exempt will have to pay  $3\frac{1}{2}$  per cent. duty on the coarse cloths manufactured in India which form their wearing apparel, while the rich, &c., &c.”—must be held to endorse Sir James Westland's view that duties, and every burden on the cost of production, must be transferred to the consumer.

10. It is pertinent to remark, in the first place, that whoever holds the immediate transferability of a burden on cost to the consumer cannot possibly hold that the profits of the Industry are higher than the average (all things being considered). The machinery relied on to transfer a burden is the increase of price ; the consumer pays the higher price because he urgently wants the goods, and because the producer can transfer his capital to the production of other things, if he got less than the fair profit attainable elsewhere. But if the producer is getting such high profits that even a considerable diminution would keep them higher than what he could get elsewhere, there would be no temptation to him to withdraw capital, and no pressure on the consumer to pay a higher price. If the higher price can be obtained at all, it would be because the producers are monopolists able to exact any price they please. That this higher price was not exacted before the duty shows that they were afraid of a diminished demand which would make the higher price less profitable than a lower one. Either, then, the profits are normal before the duty ; or after the duty, the price cannot be advanced to recoup the duty to the producer. The State may, as a silent partner in all industry, claim to levy a toll on excessive profits ; but it may not claim both that the profits are excessive, and that the toll will be passed on to some one else.

11. Sir J. Westland, then, must have really reckoned on no excessive profits to be shorn down by his scissors. Has his calculation that, with normal profits the Cotton Duty would be passed on to the consumer, been verified by experience ? The table given below shows firstly that cloth has *fallen* in price by 12 per cent. after the duty, that the margin\* between cloth and yarn has fallen,

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\* The difference between price realised per lb. of produce and the cost of production per lb. of produce constitutes the profit per lb. of produce. Of the cost of production of yarn, the most important and fluctuating element is the cost of cotton spun ; of the cost of production of cloth, the most important and most fluctuating element is the cost of yarn woven. The other items of the cost of production—such as the charges for coal, labour, stores, repairs and depreciation of plant, interest—are more or less stable. Therefore, practically profits rise or fall with the margin between yarn and cotton, or between cloth and yarn. The margin between yarn and cloth is calculated by remembering the following facts. For spinning 1 lb. of yarn, 1·18 lbs. of cotton are required, 18 p.c. of cotton being the allowance for loss in weight and wastage up to the spinning point. 784 lbs. of cotton make one candy.



while the margin between yarn and cotton has increased. The producer has not, then, recouped himself by the higher price of cloth, nor from the cheapness of yarn; if he has been compensated at all, it must be in the reduction of cost in such articles as coal, labour, stores, interest charges, etc. Now if there had been such a reduction of cost, it would have equally affected the margin between yarn and cotton, which (on the doctrine of the immediate transferability of benefits and burdens to the consumer) should have been reduced. That this margin has *increased* instead indicates that the transferability is not so rapid as is assumed, or that there is no such reduction in cost to be transferred. In fact, the Boer war must have raised the charge of English and Bengal coal alike; plague must have increased the labour-charge, and for a time also the interest-charge; the import duty must have made stores dearer.

TABLE DEDUCED FROM THE STATISTICAL ABSTRACT, No. 193.

Period.	Average price of cotton (Broach) per candy.	Yarn 20s per lb.	Imported Grey shirtings cloth per lb.	Margin between cotton and yarn per lb. of yarn.	Margin between yarn and cloth per lb. of cloth including sizing.
	Rs.				
1890-94	227	74 pice	99½ pice	13 pice	32 pice
95	178	69 pice	93 pice	21 pice	32 pice
96-99	190	67 pice	89 pice	15½ pice	28 pice
96	239½	76 pice	93 pice	11½ pice	24 pice
97-99	173	64 pice	88 pice	17 pice	30 pice

12. It is now seen that the transferability is not verified by such experience as is given by the Table. But the items of the Table are only rough, relating to Broach cotton, 20s yarn (Bombay), and the Calcutta prices of *imported* grey shirtings, stated to be 8 to 9 lbs. in weight, from which the price per lb. is deduced by taking the piece to be 8½ lbs. It is, therefore, thought advisable to examine the *actual profits*, and their course.

13. [Before the statistical examination on these lines is resumed, it would be of advantage to ask whether the inevitable intelligent anticipation of events was a transfer by the producer of the burden of the duty on the consumer. An intelligent anticipation is a theoretical treatment of a question; such a theoretical treatment, the only one throughout this investigation, is essential to the expression of the unity of thought underlying this paper. It is submitted that two conditions, neither of which were realised in the present instance, are indispensable to the producer succeeding in throwing off a new burden on cost; there must be a *steady* rate of profit less than which would result in a withdrawal of capital from the business; there would have to be a favouring state of demand

such that it could bear an advancement in price. The facts shown in minute detail in Part II, reveal no such *steady* rate of profit; the rate of profit fluctuates as among mills, and in the same mill in different years. The truth is that neither new capital can be brought in promptly, nor can old capital be withdrawn within 4 or 5 years after a change in the market, and therefore, the state of *demand* rules the market. A fall in price cannot be resisted by the mill-owner keeping his looms partly idle; the capital being already locked up, the more goods sold at a price which is profitable at all, the greater the profit.

The supply must be taken for granted as the full capacity of the existing looms; the price will be the one that will induce a demand that can carry off this supply. Now the Mill Industry showed a continuous increase of looms, and a reduction of about 10 per cent. in the price of cloth, during the ten or fifteen years preceding 1896. It seems natural to suppose that *some* of the new demand was induced only by a reduction in price, and that any advance in price would be met by a withdrawal of this demand. The upper India Chamber of Commerce, indeed, go further and assert (Blue Book on Cotton Duties, p. 161) that "in India all experience shows that it is difficult, if not impossible, to effect a change in prices." The tendency is, even in the case of food, to invest rather a fixed income in different articles than to buy constant quantities at any prices; therefore a restriction of demand would certainly have followed enhancement in price.\* If now, there be a *single* intelligent producer, or a reliable combination of producers, it may happen, and it may be perceived, that a higher price even with a diminished demand is more profitable; if the producer realise the same money on 5 per cent. less of goods, he would be spending the same amount on the fixed charges per spindle or loom, and he would be saving in labour, raw produce and other charges. It would be distinctly in such a case to the interest of the producer to restrict production. But a number of competing producers cannot act so. Each one would feel that his own restriction of out-put could have no appreciable effect on price, that his under-production cannot sensibly prop up price against the effect of the full continued production of his rivals; that, on the other

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\* From certain friendly criticism privately received on this paragraph as it appeared in the first edition, it would seem that some very competent people think that cloth is a necessary of life whose demand in India is not to be curtailed by an advance in price. I must, therefore, suppose that the presumptive evidence I have given for the restriction of demand has not been convincing. I shall, therefore, try the effect of statements of fact by Mr. Sly I.C.S. in the latest Report on the condition of the Central Provinces. Speaking of the Malguzars, he remarks; "The standard of living has deteriorated; grain and jwar are sometimes eaten instead of wheat and rice; houses are not kept in such good repair; and clothes are not so good." And of the daily labourer: "earthen pots are more commonly used instead of brass, his cloth is not so good as formerly, and he renews it less often."

hand, his own continued full production would not sensibly depress the prices pushed up by the under-production of the others ; and that any price profitable at all would be more profitable if more is sold at that price than if less is. Therefore, the old scale of production would continue even after the imposition of the duty, and therefore price cannot advance, nor the producer be recouped for the duty, till the extension and intensification of the existing demand permit a re-adjustment which would be hastened by the gradual withdrawal of capital also. When the re-adjustment does take place, the individual Mill-owner will no longer be handicapped ; but the Industry will, all the same, be less flourishing, and fewer hands will be employed in it than would have been possible without the duty.]†

[The argument in this para. is chiefly borrowed from Mr. Sidgwick's treatment of Combination Prices.]

14. As Famine paralysed the Indian demand for Indian Cloth, which is the largest market for Indian Cloth, the favouring demand which would have helped the shifting of the duty from the weaver to the consumer did not come

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† (a) In determining *a priori* the probable course of prices of a dutiable article, the element of a non-Indian demand ought not to have been overlooked. This element would modify the reasoning to this extent. Exported cloth would be allowed a drawback ; and this drawback would make a difference of price equal to the amount of the duty to the purchaser of cloth for foreign sale as compared with the purchaser for local consumption. The foreign purchaser receiving a rebate equal to the duty is prepared to intensify his demand ; the producer is thus able to diminish the supply for local consumption, until prices rise somewhat, and until the intensification of foreign demand is arrested, and local demand is reduced. At what point the equilibrium will be brought about cannot be fixed *a priori*. The point will depend upon the importance of the foreign demand and its elasticity. If the foreign demand be small, or not easily extensible with diminished price, the Mill-owner will not only pay the duty, he will also realise smaller profits and prices on export than he did before the duty.

(b) The element of the non-Indian supply introduces little complication. If the demand at the price before the duty could not be met except by a supply from Lancashire, and if Lancashire has other fields of demand to which it can divert its supply from India, unless India consent to pay the old price free of duty, or if Lancashire has means of restricting its supply unless it got its price, then under the circumstances the duty would have to be borne by the consumer. In other words, as in (a), the incidence of the duty will depend upon the importance of the Foreign supply to the Indian consumer, the magnitude of the Indian demand as compared with the non-Indian, and the elasticity of the non-Indian demand. But if Lancashire should not compete with Indian cloth except indirectly, the question is of little interest. The important thing to remember is that in cases where supply cannot be promptly curtailed, an addition to the cost of production is fully transferred to the consumer only if the Indian demand be inelastic, or the non-Indian demand very elastic ; i. e. if the Indian demand should not be pulled down by increase of price, or if the non-Indian demand be immensely extended by a very slight abatement of price.

into existence ; it may be consequently expected that for 3 or 4 years after the duty, the whole of it was paid by the weaver. This preliminary expectation has now to be verified from the profits of weaving. A  $3\frac{1}{2}$  per cent. duty on cloth is equivalent to about a 7 per cent. duty on weaving capital ; since the produce per loom sells for about *twice* as much as the value of the fixed capital per loom. There are no direct figures for the determination of the profit per loom ; Part II of this paper tries to attack this problem, and gives its inconclusive results. Weaving is generally one department of a joint concern of which spinning is the other ; the fixed capital on spinning is about 4 times the size of the fixed capital in weaving in such a joint concern usually ; therefore, if spinning profits remained unchanged, and the profits of weaving fell by 7 per cent. the profits of the joint concern would show a shrinkage of  $1\frac{1}{2}$  per cent. per annum. But the profits of spinning have fallen also, in spite of the increased margin between yarn and cotton, probably owing to the higher cost of some items ; and if yarn be cheaper in the same period, this cheapness is some set-off against the burden of duty, for weaving profits ; thus the statistical verification of the theory becomes very difficult. All that can be said with certainty is that the price of cloth has *fallen* after the duty ; that the margin between cloth and yarn has fallen also ; so that even without a duty things would not have been very cheering for the weavers ; that the duty is a new incumbrance, with a diminished margin ; that the affairs of the spinning Mills seem to show that the cost of labour, coal, stores and other charges must have increased ; that in any case, the profits both of spinning and joint spinning and weaving have fallen.

15. It is useless to plead the Famine as responsible for the upstating of Sir James Westland's benevolent intentions towards the Industry ; for such a plea would be an acknowledgment that the prompt shifting of burden relied on by the late Finance Minister operates only when there is a favouring demand. Part II gives a warning that the Mill Industry of India works at profits which are less than the Government profits on their canal works or collieries, and not appreciably greater than those of the State and guaranteed Railways ; profits which would be disdained by banks, and average money-lenders in the interior ; profits not nearly equal to what might be realised by judicious and safe investments on mortgage, or on large cultivation or in house building. For these profits, the share-holders undertake great risks. Was the Industry in a condition to permit experiments based on conjectures about the future of demand for cloth ?

16. It might appear that too much has been proved. A reduction of 7 per cent. would completely wipe off the profits of weaving ; whereas there has been an increase both in the number of looms and in the quantity of cloth produced since the duty. The apparent anomaly can be easily explained. The

reduction would not be the whole 7 per cent. of the argument of para. 13. The cheapness of yarn would be some compensation for the duty and the increased cost of production; if a burden might not be shifted with promptitude, neither may a benefit. Again, the producer deals with the sharp middleman and not directly with the consumer; even if the price cannot be raised against the consumer, fractions of a pie which would not be insisted on in prosperous times, would now be squeezed out from the middleman to diminish the burden of the duty, and similarly small economies in production would be looked to. Next the profits of weaving would not be so low as 6 per cent. in the first and second class of mills according to the divisions in Part II; the profits of the best managed mills, even when diminished, would continue to be large. If from any cause these mills found spinning less profitable than weaving even when encumbered with a duty; if, for instance, they expected a slump in the Chinese market for yarn and a recovery in the Indian market for cloth, they would turn over their yarn to their own weaving department and increase the number of their looms.\* Finally, some of the new looms were planned before the duty was put on, and only came into work after the duty. The least profitable concerns are usually the first to show sensitiveness when a new item cuts down old profits—a slackened demand, or an unaccustomed tax. That sensitiveness has been shown by the third and fourth class of the mills examined in Part II., which have practically earned nothing after 1897 or begun to lose, and one has heard recently of liquidations.

17. This preliminary part of the enquiry, then, has brought into a focus the main inferences of this paper. It has shown that whatever the justification of the Cotton Duties, they cannot be defended, as they appear to have been defended, on the ground that they are in reality borne by the consumers; or on the supposition that the Mill-owners are so flourishing that they may bear with equanimity the reduction of their profits. The average profits of the Industry are about normal; the profits of a large class of concerns are very much below the normal. These latter concerns have been shaken severely after the duty and the slump in yarn; some have gone into liquidation; the production of cloth has increased, and its price curtailed; the curtailment in cloth has not been made good by the cheapness of yarn; the cost of production has increased. Part II is now to show how these results have been obtained; an Appendix will make clear some contentious points in making estimates of the depreciation of mills, the charge for commission, and the place of Reserve Funds and depreciation in the estimates for capital.

B. J. PADSHAH.

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\* One or two of them appear to have successfully experimented with the production of the higher cloths which had been so far the monopoly of Lancashire.

*Note.*—Nothing has been said in this memo. about hand-weavers. No exact data about them are available; there is a conflict of opinion as to whether they *can* compete with the power-loom; in so far as they can, they would retard the transfer of the burden of duty to the consumer; and in any case the Mill-owners do not appear to wish duties put on the hand-loom in the only way possible—*viz.*, by a duty on Indian and European yarn alike.

B. J. P.

## POSTSCRIPT.

The need for caution in proceeding to any inference from the Table of margins between cloth and yarn given in para. 11 is already explained in para. 12. But since the text was printed, the desirability of not relying on such Tables, and the importance of investigations such as are given in Part II and the Appendices, has been practically illustrated.

The Table of para. 11 was deduced from Table No. 193 of the Statistical Abstract for 1901. It was assumed that No. 193 was only a reproduction of No. 41 in Mr. O'Connor's Blue-book on Wages and Prices in India. A reference to No. 41, however, discloses differences in two particulars: (a) The prices of the Indian T. cloth, 44 in., 24 yds., 8 lbs. are given in successive years; so that with these prices there is no need to rely on the realization on the *imported* grey shirtings; (b) Secondly, the prices are quoted for January and July separately for each year. The Statistical Abstract reproduces only the quotations for January. "They represent," says Mr. F. J. Atkinson, "the prices, as given to the Government of India by the Bombay Mill-owners' Association, on 1st January and July of each year. The Secretary of the Association was asked to give monthly figures for the purposes of this (Mr. A.'s) paper, but declined assistance. Certain cotton mills also were requested to assist, and all refused."

The prices of imported shirtings are higher than those quoted for T. cloth; very possibly, the imported shirtings are unfinished goods, and the T. cloth is finished cloth. It is assumed that 100 lbs. of warp and 100 lbs. of weft with 20 lbs. of sizing are woven into 220 lbs. of unfinished cloth, and that with 55 lbs. more of finishing material, they are converted into 275 lbs. of finished cloth. If C be the realized price on cloth, and Y on yarn,  $220 C - 200 Y$  is the margin for the cost of manufacture, sizing, &c., and profit, on unfinished goods, and  $275 C - 200 Y$  for finished goods. Sizing and finishing may be allowed for at the rate of 14 pies per lb. There would remain, for the cost of manufacture and profit, the margin in pies, on finished and unfinished goods respectively, of  $275 C - 200 Y - 1050$ , and  $220 C - 200 Y - 280$ .

The manufacturer wants these margins to compare them with the cost of production to see what profit is left over. He will insist on the same profit per cent. on his capital whether he produce finished or unfinished goods. It is obvious, therefore, that he will need to know the margin *per pound of yarn woven*. In the Table of para. 11, the margin per lb. of cloth has been given. If the above expressions are simplified, the margins per lb. of yarn woven, for finished and unfinished goods respectively, will be found to be, in pies,

$$(C - Y - 5\frac{1}{4}) + \frac{3C}{8}$$

$$\& (C - Y - 1\frac{1}{2}) + \frac{C}{10}$$

On the basis of these formulæ, the following Table has been deduced :—

Period.	Margin in pies per lb. of yarn woven.			
	On finished T. Cloth.			On imported shirtings unfinished.
	Averaged on quotations for both Jan. and July.	Averaged on quotations for Jan. only.	Averaged on quotations for July only.	Averaged on quotations for Jan. only.
1890-94	39.5	39.2	39.8	34
1895	44	49.5	38.6	34
1896-99	42	44.6	39.8	29.5
1896	36.2	39.8	32.6	25
1897-99	44.2	46.3	42	31.5

The Table leaves no doubt about its own unreliability; the course of the margin in the different columns is shown to be different. It might be expected that if the weekly price-currents of the Bombay Chamber of Commerce were utilised, the fluctuations of the margin would be more trustworthy. And so they would be, if the volume of transactions did not become nominal when the margin shrank to too near the cost of production, and if the quality of the cloth in successive periods were comparable. In the absence of these conditions, the labour on price-currents for greater accuracy can only be labour thrown away.\*

R. J. P.

\* As the proofs of the second edition are passing through my hands, it strikes me that trustworthy statistics of the course of prices of cloth and yarn could be obtained by a very slight attention to the point in the Balance Sheets of Mills. Returns are made to the Association and Government showing the number of bales of cloth purchased and quantities of yarn and cloth sold. The Balance Sheets show the values of yarn and cloth sold and the cost of cotton. If the two returns are combined, we should not only know the course of *quoted* prices, but the *annual* fluctuations in realisations per lb. of produce. The objection made in the text would be obviated. The quoted prices would have weight only in proportion to the value of transactions at those prices.

## PART II.

1. The total number of mills in India in 1900 was 186, with paid-up Capital of about 16 crores. Only 58 of these mills with paid-up Capital equal to 5 crores have been examined in detail for the purpose of this Memorandum. Whatever information could be obtained about the remaining mills from the Commercial Intelligence columns of the *Times of India*, the *Pioneer* and the *Madras Mail*, has been also tabulated separately. This relates to 49 more mills with a paid-up Capital of about 4 crores. It will be shown subsequently (see para 44) that the earnings of these 49 mills are less favourable than the results of the 58 directly examined; the mills which find no mention in the newspapers and are not examined in this memo, may be presumed to be usually the weakest.

2. Some of these 58 mills have only come into existence recently; nor would it have been easy to obtain full information about most mills from the period of their birth. Difference of economic conditions and a continuous disturbance in the purchasing power of money would have disqualified such antiquarian information from throwing light on the present-day problems of the textile world. The actual period selected is the decennium 1890-1899; and in the case of some mills, 1891-1900. The period has the advantage of being broken nearly exactly in the middle by the Cotton Duties legislation; so that a mere averaging for the period neutralises the disturbances both of good and evil times.

3. Had the life of mill plant not exceeded this period, the inquiry would have been further relieved of the duty of making allowance for the depreciation of this plant. But since the structural, and much of the mechanical, part of the capital of a mill, if kept in full substantial repair, would need no renewal for 30 years, it is impossible to overlook the possibility of mistakes in providing for the continuous wear and tear, and also the contingency of being supplanted by more productive contrivances. An examination of the annual Balance Sheets of mills reveals the fact that there is no uniformity of practice among mills, or even in the same mill from year to year, in providing for this necessary item. Most mills provide what they can spare; some make the depreciation appropriation only an excuse for a large Reserve.

4. Similarly in the matter of Agents' Commission, there is no uniformity of rate; and there is much newspaper criticism suggesting that the condition of the Mill Industry would show better if commission was charged on some intelligent principle of justice. As long as this contention should remain undisposed of, it would be vain to hope to gain a hearing for arguments founded on the condition of the Mill Industry.



5. The Appendix explains the principles on which this memorandum, advised by competent and expert opinion, estimates the "proper" charge both for Depreciation and Agents' Commission. Both the *actual* appropriations, and *estimates*, \* are throughout shown side by side.

6. It is interesting to observe that for the 58 mills taken together, while the actual depreciation payment falls short of the estimates, and the actual commission paid exceeds the theoretical amount payable, the joint charge for both depreciation and commission is nearly the same (taking the whole period) both in the actual payment and the theoretical estimate.

7. Depreciation and commission are only two of the charges that fall on the Gross Earnings of a mill. The earnings that remain after these charges are allowed for may be called the Net Earnings, which are divided among Shareholders and those who *lend* money to the mill, including depositors. The amount paid to Shareholders is called the dividend; the amount entered as interest is not all paid to lenders; a small part is the interest credited to certain Funds used on the mill. These two parts of the interest charge are shown separately in this memorandum.

8. The usual method of exhibiting profits is to work out the proportion of the dividend paid to every hundred of Share-Capital. But this method is not free from both theoretical and practical difficulties. A study of the condition of an industry cannot make distinctions between elements of capital according to the source from which they are derived. A practice has, indeed, grown up of Shareholders providing the Fixed Capital, and lenders the Working Capital; and we may, if we please, say that the share of Fixed Capital is so much, and that the share of Working Capital so much. But, in practice, some of the Fixed Capital is derived from mortgage; and if these mortgagees charge high rates, it would be absurd to dobit to the Mill Industry the accidental financial distress of its promoters. Again, a portion both of the Fixed and Working Capital of some good mills comes from what has been called the Reserve Funds. These Funds are savings from the past earnings, further applied as investments on the mills; and the actual earnings are due not to the Share-Capital alone, but to the Shareholders' Capital including, under this denomination, all the sums provided by Shareholders either as initial Capital, or as Reserve Funds saved out of past earnings. So true is this, that one mill has *watered* its Share-Capital by reducing its Funds. The watering of capital does not affect this investigation; it is merely a transfer from one part of the Shareholders' Capital (Reserve or other Funds) to another part (the paid-up Capital.)

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\* Meaning thereby the appropriations that would have been more proper theoretically.

9. The Funds used on a mill, besides the Share-Capital and Liabilities, comprise not only the Reserve Fund. In practice, it is not possible to differentiate between the Reserve Fund and the Depreciation Fund. Some mills carry to the Depreciation Account sums so much in excess of what is needed that they are entirely unable to spend them; and when the Share-Capital is watered, the Depreciation Fund is drawn upon as well as the Reserve, and the amounts of the Depreciation Fund have been shown as an asset as against mortgage. Other mills carry both to the Reserve and Depreciation Account (which they keep separate) sums so inadequate, that the two together would not provide for sufficient Depreciation.

10. Such a Fund as the mill Insurance Fund belongs to Share-holders, not in their capacity as mill-owners, but as mill-insurers; which, in their freedom to invest anywhere they please, they invest on their own mills. The only question, then, is whether these Funds should be treated as unfunded Share-Capital of the mills, or as debenture-loan granted to the mills.

11. The different parts of the Capital of a mill will be:—

- |                          |                           |
|--------------------------|---------------------------|
| (a) Share-Capital.       | } Share-holders' Capital. |
| (b) Share-holders' Funds |                           |
| (c) Borrowed Capital.    |                           |

These will be separately shown in this memorandum; and the earnings credited to each part also. These figures will be shown, as they stand in the published balance sheets, for purposes of verification; and also as corrected so as to prevent a misleading view of the profits.

12. For instance, many mills accumulate stocks, and, therefore, have to borrow largely against them. If the accounts came to be made up when the stocks were large, the borrowings shown in the Report would be in excess of the average borrowings of the year on which alone interest is calculated, and *vice versa*. Other mills which do not accumulate stocks, have more regular borrowings throughout the year. The *actual* figure for liabilities will be corrected by a reference to the actual interest paid.

13. The Share-holders' Capital, as in the actual figures taken, includes all sums spent on the mills, including the Depreciation Appropriations. No allowance has been made for the deterioration of value. If the estimated depreciation be deducted, a fair present value of the Share-holders' Capital may be obtained; and the Share-holders' capital, as shown in the second column of corrected estimates, is the figures in the first column, *minus* an allowance for deterioration. It would be interesting to compare this with the market-value of shares; and this is done accordingly.

14. The results of the mills may now be exhibited as follows :—

				Actuals.	Corrected Estimates.
Average.	Share-Capital ...	...	...	4½ crores.	4½ crores
	Funds ...	...	...	2¼ "	1 "
	Total Share-holders' Capital...			6¾ "	5½* "
	Liabilities ...	...	...	4½ "	4¼ "
	Total Capital ...	...	...	11¼ "	9¾ "
	Gross earnings...	...	...	95½ lacs	95½ lacs
	Commission ...	...	...	14½ "	9 "
	Depreciation ...	...	...	23 "	29 "
	Net Earnings ...	...	...	58 "	57½ "
	Dividend ...	...	...	31 "	} 33 "
	Interest on Reserve Fund ...	...	...	2½ "	
	Interest on Liabilities...	...	...	24½ "	24½ "

15. The percentages work out as follows :—

				Actual.	Estimated.
(a)	Net earnings to Total Capital ...	...	...	5·2 p. c.	5·9 p. c.
(b)	Dividend to Share-Capital ...	...	...	6·8 p. c.	.....
(c)	Dividend <i>plus</i> interest on Reserve Fund to Share-holders' Capital ...				...
		...	...	5 p. c.	6 p. c.
(d)	Interest to Liabilities ...	...	...	5·5 p. c.	5·8 p. c.

16. The result brought out by the second column is striking, and what might have been *a priori* expected. The fact of so many good mill-owners investing in house-property is an indication that their investments in mills, averaged over a large number of years, cannot be yielding fabulous profits; or to be more accurate, the mill-owners cannot be feeling certain that more money put into mills could yield more than good house-property. Again, the result is self-consistent from whichever point of view it is observed. Ordinarily the real profits to share-holders cannot be very much in excess of the interest on debentures; nor can they fall very short. For, in the last case, share-holders would realise and lend on debentures; and in the first case, debenture-holders would buy shares, and their eagerness to buy would bring *new* mills into existence,

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\*See Appendix D. The Estimated Share-holders' Capital is the value of the site, building, plant, stocks, balances in hand, *minus* the Liabilities, in other words, it represents the Share-holders' interest in the *Material Capital* of the mills. The Total Capital of a mill includes the working capital, usually borrowed.

and pull down prices and profits. Because debenture-holders have preference rights of property over the mills, they would be content with a little less than the expectations of share-holders; but that is all. Of course, in established mills, the disproportion would be greater; the lenders cannot buy their shares except at a premium, and cannot set up new mills without incurring extra cost equal to the value of the premium;—the premium is the price for the monopoly of the advantages of the established mills. To get the advantages possessed by an established mill as a *going* concern—a suitable battalion of workers, a trained staff, a clientele of buyers whose tastes have been successfully adapted to, machines working smoothly, &c.—a new mill would have to expend sums in experimenting; to obtain these advantages without trouble from a going concern, it should be ready to pay for “the good will” of the concern. That is the share-premium.

17. Next, the 58 mills are classified according to their average estimated rate of profit into 4 groups; and the actual and estimated percentages of each class are exhibited as follows:—

Class of Mills.	Number in the Group.	Average Dividend per cent. of paid-up Capital.	Interest per cent. of Borrowed Capital.		Income on Share-holders' Capital.		Percentage ratio of Net Earnings to Total Capital.	
			Actual.	Estimated.	Actual.	Estimated.	Actual.	Estimated.
I	3	18·4 p. c.	5·3	5·3	11 p. c.	16 p. c.	9·3	12·4 p. c.
II	13	9·4 p. c.	5·1	5·1	6·6 p. c.	9·5 p. c.	6·1	7·7 p. c.
III	19	6·3 p. c.	5·2	6·1	4 p. c.	5 p. c.	4·5	5·5 p. c.
IV	23	1·9 p. c.	6	6·4	1½ p. c.	—1·1 p. c.	3·7	2·6 p. c.
Total...	58	6·8 p. c.	5·5	5·8	5 p. c.	6 p. c.	5·2	5·9 p. c.
Total minus Central India	57	5·7 p. c.	5·5	5·8	4·2 p. c.	5 p. c.	4·7	5·3 p. c.

The teaching of the tables is that the average profits of the 58 mills are about 6 p. c.; but that this average is the mean of profits over very wide ranges, some going as high as 16 p. c.; that if even one good mill is omitted from the average, the share-holders' share falls to 5 p. c.; that nearly 40 p. c. of the mills have worked at an average loss, thereby confirming the impression that the debenture-holding class started mills of its own, stimulated by booming times, but that it showed itself incapable of reaping even ordinary profits without special knowledge.

18. For 40 out of these 58 mills, it has been possible to get market quotations of shares, with the following results. The quotations, taken from newspapers, are probably exaggerated. [See end of para 8. Part I] :—

	40 Mills.	Same excluding Central India.
Original Value ... ..	362 lacs	347 lacs
Market-value in 1890 ... ..	321 "	281 "
" " 1895 ... ..	571 "	448 "
" " 1900 ... ..	422 "	290 "
Average ... ..	459 "	365 "

19. The average dividend of these 40 mills is 7.9 per cent. of paid-up Capital ; and of the same (not including Central India), the dividend per cent. of Capital is 6.5 per cent. The average dividend of all the 58 mills is 6.8 per cent.; excluding Central India it is 5.7 per cent. So that these 40 mills are better than the average. The following figures show the expectations of the investor :—

**Central India :—**

Original value ... ..	15 lacs.
Market value in 1895 ... ..	123 lacs.
Dividend ... ..	787 thousand.
Rate of Dividend per cent. of market-value in 1895 ...	6.4 per cent.
Average value in 10 years ... ..	94 lacs.
Total Dividend paid in 10 years ... ..	6,830 thousand.
Rate of Dividend per annum per average market-value.	7¼ per cent.

**39 Other Mills.**

Rate of Dividend (average) ... ..	6.2 per cent.
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**2 Other Mills.**

Original value ... .. 14 lacs	Average Dividend per cent. of Market- value per annum.	6⅓ p. c.
Market-value in 1895 ... 9½ "		
" " " 1900 ... 7 "		
Average ... .. 9 "		

**4 Other Mills.**

Original value ... .. 27 lacs.	Dividend, etc.	4.3 p. c.
Market-value in 1895 ... 16 "		
" " " 1900 ... 11 "		
Average ... .. 17 "		

It will thus be seen that not many mills have kept their average value to the point of their par value ; that the market-values in some cases declined

even in '95 below the point reached in '90 ; that in nearly every case, the value of 1900 is lower than that of '90 and '95 and lower than the par value. The market-value is by no means, either year by year or on an average of years, equivalent to so many years' purchase of the dividend. Even losing mills have some quotation ; so that the value, of the Material Capital of a mill and its liabilities enters into the investor's calculation ; but about 6 p. c. appears to represent his expectation on an average.

20. Of the 58 mills examined, 25 have weaving departments. They may be described as follows :—

	Actuals.	Corrected Estimates.
Average Share-Capital ... ..	2½ crores	2½ crores
Funds ... ..	1¼ "	½ "
Average total Share-holders' Capital	3¾ crores	3 crores
Liabilities... ..	2½ "	2½ "
Average Total Capital...	6¼ crores	5½ crores
Gross earnings ... ..	55 lacs	55 lacs
Commission ... ..	7½ lacs	4⅔ lacs.
Depreciation ... ..	12 lacs	14·8 lacs
Net Earnings ... ..	35½ lacs	35½ lacs
Dividend ... ..	20¼ lacs	} 22½ lacs
Interest on Reserve Fund ... ..	2¼ lacs	
Interest on Liabilities ... ..	13 lacs	13 lacs

21. The percentages work out as follows :—

	Actual.	Estimated.
(a) Net earnings to Total Capital ... ..	5·7 per cent.	6·5 per cent.
(b) Dividend to share-Capital ... ..	8·1 per cent.	
(c) Earnings on the whole Share-holders' Capital ... ..	6 per cent.	7·5 per cent.
(d) Interest on Liabilities ... ..	5·4 per cent.	5·5 per cent.

The omission of the C. I. Mills works out the result as follows :—

	Estimated.	In 25 Weaving Mills.	In same minus C. I.
Net Earnings to Total Capital ... ..	6·5 per cent.	5·7 per cent.	
Earnings on the whole Share-holders' Capital	7·5 per cent.	5·8 per cent.	

22. It will thus appear that the Weaving Mills have been somewhat more profitable than the pure Spinning. The result may be partly due to the

fact that whereas only 19 per cent. of the paid-up Capital of the Spinning Mills examined falls in the first and the second classes of mills, the mills which run weaving also have 52 per cent. paid-up Capital in the two classes ; or if the C. I. Mills be excluded, still 44 per cent. This is not quite *petitio principii*. A joint S. & W. concern requires larger Capital than a pure Spinning concern, and usually is under better and more economical management for that reason. Again, in so far as the profits of Spinning and Weaving can be different, as the cheapness of yarn is good for weaving, and dear yarn unremunerative, it may be expected that the profits of Spinning and Weaving Mills will usually diverge from the normal in a direction opposite to the deviation of the pure Spinning profits. The profits of the two may now be compared period by period :—

Period.	Estimated Net Earnings in			Estimated Share-holders' Earnings in		
	Spinning Mills.	Spinning and Weaving Mills.	Spinning and Weaving Mills not including C. I.	Spinning Mills.	Spinning and Weaving Mills.	Spinning and Weaving Mills not including C. I.
1890—1894	5.3 per cent.	6.8 per cent.	5.9 per cent.	4.4 per cent.	7.6 per cent.	6 per cent.
1895	9.5 per cent.	9.2 per cent.	8.4 per cent.	11.2 per cent.	13 per cent.	12.2 per cent.
1896—1899	3.7 per cent.	5.6 per cent.	4.4 per cent.	1.6 per cent.	5.5 per cent.	3.8 per cent.

A caution may here be given. The percentages of earnings in the different years are not on the same amounts of capital. Mills have added to their capital year after year ; moreover, the balance sheets or statements for all the 58 mills were not available for all the years. For instance, there are reports for only 35 mills for all the years. Had only these mills been adhered to, the base of induction would have been unnecessarily narrowed ; and logically, the profits on the added capital of the same mills would have had to be separated—which, of course is impossible. The reader may, perhaps, apprehend that if inferior mills have been admitted after 1895, the fall of profits may be partly due to this inferiority. The apprehension would be ill-founded ; the average capital is shown in para 14 to be  $4\frac{1}{2}$  crores, and the ultimate capital is 5 crores ; moreover, two of the finest of these mills report only after 1895, and earn exceedingly well. But, perhaps, there will remain not a shadow of excuse for mistrust if I explain that the course of profits of the weaving mills in the three periods have been worked out, *after omitting mills which were not materially represented in the 1st period* ; and the results of the above table are not modified.

23. The last table shows that the profits both of Spinning and Weaving were very high in 1895 ; that this maximum was reached after an earlier period of smaller profits, and was followed by a period of greater decline than that of

the first period. The decline of the last period would have shown more if the profits of 96 had been omitted from the average. [They were something like 9 or 10 per cent.] Up to a certain point, the profits of Spinning and Weaving move in sympathy, though in the period of decline, Weaving falls less than Spinning. This may be explained, as in the last para, on the supposition that generally, Spinning and Weaving is under better management than pure Spinning; but also on the theory that when yarn is rising or falling in value owing to causes which primarily affect its supply or cost—cotton, fuel, labour-cost—then cloth rises or falls in sympathy; a part of the pressure or good luck of the spinners is sure to be shared by the weavers. But if yarn is cheapened or made dear by a change in the Demand which does not affect the Demand for cloth then cheap yarn means prosperous Weaving, and dear yarn dull Weaving. Apparently both sets of causes have been in operation during the last years of the last century. Cotton (in 1900 and after) and coal were dear owing to the Famine or the American short crops and the Boer War; labour-cost owing to plague; the Boxer movement extinguished the demand for yarn in China; while Famine postponed the demand for cloth in India.

24. The course of profits year by year in each class of mills is shown in the table below:—

In year.	Share-holders' Profits per cent. in the Mills of Class.			
	I (3 Mills)	II (13 Mills).	III (19 Mills).	IV (23 Mills).
1890... ..	20·6	10·8	12	2
1891... ..	15	10·7	8·3	5·3
1892... ..	13·6	11·6	6·8	3·7
1893... ..	9·5	4·5	0	— 5 (loss)
1894... ..	15·8	11·5	8·3	1·3
1895... ..	18·9	18	8·4	6·3
1896... ..	17·4	12	9·2	5·4
1897... ..	20·4	8·5	5·8	— 4·4
1898... ..	17·8	7·3	0	— 9
1899... ..	12·4	6	— 2·4 (loss)	— 8
1900... ..		2	— 13 (loss)	— 14

25. It has to be remembered that in this computation the Share-holders' Capital is written down by allowing for annual depreciation, or else the percentages would have been smaller. Similarly, all the interest credited to the Reserve Funds has been counted in; and Commission has been deducted not as it *was* paid, but on the much reduced scale on which it ought to have been paid. So that there is no hope of averting losses on the inferior half of the mills by any change in the system of Commissions. Roughly, the first five years are prosperous, the next two are booming, the last three or four



ruinous for one-half the mills, just good for another half, and continuing good for three mills only. The comparison of the 2nd and 3rd groups shows that there must be many mills in the third group which originally would have deserved to be in the 2nd group, and have since deteriorated.

26. If it be sought to determine how far the advantage of the Joint Spinning & Weaving Mills is due to the greater profitableness of pure weaving, the object may be attained by taking those mills which have kindly furnished, for the benefit of this Memo., the separate profits of Weaving and of Spinning. Unfortunately, only 2 mills have furnished these data; if they be so situated that cloth is more in demand in their neighbourhood than yarn, as is certainly the case at present in Ahmedabad, then they will not correctly indicate the relative profitableness of Spinning & Weaving on an average. Such as they are the figures for the two mills are given below :—

In year.*	Profits in Mill.			
	I		II	
	Per 10 Spindles.	Per Loom.	Per 10 Spindles.	Per Loom.
	Rs.	Rs.	Rs.	Rs.
1890 ... ..	174	201	13	74
1891 ... ..	152	174	19	81
1892 ... ..	98	256	21	101
1893 ... ..	118	367	11	104
1894 ... ..	179	272	17	139
1895 ... ..	219	119	46	59
1896 ... ..	201	65	52	61
1897 ... ..	237	151	23	61
1898 ... ..	204	215	33	105
1899 ... ..	135	184	35	84
Average 1890—1894 ...	144	254	12	100
1895 ... ..	219	119	46	59
1896—1899 ... ..	194	154	36	78
Total average ... ..	174	184	25	87

27. These figures have been obtained *without* deducting the charge for depreciation, but *after* deducting the whole charge of interest on borrowed Capital. The result is that the two mills are not exactly comparable; the first increases its earnings per loom or spindle, because it has less interest-charge than the normal, having large Reserve Funds; the second has more interest-charge than the normal, having a capital debt equal to  $\frac{1}{2}$  of its paid-up Capital. The interest-charge would be normal, if the working-Capital alone were borrowed

\* For Mill I, the statements relate to the years 1890-91, '91-92 &c., and not to calendar years.

Yarn is bought by the Weaving Department from the Spinning Department at the market price of the day,\* which, however, is nominal and low. It would pay the Mills to *buy* the yarn they require for their Weaving Department at the price they credit to their own Spinning Department. That they do not do so proves that they cannot buy that yarn at that price, though they cannot sell it at a higher.

28. Nevertheless, both mills show an indetical course in the profits. In '95 and '96 the profit per spindle is highest, and the profit per loom is lowest. In the quinquennium preceding, the profit per loom is highest, and the profit per spindle is lowest. In the final period, the profits of both are intermediate. An inverse sympathy between the profits of Spinning and of Weaving would appear to be established. And very naturally. In '95 and '96 yarn was dear owing to a large China demand which made Spinning profitable for other purposes than cloth manufactured in India. The Indian weaver had to pay a proportionate price for his raw material without the advantage of similar boom in his cloth. In other years, when yarn was cheapened by a low demand from China, the weaver had a good time of it.

29. There is a clear indication that after the new Tariff on Indian cloth, Weaving profits have not reached the old height. The following excerpts about the variations of price-current (No. 194 Statistical Abstract, 1901) are instructive :—

Average prices in the years.	Of Broach cotton.	Of Bombay yarn 20's.	Imported cotton grey shirtings.
1873 ...	100	100	100
1890-1894 ...	89	72	74
1895 ...	70	67	71
1896-1899 ...	74	65	66

The columns showing the relation between cotton and yarn very clearly explain the high and low profits of the various periods. But comparing the columns for yarn and cloth (if the variations of shirtings are a correct index of the variations of Indian cloth), we do not see why cloth should be less profitable in 1895 than in the quinquennium preceding or than in the four years following. The margin between yarn and cloth is less during the duty-paying period than in the first quinquennium on an average. Thus, so far from the excise-duty or the import duty having been made up by the con-

\* These two mills, whose Spinning and Weaving Departments are under equally competent management, do *not* show that Weaving is more profitable than Spinning under equally good management. Since the first edition was issued, I have gone more minutely into this question and have satisfied myself of the truth of this conclusion.

sumer, there is a deficit without the excise-duty. Famine may be responsible for this lower price by depressing the demand ; but there is no reason to suppose that the price would have been lower still but for the duty. The consumer *never* calculates the cost of production. A burden or benefit is passed on to the consumer only through the agency of supply ; as the output of mills cannot be reduced, the consumer, with or without famine, will hold his own against the transfer of duty to him, the adjustment on the rapidity of which Sir James Westland founded the most rhetorical part of his justification of the Cotton Duties can take place only when consumption is *increasing*, and demand is strong.

30. Returning to the two mills, the same course of profits may be exhibited by studying not the profits per loom or spindle, but per cent. of the value of cloth or yarn sold. The following table will serve to show the movement of profits on cloth :—

In the years.	Profits per cent. of value of cloth sold in Mills.	
	I	II
1890-1894 ...	11·4	7
1895 ...	5·2	4·2
1896-1899 ...	8·8	6

31. The same table would be slightly modified if instead of the actual values of cloth sold, the average values per lb. prevailing in the quinquennium '90-'94 were taken for all periods :—

In the years.	Profits per cent. of value of cloth sold in Mills.	
	I	II
1890-1894 ...	11·4	7
1895 ...	4·9	4
1896-1899 ...	7·8	5·3

32. These two tables teach the same truth *viz.*, that the profits of Weaving before the duty were higher than after the duty : but, of course, too much stress should not be laid on these figures, as the value of the production per loom varies from year to year. They should be used as indications, but not as more than indications, of the direction of profits. [Depreciation is not allowed for in these profits.]

33. The profits of pure Weaving have been separately worked out by two distinct methods. Of 58 mills, in 4 classes, 33 do pure Spinning ; and 25

both Spinning and Weaving. Of each of these mills in every year, the number of spindles, looms, value of production, Capital, Funds, liabilities are all noted down. Take any one year, say 1895. The pure Spinning Mills earned a profit of 11·2 per cent; if the total Capital of the Spinning and Weaving Mills for that year be divided into the part relating to Spinning, and the part relating to Weaving, and if 11·2 per cent. be allowed on the Spinning Capital, and deducted from the total profits, the balance would represent the total profits on pure Weaving, which when divided by the Weaving Capital would give the profits per cent. on pure Weaving. The method might be carried out, not for all Spinning Mills, but for each class of Spinning Mills separately. The difficulty is to precisely *divide* the Capital. No satisfactory ratio is obtainable, though many devices were employed to overcome difficulties. A rough result will be exhibited by taking the fixed capital for 17,000 spindles equal to the fixed Capital for 1,000 looms.

34. The other method is to take the number of spindles in all the pure Spinning Mills of any class, and then the profit per spindle for that class; to take the spindles only of the Joint S. & W. concerns of that class, multiply the number by the profit per spindle previously ascertained; this should give the Spinning profit of the S. & W. Mills of that class. Deduct the Spinning profit from the whole profit; the balance is the Weaving profit for all the looms of that class; this, divided by the number of looms, should indicate the profit per loom of that class. The course of the profit per loom year after year enables us to see the effect of any measure on Weaving profits. The disadvantage of this method is that unless ring and mule spindles are separated, unless old and new spindles or looms are taken apart, the result is not likely to be unambiguous; and to separate these, a much larger number of mills than are examined would be required.

35. When the capital of the Joint Spinning & Weaving Mills is divided so that the Fixed Capital on 17 spindles is taken equivalent to that on 1 loom, the following Share-holders' earnings for Spinning, and for Weaving, separately are deducible. The pure Spinning Mills are taken separately; their profits per cent. are deducted from the Spinning Capital of the Joint Concerns; the remaining Capital being taken as Weaving Capital, and the remaining profits as Weaving Profits :—

Period.			Spinning Profits* per cent.	Weaving Profits per cent.	} The C. I. Mill is not considered.
1890-1894	...	...	4·4	11·5	
1895	...	...	11·2	15·4	
1896-1899	...	...	1·6	9·6	

\* The profits in these tables are Share-holders' earnings. Depreciation has been provided for; but they include interest paid on Reserve and other Funds, but not on Liabilities.

When the method of para 34 is applied (without reference to the classification of mills) the following results are obtained :—

Period.	Profit per annum per 17 Spindles.			Profit per annum per Loom.			Profits per 17 Spindles and per Loom (omitting Class I.)	
	Rs.			Rs.			17 Spindles.	1 Loom.
1890-1894 ... ..	28.5			127			28.5	69
1895 ... ..	67			130			65	77
1896-1899 ... ..	16.3			102			13	33.4
1890-1899 ... ..	27			115			25.3	52.5

36. If the mills be taken class by class, the following results may be shown :—

Period.	Profits per 17 Spindles.				Profits per Loom.			
	Class.				Class.			
	I	II	III	IV	I	II	III	IV
		Rs.				Rs.		
1890-94 ... ..		34	41.8	7.1	...	154	15.4	50
1895 ... ..		82.5	79.2	36.5	...	194	(-97)	22
1896-1899 ... ..		48.3	17	(-10.5)	...	90.7	39	(-91.5)

The percentage earnings on Share-holders' Capital, when distributed class by class, (by the method of para 33) are shown below, both separately on Spinning and on Weaving :—

Class.	Spinning.			Weaving.		
	1890-1894.	1895.	1896-1899.	1890-1894.	1895.	1896-1899.
I ... ..	...	19.3	16.9	...	17.3	18
II ... ..	7.8	18	8	18	16.5	10.4
III ... ..	7.2	13.8	2.7	(-1)	(-17)	9.5
IV ... ..	14	7.9	(-2.2)	5.3	1	(-17)

[When thus distributed, there is no consistent excess of profits noticeable in weaving.]

37. It thus appears that the omission of Class I makes a much larger difference to weaving than to Spinning; that the Weaving Profits have been halved, when taken per Loom; that in the fourth class of mills, the fall converts

a small profit into a big loss. Nevertheless, when taken class by class, there are anomalies in the figures, as might be expected. The profit here taken is what is due to the Share-holders; but in the lower classes of mills, many must have been built on borrowed capital, and the profits due to borrowed capital are paid away as interest. A better view of the course of profits would be obtained if the interest paid be added to the profits.

The following synopsis may be instructive :—

Periods.	Profits in rupees per 17 Spindles including interest on borrowed Capital in classes.				Profits in rupees per Loom including interest on borrowed Capital in classes.			
	I.	II.	III.	IV.	I.	II.	III.	IV.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1890-1894 ... ..	...	58	62	34	...	163	59	71
1895 ... ..	163	102	100	72	387	216	(-50)	9'5*
1896-1899 ... ..	124	73	37	22	412	91	119	(-37)

38. The anomalies are not removed by taking interest together with the profits. The Weaving Profits, in more than half the cases, keep higher than the Spinning Profits; the third class Spinning Mills are quite as profitable as the second-class before 1895, while the fourth class Weaving Mills are more profitable than the third class in the same period; the weaving of the third class is more profitable in the last than in any preceding period. As has been observed

\* Comparing the Tables of paras 36 and 37, we find that while the profit per loom alone for 1895 in class IV is Rs. 22, profit *plus* interest, for the same loom in the same year, is given as Rs. 9'5. This is, of course, impossible, as interest never is negative. The anomaly arises from the method employed to obtain these figures. The interest-charge on the Spinning Mills of Class IV is excessive, probably due to the Fixed Capital also being partly borrowed; the interest-charge on the Spinning and Weaving Mills of Class IV is apparently normal. When, therefore, the profit *plus* interest per spindle obtained from the pure Spinning Mills is deducted for all the spindles of the Spinning and Weaving Mills, much more is deducted for the interest-charge per spindle than has been really paid by the Spinning and Weaving Mills; and therefore the profit *plus* interest per loom works out fallaciously smaller than it actually is. To take exact figures. The interest-charge for 1895 for the Spinning Mills of Class II and Class III is Rs. 21 per 17 spindles; that of Class IV for the same year is Rs. 35'5 per 17 spindles; the difference in the *rate* of interest is not greater than 20 per cent, or would not account for more than Rs. 5 excess; therefore about Rs. 11 per 17 spindles are probably an interest-charge due to "capital debt." From this interest-charge due to "capital debt," presumably, the S. and W. Mills of Class IV are exempt; but, on the method adopted in this paragraph, the whole of Rs. 35'5 is charged for interest on the Spinning department. In the S. and W. Mills of Class IV, there are 62 spindles to 1 loom—at the rate of Rs. 11 per 17 spindles, the 62 spindles are charged Rs. 40 for interest which ought properly to be credited to the loom for profit *plus* interest. The figure for the loom's profit *plus* interest, on this computation, would be Rs. 50, as against Rs. 22 without interest; and this is as it should be.

these anomalies might have been expected. The classification of mills, made on average profits, is not perfect ; old and new spindles and looms are not differentiated ; a mule has been roughly taken as  $\frac{4}{5}$ ths of a throstle or ring spindle. (See Appendix E). But the 'chief source of error consists in the unequal distribution of Looms and Spindles in the Joint Concern. An error of Re. 1 per Spindle in the Spinning Profits would compel an error of over Rs. 50 in the profits per Loom ; or one per cent. understatement of Spinning Profits would exaggerate the Weaving Profits by 3 to 4 per cent. Taking all these circumstances into account, the Weaving Profits derived from all mills, *without classification*, (and omitting Class I for containing 3 mills, spinning for only a few years, and 2 exceptional S. & W. Mills), are to be accepted as more reliable, where inequalities compensate each other.

39. The total amount of duty paid by the 25 S. & W. Mills investigated for this Memorandum was 18 lacs, made up as under :—

Class.	Amount of duty.	Duty per Loom.	Percentage ratio of Duty to Weaving Profit.	Percentage ratio of Duty to Weaving Profit plus Interest.
		Rs.		
I ... ..	405 thousand	55	Of Central India 38 p. c.	.....
II ... ..	899 „	42	48 p. c.	46 per cent.
III ... ..	254 „	30	75 p. c.	25 per cent.
IV ... ..	238 „	13	Loss equal to over 7 times the duty.	Loss equal to twice the duty.

40. It now remains to ascertain how far the results obtained so far, whatever their value, may be taken to be representative of the Industry of the Country. The memo so far has reviewed 58 mills ; these are mainly those whose Agents kindly furnished Reports or summary statements or both for 10 years ; in 2 cases it was possible to obtain Reports, where the Agents did not choose to favour this inquiry. Recently, a sheaf of Reports about Ahmedabad Mills has been obtained ; but the greatest portion of this memo had been already written, and it would have entailed too much delay to analyse this fresh batch of Reports, and incorporate them in this memo. A reference to the Commercial Columns of the *Times of India*, the *Pioneer*, and the *Madras Mail* has given information about 49 mills not referred to in the preceding discussion.

41. It is first important to make certain that this newspaper information is reliable. The newspapers between them give information about 40 other mills whose Reports have been studied for the purpose of this Memorandum. The Reports mention dividends actually paid during the periods noticed by the newspapers which also mention the dividends ; and the two

statements about dividends are found to be somewhat wide apart. The dividend paid, according to the newspapers, is 342 lacs, whereas the Reports show only 275 lacs. Thus the newspapers have exaggerated the dividends by 25 per cent ; and it is quite probable that the quotations for market-values are similarly exaggerated or at least careless.

42. Such as they are, they give this information. 29 mills with the paid-up Capital of 285 lacs have paid 178 lacs in dividend, or 6 $\frac{1}{4}$  per cent. These mills have been in full work for 10 years. The market-value of these in 1890 was 247 lacs or 85 per cent. of paid-up Capital ; the market-value in 1895 was 272 lacs or 96 per cent. The quotations of all are not given for 1900 ; but paid-up Capital of 250 lacs was quoted in that year at 158 lacs or 63 per cent. The average price of the period was 245 lacs or about the same as in 1890, *viz.*, 85 per cent. of the paid-up value. There is one mill which maintains its market-value at par or even more, which has kept in full work for ten years, but whose dividends are not stated ; its capital is 6 lacs.

43. 9 other mills with a paid-up Capital of 57 lacs] have worked for a shorter period, so that their average Capital is only 38 lacs ; on this they have earned a dividend of only 7 lacs in the whole period, or less than 2 per cent. per annum. Their average market-value was 44 lacs or 77 per cent.

44. Taking together these 39 mills, the dividend reported to have been paid by them is 5.5 per cent, as against the 6.8 per cent. of the 58 mills whose Reports have been examined ; and 5.7 per cent. if C. I. be omitted. The market-value of their shares, in 1890, was 84 per cent. of the paid-up Capital ; in 1895, 92 per cent ; and in 1900, 65 per cent. The market-values of 45 out of the 57 mills with Reports (Central India being omitted) were in the years 1890, 1895, and in 1900, respectively 80 per cent, 121 per cent. and 78 per cent. of the paid-up Capital. It will thus be seen that the results of this memorandum are more favourable than would be obtained by taking the generality of mills ; particularly when it is remembered that newspaper accounts are shown to have exaggerated dividends by 25 per cent. in the case of 40 other mills whose annual reports were available for comparison. The newspaper accounts, moreover, mention 10 other mills, 2 of which became private concerns, and 6 stopped work or went into liquidation. These 6 concerns had an aggregate paid-up Capital of 35 lacs.

45. The net impression on an unbiassed student of the statistics of the Indian Mill Industry would probably be this :—The profits of the Mill Industry are fluctuating, and on an average of 10 years not larger than enough



to tempt Capital ; the profits of Spinning are more fluctuating and smaller than those of Weaving, but not so much smaller but that the addition of a pie per lb. in the price of yarn may equalise the profits. Both Spinning and Weaving Profits have fallen since 1896 ; the Spinning Profits owing to increased cost of production, more directly owing to the slump in the Chinese market for Indian yarn. Increased cost of production, from the duty as well as other items, together with the arrest of demand for cloth owing to famine, may account for the fall of Weaving Profits. But whatever the causes, that prompt adjustment, and transfer of a burden or a benefit to the consumer (which is indicated by steady profits), relied on by the defenders of the cotton tariff does not exist ; and it does not exist because both the extension and withdrawal of Capital take time in this Industry. Extension becomes possible in 2 or 3 years ; withdrawal in less than a decade would be very difficult. Under such conditions, the cost of production only partially rules prices ; the determining factor of value is Demand. It is lucky for the Mill Industry that the Cotton Duties have affected cloth only ; the Capital sunk in Weaving is a small fraction of the Capital of the Industry, and Weaving Profits have been higher than Spinning. Had the duties been imposed on yarn, matters would have become serious ; with vanishing profits, the extra burden of the duty would have become unbearable. The consolation would have been that the bulk of the yarn would have escaped duty on export ; and that the price of yarn sold in India could, to a large extent, have risen in response to the duty. This would have perhaps hit the hand-weavers.

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## APPENDIX.

For deducing the rate of profits with some accuracy, it is necessary to apply some corrections to the figures furnished in the Reports of the various mills. When these corrections are applied, the figures are called "estimates" in the text of this memorandum, as distinguished from "actuals" referring to the figures taken as they stand in the Reports, and shown side by side for verification.

It should be remarked that for nearly every item there is lacking a uniform practice in statement. Repairs are sometimes lumped together with wages and stores, sometimes are shown separately, and again are partially shown as a charge on the Depreciation Fund. A Reserve Fund, when a Depreciation Fund is inadequate, is meaningless, and yet is shown as Reserve. Commission is shown or disguised in various ways. Interest-charge may or may not include interest on Depreciation and other Funds. When it was observed that the actuals gave the figures in the Reports, the figures meant were really the figures after being reduced according to some uniform principle.

The corrections relate to :—

### A.

(a) Reserve and other Funds ; and (b) Liabilities.

### B.

(a) Depreciation-charge annually ; and (b) Annual Commission to Agents.

### C.

(a) "Estimated" Share-holders' income and net earnings.

### A.

The Total Capital of a mill should mean the whole capital, fixed and working, employed on the mill, whatever the source from which it is derived. If the paid-up Capital alone had been kept in mind, and the actual dividends paid, the following inaccuracies would have resulted :—

(1) The mills require to be classified according to their profits, and then compared ; but the classification would be inaccurate if the paid-up Capital were taken to represent the Capital on which dividends are earned. Some mills showing a high rate of profit per cent. of paid-up Capital have really earned so much because their capital is larger, the Reserve and other Funds having been spent in enlarging plant. Other mills show a smaller rate

of profits than they have really earned. They may be paying heavy interest on mortgage, made necessary by the scanty paid-up Capital. Their borrowings may largely represent the losses of previous years not written off against any available Fund ; so that a portion of the paid-up Capital has been practically wiped off. They may have deteriorated in value, because of their diminished production—sufficient sums not having been spent in previous years on repairs and renewals.

(2) Apart from classification, though we may expect that the two classes of error may compensate each other in the final result, still it is better to verify the compensation than to assume it.

(3) The Liabilities are deceptive as stated in the Reports. They are only the liabilities on the last day, and may be higher or lower than the average according to the date of the making up of accounts, according to the practice of the mill to keep or avoid keeping large stocks, and according to the items put under the head of Liabilities—such as unadjusted bills, unpaid wages and unpaid dividends ; sometimes such items as Workmen's Insurances Fund, etc. Unless care is taken, sometimes a higher class of mills will appear to pay a larger rate of interest than the lower classes.

(4) Dividends are sometimes paid out of a Dividend Equalization Fund, or the Reserve Fund, or even by starving provision for depreciation and repairs. Dividends, therefore, cannot correctly indicate the *course*—the rise and fall—of earnings. And this error would, of course, be aggravated, if meanwhile the Fixed Capital has altered without a corresponding change in the nominal capital.

To avoid these and other sources of error the paid-up Capital and the Funds are taken together as Share-holders' Capital—the paid-up Capital being called the Share-Capital. No distinction is made between Reserve and Depreciation Funds, as sometimes Reserve is only a supplement of very meagre Depreciation, and sometimes Depreciation is disguised Reserve. All Funds spent on the mill out of the Share-Capital, or savings from past earnings, belong to the Share-holders either in their capacity of Mill-owners, or Mill-insurers. In this Share-holders' Capital are included all sums that have been spent out of the Depreciation or Reserve Fund on the purchase of new Machinery, or even on the replacement of old. Supposing that the Liabilities are spent entirely as working-capital, the Share-holders' Capital thus understood will exceed the real value of the fixed capital by the amount by which it has depreciated. If the actual Depreciation, (as estimated by methods to be explained later) then, be written off, the balance would represent the accurate value of Share-

holders' Capital. Unfortunately, from the way in which Depreciation is usually understood, it cannot be said that the productive power of a mill diminishes in exact proportion to this Depreciation; and as no precise scale is known to determine the relation between Depreciation and diminution of production, *two-thirds* only of the Depreciation from year to year is deducted. The Shareholders' Capital thus estimated is about 80 per cent. of the actual figures of the Reports. If the Report Figures had been adhered to, the earnings of Shareholders would not have been brought out at 6 per cent. but only at 5 per cent. The corrections help to show the position of the mills more favourably. It is not pretended that the correction is accurate; there are other petty sources of inaccuracy; but this figure is as near the mark as any other.

(b) There is no means of correcting the Liabilities except by a reference to the books of the mills which are not accessible. The correction made is on the principle that each class of mills would have a certain rate of interest. Where the rate of interest falls short of this anticipation, the liability written down to bring the interest to the expected level. But, of course, the correction is very rough. The reduction made is in the proportion of 18 to 17.

## B.

The estimated rate of Depreciation is taken at  $4\frac{1}{4}$  per cent. on the value of the whole fixed capital of a mill, including site and buildings. For this purpose, the real value of the fixed capital of each mill was ascertained year after year, by downright calculation, and also checked by comparison with figures of Shareholders' Capital. The actual Depreciation so taken exceeds the annual contribution towards both the Reserve and Depreciation Funds together, in the ratio of 29 to 23. But as a matter of fact it is smaller than the amounts actually contributed by the 16 mills that are in the first two classes. It is one-half of the amount sanctioned by the 1st class mills, and 15 per cent. less than that sanctioned by mills of the 2nd class. It is less than that set apart by mills under European management; it is much less than what is recommended in a text book on Depreciation. Repairs of every kind are payable out of this estimated Depreciation Fund, so that where the item of repairs figures in the charges on Revenue Account, that item is deducted from the amount transferable to Depreciation. The amount was adopted by a reference to the actual experience in Mr. Tata's mills, and also on the advice of Mr. Bezanji Dadabhai Mehta, Manager, Empress Mills, Nagpur, as well as Mr. A. J. Bilimoria and Mr. Morris, Architect. (of Messrs. Gostling & Morris.)

## B. (b)

The Commission system is the weak spot usually fingered by the assailants of the Bombay Mill system. If only the commission charges were

not excessive, it is argued time and again, there would be no fear of Mill-profits drying up. It has been, therefore, attempted to substitute "estimated" Commission for the actual commissions paid. The Agents of mills perform undoubted services for which remuneration is due to them. The market alone can be trusted to settle, in the long run, what is adequate but not extravagant remuneration. If the scale of the better class of mills is adopted, and made more rationally grounded, there should be some hope of lighting on a theoretically just scale. Whether mills pay or not, Agents have to do a certain amount of office work, buying, selling, studying prices and credit, attending to the general conservation of a delicate organization. For this service they are remunerated only indirectly out of the commission. More than one Agent has found it needful to employ an expert (not paid out of the mill revenues) to relieve himself of some portion of this work. More than one good mill guarantees to its Agents a minimum commission. This is reasonable. In the estimated Commission, (adopted in this memorandum) there is a minimum of Rs. 6,000 a year for every mill. The rest of the commission is made proportional to net profits. In the ordinary practice of good mills, 10 per cent. on share-holders' profits is allowed; but except in some English mills the 10 per cent. is calculated on profits before Depreciation is allowed for. This distribution is theoretically faulty. Depreciation is a part of expenditure and not of profit. On the other hand, the interest paid to a mortgagee entails on the Agent as much labour and skill to earn it, as if the mortgage-Capital had belonged to the share-holders. Therefore, the commission should be a percentage on Net Profit, including under the term sums reservable for Dividends, Interest-charge and Commission,—but not for Depreciation. What should be this rate per cent? The total earnings of the Svadeshi Mills, including interest paid, during the 10 years 1890—99 were 3,473 thousand; allowing for Depreciation, they would be probably 29 lacs; the commission paid was  $2\frac{1}{2}$  lacs; deducting Rs. 60,000 as the minimum, there would be 165 thousand on 29 lacs which is nearly 6 per cent. So, six per cent. on the Net Profit (including interest) *plus* Rs. 6,000 per annum per mill as a fixed item, has been estimated as the just commission of a Mill-Agent. So calculated, it comes to about 60 per cent. of the commission actually paid on the average.

### C.

The Share-holders' earnings in a mill have been estimated in the memorandum at 6 per cent. Had the commission charged been the actual Commission paid, and not the estimated Commission, the earnings would have dwindled to 5 per cent. Had we omitted the C. I. from the reckoning, the average earnings of shareholders would have been reduced to 4 per cent; and nearly to  $3\frac{1}{2}$  per cent. if no deduction had been made on the Capital account for deterioration.

All the corrections made, therefore, with the sole exception of Depreciation, have immensely helped a favourable picture of the mills whose normal condition would have appeared gloomy but for these modifications in estimates.

#### D.

The net income per cent. on Share-holders' Capital is taken to be the ratio of the estimated profit to every 100 of the Share-holders' Capital as estimated in Appendix A. Now, this estimated Share-holders' Capital represents the Share-holders' interest in the whole material Capital of the mill. If we take the *actual expenditure* on site, building and plant of a mill, allow for its Depreciation year after year (as in Appendix A), we should get the whole fixed Capital of the mill in any year. If we take the average value of the stocks of the raw produce and the finished articles, of balances in hand, and of liquid investments, we should get the whole circulating Capital of the mill. The usual practice is for the Share-holders to supply the Fixed Capital, and deposits and debentures and loans from banks to supply the Circulating Capital. But not always. A part of the fixed Capital may come from borrowings; a part of the circulating Capital may come from the Reserve Fund; if we add the Fixed and Circulating Capitals, and deduct the Liabilities, we get the Share-holders' interest in the Capital of the mill. It is found equal (in every year for every mill examined) to the Estimated Share-holders' Capital in Part II and Appendix A.

#### E.

The 58 mills examined are classified into 4 groups according to their average profit for 10 years. The Spinning mills and the Joint S. & W. mills are separately classified. Among the Spinning mills in each class, three divisions are made according as the spindles are all mules, or all throstle or ring, or mixed. The cost of the mills with mules only in each class, with regard to site, building and plant, (Fixed Capital) for the year 1899 is compared with the number of mules in those mills in that year; an estimate of the fixed capital per mule is thus obtained. [Where land is leased, and the rent is separately stated it is capitalised at 5 per cent per annum.] A similar estimate of the fixed Capital per throstle or ring spindle is also obtained. The general applicability of these figures is verified in the mills with mixed spindles.

The general result appears to be (but very roughly) that the Fixed Capital on a throstle is about 53 rupees; that that on the Mule is  $\frac{1}{4}$ ths. of this.

With this knowledge, the Joint S. & W. Mills are examined. The spindles are reduced to their values, which are subtracted from the whole Fixed Capital of the Joint Concerns for that class. The balance is the estimated value of all

the looms in that class. Thus estimates of values of the looms in all classes are obtained.

The general result appears to be that the Fixed Capital of a mill may be so distributed that 17 ring or throstles or 22 mules make the Capital of 1 loom.

## F

Reference has been made in para 3, Part I, to the effect in the eighties of computing capital and dividends in sterling. As the statement there has been disputed, I shall re-state my position here, and illustrate it with figures of the 58 mills examined in this memorandum.

Let us start with the hypothetical premiss that the whole capital of these 58 mills had been supplied by England. As most of the mills were founded before 1881, the capital would have been remitted to India at 20d. to the rupee. Dividends would be remitted from India to England every year at the exchange-rate of the day, *e. g.* in 1894 at 13d. to the rupee. The eligibility of the investment to the English capitalist would depend upon the number of *sovereigns* paid to him as dividend for every 100 *sovereigns* he has put into the mills. To the Indian investor, on the other hand, the measure of eligibility would appear to be the ratio of rupee dividends to the rupee capital. These two views may be numerically illustrated by the following Table :—

Year.	In thousands of Rupees.		In thousands of pounds Sterling.		Percentage of Dividend to Capital.	
	Paid-up Capital.	Dividend.	Paid-up Capital.	Dividend.	In Rupees.	In Sterling.
1890 ... ..	30,138	2,101	2,518	158	7.0	6.3
1891 ... ..	36,474	3,091	3,095	219	8.4	7.0
1892 ... ..	39,098	2,598	3,289	162	6.6	5.0
1893 ... ..	40,223	1,917	3,387	120	4.7	3.5
1894 ... ..	41,137	2,904	3,511	167	7.0	4.5
1895 ... ..	45,875	4,271	3,776	249	9.3	6.5
1896 ... ..	49,098	4,167	3,988	243	8.5	6.1
1897 ... ..	48,186	3,623	3,803	226	7.6	5.8
1898 ... ..	50,297	3,168	4,062	211	6.3	5.1
1899 ... ..	51,579	2,310	4,095	154	4.5	3.7
Average ... ..	...	...	...	...	6.5	5.3

[*Note.*—The differences of capital in the successive years arise from the impossibility of securing the Balance Sheets of all the 58 mills for all these years. In every case, the capital is converted into sterling according to the average rate of the year in which it was paid-up.]

It will thus be seen that the sterling rate of earnings is on an average 25 per cent. lower than the rupee rate ; and there should be some means of reconciling the two rates. Particularly, as the bulk of the Fixed Capital of the mills is neither rupees nor sovereigns but machinery imported from England. The reconciliation is to be found in the answer to the question—What is the real value of a rupee ?

Fluctuations in sterling exchange are not only a *cause* of industrial dislocations ; they are far more certainly the *effect*, and therefore, the indicators of alterations in the purchasing power of money in the gold-using countries, or in the silver-using countries, or both. There is reason to believe that the predominant feature up till 1885 was the appreciation of gold, but that since then silver has depreciated. More or less probable evidence in support of the depreciation of silver may be briefly presented. Prices in India have shown a perceptible rise throughout the country as shown by Mr. O'Connor, and Mr. Fred. Atkinson ; money-wages, even in agricultural districts, have risen, as shown by Mr. Fuller in his account of the Central Provinces ; large volumes of silver were pouring into the country before the closing of the mints, and probably not all flowing out into the Far East, or underground into the hoards ; and the process was reversed by the simple expedient of the closing of the mints\*. The quantitative theory of money is, then, true in some form only vaguely guessed at by us. The rupee has depreciated.

But if the rupee has depreciated, it follows that 7 rupees paid as dividend in 1895 on a hundred rupee share of 1875 are not 7 per cent. on the share-capital ; but less than 7 per cent. by the amount of the depreciation. If the sterling value of the rupee accurately measure the real value, then the sterling columns of the above Table would be the only ones which give a correct view of the situation of the mills. Otherwise, the real situation should be something intermediate between the rupee columns and the sterling columns.

I am far from suggesting that we can ever determine the " real " value of the rupee, or even that we can form a clear conception of " real " value. Nevertheless, it is absolutely necessary to keep the idea in mind, if only to avoid bankruptcy. The market-value of mill shares quoted in rupees is no measure of the rise and fall of the fortunes of share-holders. A part of the higher value of mill-shares is only an expression of the fact that the share-capital represents machinery which, other things being equal, ought to be worth more depreciated

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\* I am not concerned here to pass a judgment on the policy of the closing of the mints, or its effect on the Mill Industry, or its connection with the boom in financial surpluses. The issues would be irrelevant in this Note, and I have not qualified myself to deal with them.



rupees in 1895 than it was valued in the full-valued rupees of 1875. If the real value of the rupee be indicated by its sterling value, and if there be no disturbance in the relative values of iron and other things, machinery in 1895 should be worth 60 per cent more rupees than in 1875; and a share of the nominal value of a hundred should automatically be worth 160, other things being equal; the dividend of 7 on 160 is only 4·5 per cent on the real capital.

But a formidable objection has now to be met. "A Rupee is a Rupee in India," it is urged with the whole emphasis of an *argumentum ad baculum*. It was not so long ago that corn-rents were the customary form of payment to an Indian land-owner; but I never hear it remarked that "a sack of wheat is a sack of wheat". If the land-owner himself consumed the wheat, there would be some truth in the contention; but if he has to get rid of the bulk of it in exchange for other things, then the value of things the sacks will exchange for is the true measure of the receipts in the form of sacks of wheat. For the same reason nobody acts on the belief that a Russian rouble note is a Russian rouble note. Why then should a Rupee be always a Rupee, unless we wish to eat the coin, or use it to decorate the shirt-front or shirt-sleeves, or employ it as a material in the arts? If the only use we wish to make of it is as a standard and store of value, then a rupee of 1895 is no more a rupee of 1875 than gilt is the same as gold. It is the view of the baby that identifies gold and brass balls and lemons because they are all yellow. To the natural baby, colour and form are of the essence of objects; to the currency baby, the jingle of the rupee, its weight and fineness,—and not the purchasing power—are of the essence of the rupee. Or is it that the fixity of the ratio between sovereign and rupee maintained by the Latin Union for over half a century is responsible for the sentiment in favour of the fixity of the rupee?

It may, at this stage, be naturally inquired whether the fall of rupee profits in the period 1897-99 evidenced in Part II may not be only an indication of the appreciated rupee. The subjoined table of the average sterling values of the rupee disposes of any such contention:—

Period.	Average					
	Sterling value of Rupee.					
	<i>s.</i> <i>d.</i>					
1889-90	...	...	...	...	1	4.5
1890-91 to 94-95	...	...	...	...	1	3.6
1895-96	...	...	...	...	1	1.5
1896-97	...	...	...	...	1	2.4
1897-98 to 99-00	...	...	...	...	1	3.66

The sterling value of the rupee averages the same in the concluding period as in the initial.

## C

J. H. FISHER &amp; Co.

TELEGRAPHIC ADDRESS

Fissure, Manchester "

Telephone No. 156.

9, SOUTH PARADE,

Manchester, June 23, 1902.

DEAR SIR,

I have perused with much interest Mr. Padshah's memorandum which has been very carefully and intelligently prepared, but the absence of necessary "data" prevents me from thoroughly criticising it. The conditions of Spinning and Weaving in India are so different from those obtaining in this country that comparisons are practically impossible; but there is one very important point which calls for remarks, *viz.* the question of Depreciation. The memo shows that the "Estimated" rate of Depreciation on the whole of the Plant (including Site) is taken at  $4\frac{1}{2}$  per cent per annum based upon the "real value" of the fixed Capital of each mill ascertained year by year, which I take to mean the depreciated value and not the original cost, but the actual amounts allowed seem to have fallen short of the Estimated rate in the ratio of 29 to 23. In this country it is not considered sound policy to allow less than  $2\frac{1}{2}$  per cent on the "Original Cost" of Fixed Plant *i. e.* Buildings, Boilers, Engines, Mill gearing, etc. The site is not included as the Land is usually taken on a long lease (999 years) at a fixed price per square yard per annum and the Chief Rent thus paid is taken as a part of the working expenses. Then is also allowed  $7\frac{1}{2}$  per cent per annum on the Cost of Machinery, Card Clothing, and Furnishings generally making an average of 5 per cent per annum, as near as possible, on the value of the whole plant. Where depreciation is thus allowed on the "original" cost it is customary to add to Fixed Stock (Mill and Machinery) the cost of all ordinary Repairs and Renewals, and experience has proved the soundness of this system. The practice of interfering with the rate of Depreciation in times of narrow margins of profit, either to reduce a loss or to increase a small profit, cannot be too strongly condemned from an Investor's point of view. In passing I should like to say that the system of Depreciation as adopted in this country would, if applied to Indian Mills, simply strengthen Mr. Padshah's contentions and deductions.

The object of the memorandum is intended to shew that before the imposition of Cotton Duties on Cloth, Weaving was more profitable than Spinning from 1890 to 1894 and that since the introduction of Duties profits on Weaving have been gradually diminishing. The assumption is that had similar Duties been imposed on Yarns matters would have been very serious for the Indian mill industry. It goes on to shew that the average profits of the mill industry since

1890 are not high, with which I thoroughly agree, and are not such, when taken over the decade, to encourage Mill Building. The fallacy (so-called) of the Cotton Duties being paid by the consumer and not by the producer, is no doubt true to a certain extent, but the real point is, after all, the question of supply and demand. It is more than probable that other causes than the imposition of Duties may be responsible for the vanishing profits, such, for instance, as over-production, and Famine. The profitable nature of Weaving prior to 1895 doubtless encouraged a large increase in the number of Looms, and the production of Cloth has probably been greater than the Home demand, hence where Spinning and Weaving have been combined the average earnings of such mills have decreased since 1895 in a greater ratio than where there has been Spinning only, the deduction being that the Export of Yarns has benefitted those mills with Spinning only, whilst the increase in price of Cloth, through the imposition of Duties, has curtailed the home demand. Such may be the case, but I am not in a position to discuss the point. Mr. Padsbah has evidently very carefully studied the whole question as his remarks and the figures quoted prove him to be thoroughly acquainted with the whole subject.

Believe me,

Yours faithfully,

J. H. FISHER.

JAMES ATKINSON Esq. }  
 MESSRS. JEREMIAH LYON & Co., }  
 MANCHESTER.

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## SUMMARY.

The conclusion of the appendices may now be stated. The problem of this paper is twofold; one to ascertain the average earnings of the Mill-industry; the other to discuss the rise or fall of the rate of profit after the particular measure of the Cotton Duties. In the solution of both parts of the problem, it is essential to measure both capital and profits correctly; and in the solution of the second part, the course of the rate of profit, it is particularly desirable that alterations in the capital and profit from one year to another should not escape detection. Changes in the purchasing power of the rupee, the method of providing for repairs and depreciation, the method of writing off of capital from year to year are among the factors on the right assessment of which must depend the correctness of the results. These and other factors have, therefore, been analysed in the foregoing appendices; and it has been shown that the ordinary process of taking the ratio of the actually paid dividends to the originally paid-up capital could have been both crude and misleading. But it has not been held that the approximate processes substituted in this memo cannot be improved; it is, on the contrary, suggested that if the Mill-owners' Association would appoint Committees to consider these troublesome questions, they would be doing a service to the Industry the Association represents.

For instance, our English expert adviser holds that the allowance here made for depreciation is too small, and the Editor of the *Times of India* considers that a proper allowance should be nearer ten per cent than four. To both these statements my answer would be that the proper allowance for depreciation in an Industry depends on a special and full experience of the conditions of the industry—an experience not at the command of every mill-owner; that the figures adopted in this Memo were based on competent advice, and were adopted after a conference at which English principles and practice were also considered; and finally that the mills which have made a much larger provision for repairs and depreciation than here argued for have not been able to spend the whole of the depreciation fund, have, in some cases, enlarged their mills out of this fund, and in more than one case the fund has been shown as an asset along with the paid-up capital as against the capital expenditure of the mills.

A Committee of the Millowners' Association would begin by accepting the *principles* underlying the actual provision for depreciation made by English mills. These principles have been reduced to a system, and may be studied in proper text-books. The Committee would then proceed to apply those principles to the special conditions of India, and *recommend* a proper standard provision for depreciation, which different mills would approximate to, after making allowance

for individual differences of situation. The Committee would probably discover that the English scale of provision must be different from the Indian.

As this seems to be disputed, I shall argue the point a little. The constituents of a depreciation charge are three :—(a) a certain amount of repair, casual and substantial, has to be effected annually ; (b) with all the repairs thus administered, the life of mill-plant (including building) is limited ; (c) and lastly even before this limit of life is reached, parts of the plant have to be supplanted in favour of more productive or simpler plant ; and the value of all has to be written down, owing to the improvements in machine-making which cheapen plant. Now, (a) the cost of the annual repairs and replacement would depend on the price at which the stores and labour for replacement and repair can be obtained, on the rate at which the climate affects the plant, and finally, on the rate, speed, intelligence with which the machinery is worked. Obviously, these need not be the same for England and India. (b) The provision against the wear and tear of plant would, in the first instance, depend on how the plant is worked, and affected by climate ; secondly, by the cost of buying a substitute ; but also on the rate of interest. The annual provision has to accumulate at compound interest so that when the life of the plant has reached its term, the amount accumulated could buy the new plant required. But, the rate of interest in India being higher, the annual sinking fund has to be so much lower here than in England. (c) Similar considerations affect the supersession of existing plant by invention. It is often said that the unintelligence of Indian millowners protected by restriction in competition need not be troubled about new inventions of which they will rarely hear. It may be doubted if the unintelligence and restriction of competition are quite authentic ; but, in any case, the European machine-makers are not similarly exempt from competition and unsusceptible to invention ; and in any case the question may be settled by adducing authentic figures. With exchange at 19d in 1875-6, a pair of engines (of a given make) cost £7,302 ; the same firm supplied an identical pair in 1888 (exchange 16½ d.) at £3,574.

The Committee, having concluded what provision to recommend for depreciation, would further consider to what extent the value of the material capital should be written down. Because we need to provide a sinking fund against the term of the life of a building, it does not follow that its productive power is diminished. If the spindles in a mill are depreciated through wear and tear, if the depreciation provision be expended in the purchase of new spindles, the production of the worn out old spindles *plus* the new spindles would be probably greater than the production of a brand-new mill with the original number of spindles. If the profits are to be compared from year to year, and as between a mill and mill, this fact cannot be overlooked.

The Bombay Mill-owners' Association are already collecting balance-sheets of their constituents for statistical information ; would it not be better to *recommend a form* of balance-sheet ? Let it be remembered that a diminution of *one pie* a day in the cost of production per spindle makes an addition of 3 to 4 per cent. to the profits ; that profits depend on " the stoppage of leakages ; " that mill-agents, variously occupied, cannot check these leakages with the greatest efficiency, except by carrying constants of factors of production in their heads ; that these constants can only be obtained by comparisons of balance-sheets (intelligently drawn up) not only of the same mill in successive years, but of different mills in the same year. Let any one compare the statements of the Bombay Mill Industry with the statements of the Japanese Mill Industry. In the latter figure such items as the ratio of working spindles to standing spindles, average time of work, average counts of yarn, average daily produce per spindle, waste yarn, coal consumed, horse-power, average wages.

Standardisation or graduation of the *quality of products* is a recognised essential of industries ; standardisation of the *processes* of production is neglected. The question would advance rapidly towards solution if only a beginning be made of appointing Committees to deal with the question. This I will certify from experience. The statistical work can be carried through without any mill-owner knowing any secret or figure of any mill not his own.

## CONCLUDING REMARKS.

As these pages are passing through the Press, suggestions reach me from friends who have been so kind as to read them in proof. It is thought that for a correct picture of the financial condition of the mills, the Capital wiped off by the liquidation of some of the mills should be deducted from the profits; and that, at least, the Capital loss owing to the fall in the value of shares in the market between the years 1890 and 1900 should be subtracted from the profits. I am doubtful about the propriety of writing off from profit the loss arising from the difference in quotation of market-values of shares between two terminal years; for the difference might be accidental, and due to passing causes. The first suggestion about the mills in liquidation seems sound.

Mr. Bezanji D. Mehta, Manager of the Empress Mills, Nagpur, sends me an instructive method of exhibiting the fluctuations of Spinning profits, and Weaving profits; and he works these out in connection with his own mills. He divides his spindles into those turning out saleable yarn, and others which produce yarn for weaving. He finds that 22 spindles of the latter sort are required to feed 1 loom. The cost of the Fixed Capital per loom to Mr. Bezanji's Company is 882 rupees; and the cost of the Fixed Capital per each spindle is Rs. 56. If the spindles for weaving yarn be supposed a part of the weaving plant, then the cost of the Fixed Capital per spindle for weaving would be Rs. 56 *plus*  $\frac{882}{22}$ , or Rs. 96. Mr. Bezanji examines the profits per spindle of either kind for 10 years, and finds that "a spindle employed on saleable yarn during the ten years earned on an average per day 13·768 pies, and the one employed for yarn to be woven into cloth earned 15·581 pies per day, *including* the profit on looms, or say all profit up to weaving points." And again he says, "while the spinning spindles worth Rs. 100 earn on saleable yarn 24·585 pies per day, the weaving spindles worth the same amount earn only 16·23 pies a day."—a difference of 50 per cent. in favour of pure spinning. Mr. Bezanji favours me with a statement of these profits during each quarter for ten years, from which I deduce the following conclusions :—

(a) That up to December 1894, the profits per spinning spindle were Rs. 15 per year, and the profits per weaving spindle were Rs. 26. *In every quarter*, the profits per weaving spindle were higher than the profits per spinning spindle.

(b) In 1895, the year of the China boom for yarn, the profit per spinning spindle was Rs. 27, and the profit per weaving spindle Rs. 25.

(c) For 11 quarters after this, the profits per spinning spindle keep *uniformly higher* than those per weaving spindle, the average being Rs. 32 and Rs. 25 respectively. This was the period immediately after the duty.

(d) For the 9 succeeding quarters, the profits fluctuate; but the average per spinning spindle is Rs. 22, and that per weaving spindle is Rs. 24.

(e) The average per spinning spindle (for the whole ten years) is Rs. 22, and that per weaving spindle is Rs. 25.

(f) When the weaving spindle earns less than the spinning spindle, it is not because weaving is a dead loss; only the yarn used for weaving is probably of a higher count, and is less profitable than saleable yarn. (*Vide* para 27 part II, last sentence.)

(g) The profits of the spinning spindle are rising, while those of the weaving spindle are stationary, thus :—

Profits per annum.				
In the period.			Per Spinning Spindle value Rs. 56.	Per Weaving Spindle value Rs. 96.
			Rs.	Rs.
1891-94	...	...	15	26
1895	...	...	27	25
1896-98	...	...	32	25
1899 & 1900	...	...	22	24
Average Rs.	...	...	22	25

(h) The particular value of these figures to my mind is that the Central India mills are somewhat independent of the China market for yarn. The stationary profits on the weaving spindle fall into two parts—the profits on the spinning part which are rising, and the pure weaving profits which must, therefore, have fallen.

(i) Taking the profits of cloth to mean the profits of the whole process from cotton to cloth, we eliminate the fluctuations due to the fluctuations of yarn. In the Empress mills, there would be about 30,000 weaving spindles during the period after the duty; supposing only 27,000 to be working (the remaining being under repairs or otherwise idle), and the annual duty paid being about Rs. 75,000, the duty per weaving spindle per year is Rs. 2·8. Dividing the 10 years into two exact halves, one preceding, one succeeding the imposition of the duty,



there is a reduction of Re. 1.25 in the profits of the weaving spindle per annum. Whether there is any thing else besides the cotton duty to account for this reduction is not stated in the data. It should be remembered that though the profits of the weaving spindle *look* stationary, they range between Rs. 16 and Rs. 36 per weaving spindle per annum.

Would other mill-Agents or Managers kindly supply similar criticism, and similar light-throwing figures?

Finally, Mr. Bezanji asks: "If the Mill Industry has not been paying better than other safe investments, why have so many mills been put up? The answer is that promoters with a view to Agency Commission, and agents of Machinists and Stores Suppliers with a view to obtain commission on orders, have been ever on the look out to take advantage of a prosperous year or two, and induce the investing public to take shares for new concerns; pointing out the profits made by the existing mills for the time being, and the advantages of new machinery &c." This apparently would account largely for the extension of the Textile Industry during the decade under examination.

B. J. P.

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REPORT  
ON THE  
MANUFACTURE OF PAPER AND PAPER PULP  
IN BURMA

*(Prepared by Order of the Government of India)*

BY  
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WOOD PULP AND PAPER TRADE EXPERT.

RANGOON, *March* 1906.

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Extract from the Proceedings of the Government of Burma, Revenue (Forest) Department,—No. 2F.-2,  
dated the 10th October 1906.

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RESOLUTION.—The following Report prepared by Mr. R. W. Sindall, F.C.S., (Lond., Eng.) Consulting Chemist, Wood Pulp and Paper Trade Expert, under the orders of the Government of India, on the manufacture of Paper and Paper Pulp in Burma, is published for general information.

By order of the Lieutenant-Governor,

R. E. V. ARBUTHNOT,

*Revenue Secretary to the Government of Burma.*

# REPORT

## ON THE

### MANUFACTURE OF PAPER AND PAPER PULP IN BURMA.

1. The subject of paper manufacture is one which has long possessed attractions for the Government of India, and this is not surprising in view of the enormous quantity of raw material apparently available as a source of supply. Previous reports on the subject.
2. As far back as 1873 the Government took steps to collect information about the subject, and eventually issued reports on the matter, giving details as to the extent of the trade then carried on, principally by natives. Generally speaking these reports contained the names of fibre-yielding plants in use for paper making, or of fibrous plants which were considered to be serviceable. In these early reports, as might be expected, the information obtained seems to deal almost exclusively with the nature of the fibres, and embodying expressions of opinion from the various officials as to the strength and quality of the fibres judged from the known standards applied to plants available for the textile industries. Enquiry of 1873.
3. An interesting report was issued in 1874 by Baboo Hem Chandra Kerr on "The Cultivation of Jute in Bengal, and on Indian Fibres available for the Manufacture of Paper." After explaining the process of paper making by certain natives, Kerr gives a short description of the various fibres mentioned in the Government Circular (June 26, 1873). Report by Kerr.
4. A Memorandum on "Materials in India suitable for the Manufacture of Paper" was issued in 1880 by L. Liotard, compiled from various papers and books then available. This memorandum deals very fully with the subject-matter of the Government's report of 1873. Liotard's memorandum.
5. The Chief Commissioner for Burma reported a very large number of fibre-producing plants, and in Liotard's memorandum the list given is as follows:— Fibrous plants in Burma.

TABLE I.—*List of Burmese Fibres (L. Liotard's Memorandum).*

Scientific name.	English name.	Burmese.
1	2	3
Abelmoschus esculentus	...	Yōnmadi.
Abutilum indicum	...	Thamagyōk.
Adansonia digitata	...	Thu-ngē-gyō.
Areca catechu	...	Kunthi.
Agave Americana	...	Thinbaw-nanat.
Bambusa	...	.....
Bombax	...	.....
Borrassus flabelliformis	...	Tan.
Bromelia ananas	...	Nanat.
Broussonetia papyrifera	...	Malanig.
Calotropis gigantea	...	Mayo.
Cannabis sativa	...	Bin.
Crotalaria juncea	...	Paiksan.
Cocos nucifera	...	Ōn.
Coreya arborea	...	Ban-bwe.
Daphne Cannabina	...	Sōlō.
Ficus religiosa	...	Nyaungbawdi.
Hibiscus sabdariffa	...	Thinban.
Hibiscus tiliaceus	...	Thinban.
Linum usitatissimum	...	Kaung-ma.
Musa paradisiaca	...	Nga-pyaw.
Oryza sativa	...	.....
Pandanus odoratissimus	...	Satthwa.
Saccharum officinarum	...	.....
Sterculia ramosa	...	Shaw-byu.
Sterculia ornata	...	Shaw-ni.

Routledge  
on bamboo.

6. In 1875 the subject of *Bamboo* was brought forward by Mr. Thomas Routledge of Sunderland, England, who published two pamphlets: "Bamboo considered as a Paper-making Material" 1875, "Bamboo and its treatment" 1879, in which Mr. Routledge explained his views on the suitability of this plant as a raw material for paper making and described the conditions under which a permanent supply of proper stems could be ensured.

Strettell on  
Muddar.

7. In 1878 a lengthy pamphlet was published by G. W. Strettell on the possibility of the *Calotropis gigantea*.

Cross, Bevan  
and King  
Report of,  
1887.

8. The most modern publication on the subject is the "Report on Indian Fibres and Fibrous substances" published by Messrs. Cross, Bevan and King in 1887. The authors examined many specimens of fibres exhibited at the Colonial and Indian Exhibition of 1886, and this report contains a great deal of useful and interesting matter, from which we take one or two extracts.

Plantain.

9. "*Musa paradisiaca*.—The Plantain. Ultimate fibre. Length 2-4 m. m. A beautiful fibre obtained from the stem of the plantain. It seems probable that.....the thousands of plantain stems which are annually thrown away as useless by the natives may yet come to be used for paper manufacture. The chief difficulties consist in the low yield of fibre and in the fact that the cultivated plantain stems would have to be collected over a wide area, since it would scarcely pay to cultivate the plant exclusively as a paper material."

Grasses.

10. "*Munj grass and Bhabar grass*.—The two most important indigenous paper fibres in India are the Munj and Bhabar grasses. These are now being largely used by our Indian Paper Mills, the supply at a remunerative price being the chief obstacle. The root and stems of rice have been suggested as a paper fibre, and if established that this material would be worth the trouble of collecting, the supply might be practically unlimited, but it is doubtful whether the paper maker could pay sufficient to cover freight and expense of collection."

Bamboo.

11. *Bamboo*.—Ultimate length of fibre, 2-4 m. m. There are practical difficulties which render it extremely improbable that bamboo will ever come into use as a paper material. The difficulty of getting a continuous supply of young shoots without injuring, if not killing the clumps, after two or three years, the heavy charges likely to be incurred in conveying the material from malarious jungles to the mill, and the fact of the scales and young stems being covered with hairs, render the bamboo practically unsuitable for paper making.

The following are the principal bamboos that may come to be used in the manufacture of paper:—

*Bambusa arundinacea* (Kyakatwa).

*Bambusa balcooa*.

*Bambusa brandisii* (Wabo).

*Bambusa tulda*.

*Bambusa vulgaris* (Wanet).

*Dendrocalamus hamiltonii*.

*Dendrocalamus strictus* (Myinwaj).

"*Broussonetia Papyrifera*.—The Paper Mulberry. Length of ultimate fibre, 6-20 m. m., a fibre found in great abundance in Upper Burma.

References  
to subject  
in "Indian  
Forester."

12. Since 1887 no systematic enquiry has been made on the question of the possibility of turning to practical use the fibres of India, though references to the subject have appeared from time to time in the pages of official organs like the "Indian Forester" and in paper trade journals in England.

The writer is inclined to the opinion that the broad general statement in most of the reports that the "cost of collecting raw material and getting it to a mill is prohibitive" or statements of a similar kind, have stopped further investigation. But when the list of those fibres which, by common consent, give excellent paper pulp, is examined and cut down to practical limits, i.e., abridged until it only contains fibres known to be fairly plentiful, the whole subject is reduced to such a compass as to render a proper investigation of "commercial conditions" feasible.

Concession  
granted for  
working  
bamboo,  
1894.

13. In August 1894 a concession was granted to Messrs. A. Scott & Co., of Rangoon for certain privileges in connection with a project for the manufacture of paper stock from bamboos or other suitable fibrous plants. The terms of this concession were briefly as follows.

The Government agreed—

- (1) To allocate certain areas of lands in Burma to the Company, from which bamboos and suitable fibrous plants could be cut.
- (2) To grant exclusive right to the Company for a period of 21 years within the above areas, to cut and use bamboo, etc., free of all duties and royalties.
- (3) To give exclusive rights to the cutting of bamboos and wood (except reserved trees) for fuel within the above areas, in connection with the factory.
- (4) To give free use of all roads to and from the factory.
- (5) To refund any duties or royalties paid on bamboos or fibrous plants sold by outside contractors to the Company for use in the factory.
- (6) To grant suitable sites for the erection of buildings, subject to certain restrictions, for a period of 21 years, rent free.
- (7) To charge no royalty on manufactured paper stock for the first seven years, and only Re. 1 per ton on paper stock subsequently manufactured.
- (8) To grant liberty to make dams, reservoirs, roads, bridges, etc., upon the lands in the control of the Company, subject to existing rights and to the approval of the Commissioner.

The Company binding themselves—

- (1) To build a factory within two years of the date of the concession and to keep same working each year at least 120 days.
- (2) To produce after the first seven years an annual output of 10,000 tons, and after fourteen years, an output of 20,000 tons per year.
- (3) To render monthly statements showing the output of the mill each month.
- (4) To allow a full inspection of all books by the Chief Commissioner.
- (5) To consider the agreement null and void if the operations were not commenced as provided for in the terms of the concession.

Apparently nothing further was done in this matter, and the concession lapsed owing to the expiry of the allotted period. It is interesting to note that a similar concession had been granted as far back as 1882 (March 17, 1882) to Mr. Thomas Routledge, whose name has been so intimately associated with bamboo fibre.

14. In 1905 the Government of India requested the writer to visit Burma for the purpose of investigating the possibility of utilizing wood, bamboo and other fibres as raw material for paper making, and to determine whether the process of pulp or paper manufacture could be carried out successfully. Investigation, R. W. Sindall, 1905.

The enquiry was to extend over a period of four months (November 1905—February 1906); to include experimental work on certain varieties of wood and bamboo, as to the kind of paper pulp that could be obtained; to include an inspection of certain parts of the country for suitable mill sites; the actual cost of production of the paper pulp, and any other details likely to give such information as was needed.

15. In accordance with instructions, a temporary experimental laboratory was fitted up at the Government Timber Depot, Rangoon, on the banks of the river Hlaing, apparatus and suitable digesters having been ordered out from England. Samples of wood, bamboo and other fibres were dealt with at this laboratory during the months of November—December 1905, the remainder of the period being devoted to an inspection of possible sites, the collection of necessary information and the final drafting of the report. Experimental laboratory at Rangoon.

## BAMBOO.

Paper pulp  
from bam-  
boo.

16. *The conversion of Bamboo into Paper pulp.*—It has generally been conceded that bamboo can be converted into paper pulp of excellent quality, but so far, in spite of this admission, the idea of manufacturing paper on a large scale from this plant has never found expression in a practical form.

Difficulties  
in the manu-  
facture of  
paper pulp.

17. This may be traced to several causes, some of which are technical and others commercial. In the latter case the questions of freight have been the main drawback to any scheme having as its basis the plan of simply exporting the bamboo itself to a distant paper mill. The bamboo occupies a considerable amount of space, it contains a good deal of natural moisture which adds to its weight, and finally the amount of raw material which must be used in order to produce a ton of air-dry finished pulp or paper is large.

With regard to technical considerations, the lack of definite information on certain important particulars is probably the main reason for the delay experienced in the development of a promising industry. The systematic investigation of all the conditions likely to affect the quality, quantity and cost of the manufactured pulp has never been undertaken, and even the present enquiry is only a preliminary attempt to deal with the subject.

Bamboo,  
quantity of—

18. In regard to the question of *quantity*, little or no information is forthcoming as to the amount of bamboo available in particular areas, the distribution of the various species, and the weight of material that can be cut annually per acre.

The mere statement that there are huge quantities of bamboo everywhere is scarcely an adequate answer, nor is it a practical one. While it is true that bamboos can be purchased almost anywhere in Burma at prices which permit of a pulp industry on a remunerative scale, yet the steady demand for a regular supply of a large quantity of bamboo at a fixed locality where the mill would be situated might cause a rise in prices. The supply must be independent of outside markets, and this can only be possible where forest areas are reserved for the purpose. Hence the importance of knowing the yield of bamboo per acre, its habits and powers of reproduction, and many other facts, in order to determine ultimately the cost of the raw material and to ensure a supply at a constant price for some years at least.

Bamboo,  
quality of—

19. In regard to the question of *quality*, experimental evidence is needed as to the strength, colour and suitability of the pulp prepared from the bamboo. The fact that there are many species of bamboo available must be taken into account. Careful investigation is necessary to determine the influence of the *species* of bamboo, the *age* of the bamboo, the *conditions of growth*, and the *existence of knots*, which latter has always given trouble in this and other similar fibrous plants.

The complete answer to this question will require a prolonged investigation in the laboratory, but for the present it is sufficient to show that certain species available in considerable quantities give a suitable pulp, when treated under normal paper-making conditions. The experiments recorded elsewhere deal with these points, though even experimental evidence will not fix the market value of the product absolutely.

Bamboo,  
cost of raw  
material

20. In regard to the question of cost of raw material and finished paper, information is needed as to the usual methods of getting out bamboos, the cost of the several stages in the operation required to get the bamboos from the jungle to the mill on a large scale.

Prices of  
fuel, etc.

21. The prices of fuel and of chemicals delivered to possible sites, the cost of freight by rail and by local steamers, the price of cartage, the price of labour, all form necessary items in the final cost sheets of a ton of finished paper or paper-pulp.

One of the most important items is the cost of freight to England or to such countries where the finished paper pulp may find a market.



22. *The use of Bamboo for Paper-pulp.*—In an excellent article "Biological Notes on Indian Bamboos" (Indian Forester, 1899) Sir Dietrich Brandis, F.R.S., suggests the importance of recording observations likely to give information on the life history of the bamboo, and that such notes would be of commercial value directly any new industrial application of bamboo becomes possible. He further insists that in Burma particularly, with the increase of population and its growing prosperity, the question of systematic management of Bamboo forest must arise. He also describes as a case in point the bamboo paper question which first came under the notice of the authorities at the Forest Conference in 1875, and mentions the work of Mr. Thomas Routledge in connection with the manufacture of paper.

It is clear that the subject had received the attention of various officials, but one fails to find many notes of specific value in going through the files of the "Indian Forester." During the years 1898—1905 the following papers and letters appeared. Most of these papers are merely brief notes published in the correspondence columns of the journal:—

1899.			
Biological notes on Indian Bamboos	...	...	Sir D Brandis.
Treatment of Bamboo clumps	...	...	J. S. Gamble.
Treatment of Bamboo clumps	...	...	K. N. Mukerjee.
Wood-pulp	...	...	J. N. Clutterbuck.
1900.			
Doubtful Burmese Bamboos	...	...	D. Brandis.
Flowering of Bamboos in Darjeeling District	...	...	G. Rogers.
Bamboo Manna	...	...	D. Hooper.
Treatment of Bamboos	...	...	C. P. Fisher.
Notes on Dendrocalamus strictus	...	...	W. H. Lovegrove.
Wood-pulp manufacture in India	...	...	P. H. Clutterbuck.
Paper manufacture in Shan States	...	...	W. H. Craddock.
The Bamboo Forests	...	...	E. A. Radcliffe.
1901.			
Flowering of Bambusa	...	...	Arundinacea Pillai.
Flowering of Dendrocalamus strictus	...	...	A. Smythies.
Best season for cutting Bamboos in Madras	...	...	H. Jackson.
1902.			
An interesting Bamboo (Melacalamus compactiflorus)	...	...	F. G. R. B.
Flowering of Dendrocalamus strictus	...	...	F. J. Branthwaite.
1903.			
Flowering of Bambusa polymorpha	...	...	Wathôn.
Flowering of Bambusa polymorpha	...	...	Kwe-tu-wet-tu.
Grass for Paper manufacture	...	...	Thiselton Dyer.
Grass for Paper manufacture	...	...	J. S. Gamble.
Grass for Paper manufacture	...	...	G. W. Thompson.
Preservation of Bamboos from the "Shot Borer" Beetle	...	...	E. P. Stebbing.
1904.			
Flowering of Bambusa polymorpha	...	...	Taw Kwe.
Flowering of Dendrocalamus strictus	...	...	C. W. A. Bruce.
1905.			
Nil.			

23. The Bamboos which appear to be most abundant in Burma are:—

- Bambusa Polymorpha*.—(Kyathaungwa). A large bamboo reaching to a height of 60 or 70 feet, the diameter ranging from  $2\frac{1}{2}$ " to 5". It grows in dense clumps and is largely used for building purposes. Bamboos in Burma.
- Bambusa Tulda*.—(Thaikwa). A common bamboo growing to a height of 30 to 70 feet, with an average diameter of 2 to 3 inches. Used for building purposes, mat and basket making.
- Bambusa Vulgaris*.—(Wanet). A distinctive species reaching 20 to 30 feet in height with an average diameter of 2 to 4 inches.
- Dendrocalamus Strictus*.—(Myinwa). The male bamboo, variable in size, 30 to 50 feet high and 1 to 3 inches in diameter. This bamboo is in great demand for many purposes, Gamble estimating the annual output as 100 million stems.

*Dendrocalamus Hamiltonii*.—(Wabomyetsangyè). A large bamboo growing up to 80 feet in height, with a diameter of 3 to 6 inches.

*Dendrocalamus Brandisii*.—(Wabo). A large bamboo 60 to 100 feet high and 4 to 8 inches diameter. Not much used.

*Dendrocalamus Membranaceus*.—(Wapyu). A bamboo growing freely in Upper Burma.

*Cephalostachyum Pergracile*.—(Tinwa). A deciduous tufted bamboo growing 30 to 40 feet in height, and 2 or 2½ inches in diameter. Found in great abundance associated with teak.

Bamboo, distribution of.

24. Very little is known as to the exact distribution of these bamboos or as to the quantity obtainable per acre. If the sole object of the present enquiry was to show that a large number of mills could be supplied from forest reserves for many years with ample material, it would be necessary to determine the average annual crop that could be realised per acre in certain selected areas of the country, the position of which would be decided by the site of the mill, and the conditions under which the cutting would have to take place to ensure a permanent supply for a long period.

Assuming for the sake of argument that it is proposed to erect a mill having an annual output of 50 to 60 tons of finished pulp per week, what quantity of bamboo will be necessary? This depends on the species of bamboo, its growth and its air-dry weight. The importance of these factors is shown by the following series of measurements.

Bamboo, air-dry weight.

25. (1) *Bamboos*. Relation of age to air-dry weight.—The necessity for accurate information as to the condition of bamboos intended for paper making in order that the estimations of *yield* and *cost* may be properly made is amply shown by the example quoted below. Stems each about 6 feet in length were cut from several species of bamboo, 5 cut from the latest growth, *viz.*, bamboos of the year 1905, 5 of the previous year 1904, and 5 stems of 1903.

Bamboo, tables of weight.

TABLE II.—*Showing conditions of Bamboos in regard to Age. Results all calculated for Stems 20 feet long.*

Kyathaungwa.					DATE OF GROWTH.		
					1903.	1904.	1905.
I					2	3	4
Diameter, inches	...	...	...	...	2'15	2'0	2'24
Weight when cut, lbs.	...	...	...	...	13	10'7	11'53
Knots per stem (percentage by weight)	...	...	...	...	8'5	6'0	6'0
Percentage of air-dry bamboo in the stem, per cent.	...	...	...	...	69'5	67'6	40'0
Weight of air-dry stem, lbs.	...	...	...	...	9'0	7'2	4'6
Weight of 100 stems, cut, lbs.	...	...	...	...	1,300	1,070	1,153
Weight of 100 stems, air-dry, lbs.	...	...	...	...	900	720	400

Myinwa.					DATE OF GROWTH.		
					1903.	1904.	1905.
I					2	3	4
Diameter, inches	...	...	...	...	1'6	1'3	1'6
Weight when cut, lbs.	...	...	...	...	11'2	8'4	10'6
Knots per stem (percentage by weight)	...	...	...	...	9'2	8'0	10'7
Percentage of air-dry bamboo in the stem, per cent.	...	...	...	...	74'0	75'0	61'0
Weight of air-dry stems, lbs.	...	...	...	...	8'3	6'3	6'0
Weight of 100 stems, cut, lbs.	...	...	...	...	1,120	840	1,000
Weight of 100 stems, air-dry, lbs.	...	...	...	...	830	630	600

Thaikwa.					DATE OF GROWTH.		
					1903.	1904.	1905.
1					2	3	4
Diameter, inches	...	...	...	...	1'3	1'25	1'25
Weight when cut, lbs.	...	...	...	...	9'4	9'0	9'3
Knots per stem (percentage by weight)	...	...	...	...	8'0	9'0	8'5
Percentage of air-dry bamboo in the stem, per cent.	...	...	...	...	75'0	75'0	50'5
Weight of air-dry stems, lbs.	...	...	...	...	7'0	6'75	4'7
Weight of 100 stems, cut, lbs.	...	...	...	...	940	900	930
Weight of 100 stems, air-dry, lbs.	...	...	...	...	700	675	470

Tinwa.					DATE OF GROWTH.		
					1903.	1904.	1905.
1					2	3	4
Diameter, inches	...	...	...	...	1'5	1'7	1'6
Weight when cut, lbs.	...	...	...	...	9'2	8'3	6'6
Knots per stem (percentage by weight)	...	...	...	...	6'0	6'4	6'5
Percentage of air-dry bamboo in the stem, per cent.	...	...	...	...	67'0	69'0	61'0
Weight of air-dry stems, lbs.	...	...	...	...	6'2	5'7	4'0
Weight of 100 stems, cut, lbs.	...	...	...	...	920	830	660
Weight of 100 stems, air-dry, lbs.	...	...	...	...	620	570	400

NOTE.—These figures cannot be taken as generally applicable to the species of bamboos in question; being the results of a few isolated measurements only, and not the average of a great number of measurements. The measurements were all made soon after the bamboos were cut the stems being in their natural condition and not dried by exposure to air.

(2) *Measurements of the Weight and Size of certain Bamboos.*—The bamboos on sale in the various markets of Burma have an average length of 20 feet, being fairly straight according to the care exercised in selection. They are usually sold by number, that is, at a certain rate per 100 stems, the actual length being merely a question of convenience determined mainly by the purpose for which the bamboos are intended. Bamboo weight and size of stems.

The question of the actual air-dry weight of the bamboos being a matter of the utmost importance, and no statistics being available giving the weight per stem, measurements were made by the writer at various localities. It must be specially noted that the bamboo stems examined were only the ordinary market lengths, *i.e.*, not the full length of the whole stem as it occurs in the forest, but merely that portion selected and cut for sale, the remainder being thrown aside as useless. Some 250 stems in all were measured at the places visited. The full details are given in the case of the well-known *kyathaungwa* as a guide for future measurements by other observers, but the final results are summarised in Table IV. The measurements given are for air-dry bamboos, dry because of exposure to air.

Kya-  
thaungwa  
measure-  
ments.

TABLE III.—*Measurements of Kyathaungwa.*

Length.	Diameter.	Weight.	Length.	Diameter.	Weight.
1	2	3	4	5	6
Feet.	Inches.	lbs.	Feet.	Inches.	lbs.
21	2'8	14	22	2'9	14
21	2'4	11	20	2'7	10
20'5	2'4	16	22	3'0	13'5
19'5	2'8	13'5	23	2'8	13
20'5	3'2	18	21	3'2	12
21	2'8	10	25'5	3'0	12'5
21	3'1	16	24	3'5	14
21	2'7	14'5	23'5	2'8	12'5
21	3'0	16	33'5	3'6	21
21	3'2	16	24	3'1	14
19	2'5	8	24	3'0	15
20	3'0	13'5	29	3'1	14
21	2'8	13	25	3'0	17'5
21	2'9	18	24	4'0	17
21	2'7	13	25	3'1	12'5
21	2'9	15'5	27	2'5	11
21	2'8	13	22	2'3	12
25	2'6	13	24	2'4	11
24	2'3	9	20'5	2'3	11'5
27	2'2	14	20	3'0	16
25	2'5	12	20	2'3	10'5
24	2'3	9	20	2'2	9
25	2'4	10	20	2'2	7'5
22	2'3	9'5	30	2'2	19'5
22	2'6	12	16	2'0	9
25	2'5	10	16	2'0	8
		Mean	22'5	2'7	13

## AVERAGE OF RESULTS.

Mean length of a market stem of *Kyathaungwa* ... 22'5 feet  
 Mean diameter ... 2'7 inches.  
 Mean weight of stem ... 13'0 lbs.

TABLE IV.—*Weight and Size of certain Bamboos (air-dry condition) calculated for a stem 20 feet long.*

Species of Bamboo.	Length, feet.	Average diameter.	Weight.	Numbers of knots per stem.	Per cent. of knots per stem by weight.
1	2	3	4	5	6
		Inches.	lbs. air-dry.		
Kyathaungwa ...	20	2'7	11'5	8	6'5
Wapyu ...	20	1'8	12'0	16	...
Myinwa ...	20	1'8	7'0	11	9'0
Thaikwa ...	20	1'3	7'0	6	8'0
Large Tinwa ...	20	1'9	7'25	9	6'2
Small Tinwa ...	20	1'5	4'5	9	...

NOTE.—The figures representing the percentage of the total weight of stem occupied by knots were obtained by cutting out the knots from a few stems and ascertaining their weight.

For the purposes of this investigation the following summary may be used as a basis for working out costs:—

	Average weight of a stem 20 feet long air-dry.	Average weight of 100 stems air-dry.	Number of stems to give one ton air-dry bamboo.
1	2	3	4
Large bamboos ...	11'5	1,150 lbs.	195
Small bamboos ...	7'0	700 lbs.	320

Hence for a mill having an output of say 60 tons per week of finished paper-pulp, the number of stems of bamboo necessary per week would be determined on this basis : Bamboo, amount required for pulp mill.

128 tons of air-dry bamboo yielding about 47% air-dry unbleached pulp would give 60 tons bamboo pulp,

1 ton air-dry bamboo requires 195 stems of large bamboos, or 320 stems of small bamboos,

128 tons of air-dry bamboos would require 25,000 large, or 41,000 small stems,

without any allowance for loss or waste.

It cannot be supposed that the comparatively small quantity of 41,000 stems per week delivered constantly to one mill can affect the market prices, particularly when it is understood that stems which are valueless in the ordinary market for building purposes can be utilised for paper making.

The measurements set out above give the data upon which the cost of bamboo for paper manufacture can be worked out.

(3) *The Cost of Bamboos as a raw material for Paper Manufacture.*— Bamboo, cost of raw material. Precise information as to the cost of getting out bamboos on a large and systematic scale it is almost impossible to obtain. Although the number of bamboos cut annually is great, the trade in bamboo stems is not carried on by any organised method, the so-called contractors being merely buyers of small lots from many sources and knowing little or nothing as to the cost of getting the bamboos from the forests.

The villagers up country, in many cases, simply cut bamboos, bring them to the mouth of a stream, and sell to buyers who raft them to the nearest market and sell to a contractor.

The price at which bamboos can be obtained in the open market is for the moment the only reliable source of information, and a brief consideration of the circumstances is all that is necessary to determine the probable cost delivered to a mill.

26. The following table shows the prices of bamboos as ascertained during this enquiry.

TABLE V.—*Price of Bamboos in the Market.*

Place.	PRICE PER 100 STEMS AVERAGING 20 FEET IN LENGTH.		Bamboo, market prices.
	Large Bamboos.	Small Bamboos.	
	2	3	
1			
	Rs. A. P.	Rs. A. P.	
Toungoo ... ..	5 0 0	2 8 0	
Kabaung River ... ..	6 0 0	2 8 0	
Mandalay ... ..	4 0 0	2 8 0	
Pakókku ... ..	5 0 0	3 8 0	
Thayetmyo ... ..	5 0 0	3 0 0	
Prome ... ..	5 8 0	3 8 0	
Rangoon ... ..	10 0 0	3 8 0	
Average ... ..	5 12 0	3 0 0	

It is clear from this schedule of prices that large bamboos can be purchased at the several villages in the open market at Rs. 5 (omitting Rangoon), and small bamboos at Rs. 3, per 100 stems.

Now these bamboos are properly selected for building purposes, and the rafts are built up carefully, no inconsiderable portion of the full length stem being left in the forest. But the cost of getting them out will be greatly reduced if the stems are cut longer than 20 feet and if a larger proportion of the actual full length stem

is taken. Setting the reduction of cost so obtained against expenditure, which would be inevitable when the bamboos have to be cut some distance away from the streams, the prices of bamboo may be taken as stated.

27. On this basis the following results are obtained.

Bamboo,  
price per  
ton.

TABLE VI:—*Cost of one ton of Bamboo.*

	Large Bamboos.	Small Bamboos.
1	2	3
Price per 100 stems, Rs. ... ..	5	3
Weight of 100 stems, lbs. ... ..	1,150	700
Price per ton air-dry bamboos, Rs. ... ..	974	9'60

From the evidence afforded by Conservators, District Officers and local traders, it is clear that bamboos operated for paper-making can be delivered much cheaper than at the rates quoted above, which is practically based on the selling prices ruling in the local markets visited.

Bamboo,  
enquiry as to  
cost of oper-  
ating.

28. The following schedule was sent to several Forest Officers with a view of ascertaining the cost of getting out bamboos in quantity.

#### ENQUIRY AS TO THE COST OF GETTING OUT BAMBOO.

To cut out 100,000 bamboo stems from a forest in one month—

- (1) How many men would be employed to cut?
- (2) How are the bamboos got to the bank of a stream flowing into the main river?
- (3) Are the stems made into rafts at the mouth of the stream?
- (4) If so, how many men are required for rafting purposes, and what would it cost to make 10 rafts of 10,000 bamboos each?
- (5) If the mouth of the stream is 200 miles from Rangoon, how long would the bamboos take to float? How many men in charge of raft, what would it cost to raft 100,000 bamboos?

#### SCHEDULE TO BE FILLED IN.

Cost of 100,000 bamboos delivered at Rangoon from a camp 200 miles up river.

*Imaginary conditions.*—The bamboos to be cut, thrown into a stream, say, 20 miles from mouth of stream where it runs into the main river. Stems to be cut and delivered in one month.

Number of men actually cutting	...	...	...
Rate of pay	...	...	...
Total cost of cutting for one month	...	...	...
Number of helpers (if any) getting the bamboos to mouth of streams	...	...	...
Total wages paid to helpers	...	...	...
Number and cost of buffaloes (if any)	...	...	...
Number of men making rafts	...	...	...
Total wages paid to them	...	...	...
Number of men floating rafts	...	...	...
Total wages (including food allowance) paid to raft men	...	...	...
Total cost of 100,000 bamboos	...	...	...

Letters on  
subject of  
cost of  
operating  
Bamboos.

29. As an instance we quote an interesting letter received during the course of enquiry from Mr. F. A. Leete, Deputy Conservator of Forests, Minbu Division.

\* \* \* \* \*

2. In Minbu, the forests from which bamboos could be sent to Rangoon are those on either side of the *Môn chaung*.

Between 50 and 100 miles from its mouth practically an unlimited quantity could be cut within 4 or 5 miles of the river. The stream is an excellent floating one.

3. The work would be by contract. A man could cut 200 a day, and would, if paid by contract; on daily labour he would not cut more than 100. Although, therefore, the usual coolie rate here is Re. 0-8-0, it would be best to take the cost of cutting at Re. 0-8-0 per hundred.

4. Dragging would be done by the same man on alternate days or by separate men. One man with a pair of buffaloes or bullocks would drag 200 in a day up to four miles. For him also we may take the cost as Re. 0-8-0 per hundred.

5. Making into rafts is done at the nearest place on the floating stream; five men would make a raft of 10,000 in a day (rate, Re. 1 per man). The rafts would take up to a month to get down to the mouth of the stream and another month to reach Rangoon.

6. On the *Môn chaung* small rafts of 3,500 are made; each requires one man, and the average rate is Rs. 5 for rafting to the mouth of the river.

On the Irrawaddy these small rafts are made up into large ones of 10,000; five men are required to manage such rafts, and Rs. 20 per man would be a fair rate to pay for taking to Rangoon.

7. With the above explanations the following is the schedule you ask for—

#### SCHEDULE.

100,000 BAMBOOS.

*Sidókhtaya Môn chaung to Rangoon.*

	Rs.
1. Number of men cutting—17	
2. Rate of pay, 8 annas per 100.	
3. Cost of cutting ... ..	500
4. Number of men dragging—17.	
5. Rate of pay, 8 annas per 100	
6. Cost of dragging ... ..	500
7. Number of men making rafts, 10 for 5 days.	
8. Rate of pay, Re. 1 per day.	
9. Cost of making into rafts ... ..	50
10. Number of men floating rafts on <i>Môn chaung</i> —30.	
11. Cost of men floating, at Rs. 5 per man ... ..	150
12. Number of men floating rafts on Irrawaddy—50.	
13. Cost of men floating rafts on Irrawaddy, at Rs. 20 per man ... ..	1,000
14. Cost of ropes, poles, oars, etc., on Irrawaddy ... ..	125
Total	2,325

or Rs. 23-4-0 per thousand (in round figures, Rs. 25 per 1,000).

[Mr. Leete does not appear to have allowed for the cost of buffaloes. If, however, the amount suggested in Mr. Ryan's estimate is added then the estimates of Mr. Leete and Mr. Ryan agree very well.]

Another estimate from C. V. Ryan, Esq., Extra Assistant Conservator of Forests, Mandalay, gives the following schedule—

*Cost of taking out 100,000 large Bamboos in one month.*

	Rs.
Men engaged in cutting the bamboo stems, 33 at 8 annas per day.	
Total cost of cutting for the month ... ..	500
Helpers engaged in getting bamboos to mouth of streams, 33 at 8 annas per day ... ..	500
Buffaloes (1 pair will drag 100 stems per day), 33 pairs required at Rs. 100 per month ... ..	3,300
Men making rafts, 20 men would make up the 100,000 stems for ... ..	100
Men floating rafts—say 4 men to each raft of 20,000 bamboos—20 at Rs. 20 per man including food ... ..	580
Cost of mooring canes, oars, and rope ... ..	540
Cost of 100,000 stems	5,520

H. Carter, Esq., Conservator of Forests, Southern Circle, Maymyo, suggests the following schedule of costs:—

*Cost of 100,000 bamboos from Madaya forests to Rangoon.*

	Rs.
Men cutting and throwing bamboos into stream, 100.	
These men would also raft the bamboos from the forest stream to the main river (Irrawaddy).	
Total cost of the work ... ..	2,000
Number of men rafting the bamboos to Rangoon taking 25 days.	
Twenty men at Rs. 20 per month, 60 men at Rs. 18 per month ...	1,480
Total cost of 100,000 stems ...	3,480

Bamboo, measurement of stems per acre forest reserves.

30. The following measurements of the bamboo growth were made at random in certain districts:—

(1) S. Carr, Esq., Deputy Conservator of Forests, Tharrawaddy Division, gives us the result of an enumeration made near Kywemakaing.

Species of bamboo growing on a selected acre—*kyathaungwa*.

Number of clumps on the acre, plot 97.

Stems of 1905 growth ... ..	196
Stems of older growth ... ..	1,362

Total ... 1,558

Average height 70 feet.

Average diameter 3 inches.

Average weight (green) 48 lbs.

(2) T. Hauxwell, Esq., Conservator of Forests, Northern Circle, gives some measurements as follows, taken in the Myittha Division:—

Species.	Clumps per acre.	1905 stems.	Older stems.	Total stems.	Average length.
1	2	3	4	5	6
					Ft.
Myinwa ... ..	108	308	1,926	2,334	40
Tinwa .. ...	328	812	3,008	3,880	45
Kyathaungwa ... ..	68	468	1,568	2,036	50
Wabo ... ..	192	176	1,536	1,712	55

(3) C. B. Smales, Esq., Deputy Conservator of Forests, Pyinmana Division, gave some measurements as follows, taken near Pyinmana:—

The selected acre contained—

*Tinwa*, 76 clumps.

*Kyathaungwa*, 92 clumps

containing on an average four new stems each of 1905 growth having an average height of 58 feet.

(4) A. Rodger, Esq., Deputy Conservator of Forests, Rangoon Division, counted bamboos on the Okkan reserve with the following results:—

Species of bamboo on the selected acre—*kyathaungwa*.

Total number of clumps—40.

Stems of 1905 growth ... 160

Stems of older growth ... 744

Total ... 904

	1904 growth.	Older growth.
1	2	3
Length ... ..	61 feet.	64 feet.
Diameter ... ..	3 inches.	3 inches.
Weight, lbs. (green) ... ..	44 lbs.	57 lbs.



(5) W. H. Craddock, Esq., Extra Assistant Conservator of Forests, Toungoó, gives the following enumerations :—

AN ACRE CONTAINING MAINLY KYATHAUNGWA, ON THE BANK OF THE BÓN  
•• CHAUNG.

Number of clumps, 33—				
Average number of culms, per clump, new growth	...	...	...	3
Average number of culms, of old growth	...	...	...	27
Total	...	...	...	30

AN ACRE CONTAINING MAINLY TINWA, IN THE MYOHLA RESERVE.

Number of clumps, 74—				
Average number of culms per clump, new growth	...	...	...	2
Average number of culms per clump, old growth	...	...	...	18
Total	...	...	...	20

*Table of Weights and Sizes (W. H. CRADDOCK, Esq.)*

	KYATHAUNGWA		TINWA.	
	New stems.	Old stems.	New stems.	Old stems.
I	2	3	4	5
Length (feet) ...	66	58	46	43
Mean diameter (inches) ...	32	30	21	19
Weight (lbs.) ...	70	48	26	23
Number of knots ...	34	26	22	21

31. *Cost of Bamboo for the Manufacture of Pulp.*—With bamboo costing Rs. 9-8-0 per ton, the value of the raw material required for a ton of unbleached pulp works out at a reasonable figure. Bamboo, cost of manufacture of pulp.

As it would take about  $2\frac{1}{4}$  tons of bamboo to make one ton of paper pulp, the cost of raw material for one ton of finished pulp is Rs. 22-8-0, or £1-10-0.

32. *Cost of the Manufacture of Paper Pulp from Bamboo.*—At the prices quote above, the manufacture of paper pulp for export seems to be a practical commercial problem. A ton of unbleached bamboo pulp could be produced for about £5-10-0, including manufacturing costs, interests and sundry charges. This cost, supplemented by the freight to England and sundry dues, would be increased to £7-10-0 as the price delivered to London or Liverpool. Having regard to the quality of the pulp, a higher price would be realised, since woodpulp is valued at £8 to £9 per ton. Prospects of an export trade in Bamboo pulp.

The prospects of an export trade for unbleached bamboo pulp would therefore appear to be reasonable, having regard to the excellent quality of the pulp prepared under favourable conditions.

The manufacture of a bleached bamboo pulp for export does not seem a feasible proposition, since bleaching powder brought out from England to such a warm climate suffers considerably in strength and quality. The cost of bleaching would be very high not only on this account but also because the price of the bleach delivered to the mill, when freight had been paid, would be too great. The bleaching of such pulp could be effected much cheaper by the paper-maker.

33. The value of the pulp for local use in a paper mill in Burma itself is therefore undoubted, and the manufacture of paper from bamboo as a new industry for Burma is an attractive proposition, especially in view of the large demand for paper and similar products in the populous towns. Bamboo, local paper mill.

34. *Bamboo Pulp for Export.*—The proposition for an export trade in bamboo pulp being a reasonable one, the Government might very profitably arrange to have a few tons of selected bamboos sent to Europe for treatment on a large scale, and for this the following quantities and species might be supplied :— Bamboo pulp, suggested further experiments.

*Myinwa* (*Dendrocalamus Strictus*)—  
5 tons of stems the new year's growth,  
5 tons of stems older growth.

*Kyathaungwa* (*Bambusa Polymorpha*)—

5 tons new stems,  
5 tons stems one year old,  
5 tons stems more than one year old,

all to be cut in stems of 20 feet in length.

If some of these were sent to mills in Scandinavia, they could be converted into Sulphite pulp and ultimately into paper. The remainder could be treated in England.

A trial on a large scale like this would go far towards bringing the preliminary enquiry to an ultimately successful issue.

A Paper-  
mill in  
Burma.

35. *A Paper-mill Proposition.*—The quantity of paper consumed in the principal commercial centres of Burma, *viz.*, Rangoon, Mandalay, Moulmein, Bassein, appears to be very large, and the prices obtained are certainly high enough to enable a local paper-maker to supply paper at remunerative prices.

It would appear from the numerous enquiries made in this direction that there is ample room for a mill near Rangoon to manufacture a variety of papers, not only stock orders for ordinary printings, but special lines in wrappers, card-board and medium writings.

Such an enterprise could scarcely fail to succeed, as the local demand for all kinds of paper is undoubtedly large.

This would also form the natural beginning to an industry which might ultimately develop into a manufacture of paper pulp for export. Such a mill would be in a position to send trial lots of paper pulp made from bamboo and wood to some outside market and thus ascertain the market value of the new pulp, without the expenditure of large capital.

## EXPERIMENTS ON THE MANUFACTURE OF PAPER PULP FROM BAMBOO.

Bamboo,  
laboratory  
experiments.

36. *Explanation of Terms applying to the Age of Bamboo.*—In all references to the growth and age of bamboos in this report the following definitions are observed :

*Age.*—When a bamboo stem is described as *three years old* the phrase is understood to mean a stem allowed to remain growing on the clump for a period of three years after its appearance and then cut down and used for investigation within a few weeks of being cut, and not merely some market stem which has been in use three years, or some sample stored away three years after having been cut. In the latter case the age is uncertain.

*Growth.*—A stem described as of “1905 growth” means a stem appearing on the clump in the rainy season of 1905 and cut when fully grown within about three months of the end of the rainy season.

A stem described as of “1904 growth” means a stem appearing in the season of 1904 and cut after the rainy season of 1905. (This would be a bamboo one year old).

A stem described as of “1903 growth” means a stem appearing in the season of 1903 and cut down after the rainy season of 1905. (This would be a bamboo two years old.)

Bamboo, ex-  
periments as  
to suitability  
of pulp.

37. *First Series of Experiments with Bamboo.*—Bamboos of various species (*Kyathaungwa*, *Thaikwa*, *Tinwa*) but of uncertain age, though known to be more than three years old, were selected for this experiment.

The stems after having been measured for size and weight were cut up at the knots so as to separate the *internodes* or portions of clear stem from the knots.

Distinction  
of internodes  
and nodes  
(knots).

38. Weighed quantities of average samples of the *internodes* were cut up and digested in suitable apparatus with caustic soda solution of known strength, at a definite temperature for several hours. The resulting product was carefully washed and broken up into moist pulp.

The moist pulp was divided into two portions, the first being made up into rough sheets, dried in the air and carefully weighed in order to determine the actual yield of air-dry pulp from a known weight of bamboo. The second portion was bleached under the usual conditions familiar to chemists and made up into sheets for further observation.

Weighed quantities of the *knots* were treated under conditions exactly similar to those described above, this method of investigation permitting of an exact comparison of the pulp obtained from clear internodes with that obtained from knots, both as to yield, colour and suitability, so that conditions for a serviceable bamboo pulp could be clearly stated.

39. *Conditions of boiling.*—The sample of bamboo cut into small pieces was put into a digester with caustic soda solution of 10° Twaddell (specific gravity 1.050) containing caustic soda equal to 20 per cent. of the weight of bamboo. The material was boiled six hours at 70 lbs. pressure. Bamboo pulp, soda process.

With all the bamboos mentioned the *internode* samples seemed to be sufficiently boiled, disintegrating readily into pulp when broken up by hand. The *knot* samples required a more vigorous mechanical treatment before a complete breaking up of the boiled material was effected. This pointed to an insufficient chemical treatment.

The portions washed, made up into unbleached sheets and dried by exposure to air, gave the following results.

TABLE VII.—*Showing Yield of Air-dry Unbleached Pulp from Bamboos (Age uncertain).*

Species.	INTERNODED.		KNOTS.	
	Per cent. air-dry pulp obtained.	Reference mark on samples.	Per cent. air-dry pulp obtained.	Reference mark on samples.
I	2	3	4	5
Kyathaungwa ... ..	43	K	34	KK
Thaikwa ... ..	40	TR	33	TK
Tinwa ... ..	47	TnR	33	TnK

Bamboo, yield of pulp.

40. *Conditions of Bleaching.*—The portions reserved for bleaching tests were completely broken up by severe maceration, mixed with a clear solution of chloride of lime, prepared from ordinary bleaching powder, and the amount of bleach consumed determined by the usual analytical methods. In the case of the *internode* samples, the bamboos all gave pulps of excellent colour, but the *knot* samples even when further treated with an extra quantity of bleach did not give sufficiently good results.

The amount of bleaching powder consumed to give the results obtained was—

For *internode* ... .. 22 per cent. on the weight of air-dry unbleached pulp.

For *knots* ... .. 28 per cent.

The preliminary trials show that the cost of production of a ton of bleached bamboo pulp, the colour of the pulp and its quality are decidedly influenced by the presence of knots.

This factor has always proved troublesome with bamboo and plants of a similar character. The question, therefore, of cutting out the knots, naturally suggests itself as one to be carefully considered.

41. *Second Series of Experiments with Bamboos.*—Bamboos of various species (*Kyathaungwa*, *Thaikwa*, *Tinwa*, *Myinwa*) but of definite age and growth were selected for this experiment, *viz.*—

Bamboos, influence of age on quality of pulp.

Stem of 1905 growth }  
Stem of 1904 growth } for each species.  
Stem of 1903 growth }

The stems having been carefully measured for weight, diameter and size, were cut up into clear internodes and knots respectively, and the samples so obtained treated as the Bamboos in the first series of experiments, save for slight variation in the actual conditions of boiling.

Examina-  
tion of  
Tinwa.

42. *Tinwa. Conditions of Boiling.*—Boiled a weighed quantity of *internodes* and of *knots* with 10 per cent. of its weight of caustic soda, using caustic soda solution of 7° Twaddell (1.035 sp. gr.) for 9 hours at 75 lbs.

Washed the samples of boiled pulp. Divided into two portions, using one portion for determining the yield of unbleached pulp, and the second for bleaching experiments.

Under these conditions the bamboo proved to be insufficiently boiled. The effect of *age* was clearly marked, the 1905 internode samples breaking up readily when macerated, the others requiring severer mechanical treatment. In the case of the *knots*, the 1905 samples after boiling was disintegrated by squeezing between the hands, the 1904 samples after boiling had to be disintegrated by means of a hammer, the 1903 samples after boiling to be thoroughly hammered, and even then only broke up into coarse fibrous bundles.

The samples attached to the report show these defects.

The amount of air-dried unbleached pulp so obtained was—

TABLE VIII.—*Showing Yield of Air-dry Unbleached Pulp from Tinwa.*

Growth.	INTERNODES.		KNOTS.	
	Yield.	Reference letters on samples.	Yield.	Reference letters on samples.
	Per cent.		Per cent.	
1903 ... ..	50.0	TnR 1903	41.0	TnK 1903.
1904 ... ..	50.0	TnR 1904	43.0	TnK 1904.
1905 ... ..	50.0	TnR 1905	43.0	TnK 1905.

This yield is high, but arises from the fact that the pulp was not sufficiently boiled.

*Bleaching.*—To the six separate portions reserved for the bleaching test added 20 per cent. of bleach in the usual way, and heated gently on a water-bath at 45° C. The bleach was quickly exhausted. The addition of a further 20 per cent. was sufficient to give good bleached pulp in the case of the 1905 growth (internode samples), but the older growths were quite yellow. The knot samples were scarcely affected.

*Remarks.*—The treatment of the bamboo under the specific conditions described, shows—

- (1) That the comparatively mild treatment sufficient for many fibres of the grass species, *e.g.*, rice, straw and munj, will not serve in the case of bamboo.
- (2) That the conditions of the boiling must be varied according to the age of the bamboo.
- (3) That the knots require a far more drastic treatment than the clear stems or internodes.

A duplicate experiment on a sample of *internodes* with stronger caustic soda solution (18° Twaddell) gave a pulp of excellent colour with the bamboos of older growth.

Experi-  
ments with  
Myinwa.

43. *Myinwa. Conditions of Boiling.*—Boiled weighed quantities of *internodes* and *knots* for each of the three years growth separately, with 12½ per cent. of caustic soda, using liquor of 10° Twaddell (1.050 sp. gr.) for 9 hours at 80 lbs.

Washed the sample of boiled pulp. Divided each into two portions, reserving one for determining the yield of unbleached pulp and the second for bleaching experiments.

Under these conditions the *internode* samples were readily disintegrated by maceration in the usual way, though the 1903 growth did not break up so easily as the others. The knot samples were all hard, the 1903 growth having to be broken up, after boiling, with a hammer.

TABLE IX.—*Showing the Yield of Air-dry Unbleached Pulp obtained from the Air-dry Bamboo (Myinwa.)*

Growth.	INTERNODES.		KNOTS.	
	Yield.	Reference letters on samples.	Yield.	Reference letters on samples.
	Per cent.		Per cent.	
1903 ... ..	55.0	MR 1903	42	MK 1903
1904 ... ..	51.0	MR 1904	40	MK 1904
1905 ... ..	50.0	MR 1905	40	MK 1905

This yield seems high, but it is to be accounted for by the fact that the pulp is insufficiently cooked.

*Bleaching.*—The knot samples were not submitted to a bleaching test, as they were insufficiently digested.

The *internode* samples did not bleach well even with 25 per cent. of bleach. With an additional 5 per cent. of bleach the colours were—

MR 1905 white.

MR 1904 yellowish white.

MR 1903 decidedly yellow.

*Remarks.*—The *Myinwa* requires a more severe treatment than the *Tinwa*, and as in the case of the latter, the colour of the fibre product is ruled to some extent by the age of the bamboo.

The young shoots evidently yield to treatment far more readily than those of older growth, while the *knots* offer considerable resistance to the conditions which are sufficient for the *internodes*.

The question of removing the knots, therefore, has to be seriously taken into account, in order to ensure a pulp of good colour.

A sample of the 1903 growth boiled under more severe conditions gave a pulp of good colour and quality.

44. *Kyathaungwa. Conditions of Boiling.*—Boiled a weighed quantity of *internodes* for each of the three years growth separately with 12½ per cent. of caustic soda, using liquor of 10° Twaddell (1.050 sp. gr.) for 9 hours and 70 lbs. pressure. Experiments on  
Kyathaungwa.

Washed the sample of boiled pulp. Divided each sample into two portions, reserving one for determining the yield of air-dry unbleached pulp, and the second for bleaching experiments.

Under these conditions the *internode* samples seemed well boiled.

TABLE X.—*Showing the Yield of Air-dry Unbleached Pulp obtained from the Air-dry Bamboo (Kyathaungwa).*

Growth.	INTERNODES.		KNOTS.	
	Yield.	Reference letters on samples.	Yield.	Reference letters on samples.
	Per cent.		Per cent.	
1903 ... ..	45.8	KR 1903		
1904 ... ..	44.0	KR 1904	Nil.	Nil.
1905 ... ..	48.0	KR 1905		

*Bleaching experiments.*—Only the internode samples of 1905 growth bleached to a good colour with 22 per cent. of bleach. The other samples (1904 and 1903) were yellowish and brown respectively.

Experi-  
ments on  
*Thaikwa*.

45. *Thaikwa. Conditions of treatment.*—Boiled a weighed quantity of internodes or knots with 15 per cent. of its weight of caustic soda solution, using liquor of 11° Twaddell (sp. gr. 1.055) for 9 hours at 70 lbs. pressure.

Washed the boiled pulp. Divided into two portions, one being converted into sample sheets of unbleached pulp for the purpose of ascertaining the yield, and the second for the bleaching test.

The yields of air-dry pulp obtained were as follows:—

TABLE XI.—*Showing Yield of Air-dry Pulp obtained from Air-dry Bamboo (Thaikwa).*

Growth.	INTERNODES.		KNOTS.	
	Yield.	Reference letters on samples.	Yield	Reference letters on samples.
	Per cent.		Per cent.	
1903 ... ..	49.0	TR 1903	32.0 (?)	T K 1903
1904 ... ..	50.0	TR 1904	45.0	T K 1904
1905 ... ..	47.5	TR 1905	49.0	T K 1905

The effect of the *age* of the bamboos was not so noticeable with the *internode* samples as with the *knot* samples.

While the pulp obtained for each of the three years from the internode sample seemed sufficiently boiled, the pulp obtained from the successive years in the case of the *knot* samples varied, the 1903 growth being considerably harder than the 1905.

*Bleaching.*—The effect of the age of the bamboos showed itself in a marked degree in the colour of the bleached samples, as also the difference between *internodes* and *knots*, in their resistance to chemical treatment.

The *Thaikwa* internodes 1905 for example bleached to a good colour with 18 per cent. bleach. *Thaikwa* knots even after 25 per cent. bleach did not give such a good colour. As a general rule it appears obvious that, the older the growth, the poorer the colour.

The *knot* samples of all three years even when treated with bleach equivalent to 30 per cent. of bleach gave very poor results, thus showing the necessity of a more severe digestion with alkali.

General  
conditions  
for treating  
bamboo.

46. *General conditions for the treatment of Bamboo by the soda process.*—If stems of the year's growth (*i.e.*, stems cut immediately after the rainy season) are selected as raw material, the treatment necessary will be much less severe than that required for stems of older growth.

In the case of the stems one year old and more than one year old, it may be advisable for the manufacture of high class papers to cut out the knots. The cost of cutting out knots should be easily covered by the utilization of the knots as fuel, the quantity being roughly 10 per cent. of the total bamboo; (2) the saving in caustic soda and bleach effected by only using the clear stem or internode; (3) the production of a paper free from specks and dirt.

There should be no difficulty in producing a good quality of pulp even from stems of older growth than those cut immediately after the rainy seasons. The conditions will require to be more severe than those described in the experiments, a liquor of greater density being necessary, say, 15° to 20° Twaddell (1.075 sp. gr. to 1.100 sp. gr.), and probably a somewhat higher pressure of about 90 lbs. The chief trouble would be experienced in bleaching up the pulp to a pure white colour, such as can readily be obtained with the *Stems of the year's growth*, but the removal of the knots should go a long way towards this end.

In point of texture and strength the pulp obtainable is of excellent quality.

MICROSCOPICAL EXAMINATION OF THE PAPER PULP PREPARED  
FROM BAMBOO.

47. In the case of the measurements of the fibres of bamboo pulp it was found that the fibres could be classified to some extent, the pulp appearing to consist of—

- (a) fibres short and fairly broad ;
- (b) fibres long and of medium diameter ;
- (c) fibres of medium length, but very small diameter ;

the proportions in which these were present being approximately—

- (a) 10—20 per cent.
- (b) 70—60 per cent.
- (c) 20—30 per cent.

The bamboo pulps examined were *Tinwa* and *Myinwa*.

*Measurements of Tinwa Fibre.*

Fibres.			Length in Millimetres. Date of growth.			Diameter in Millimetres. Date of growth.		
			1903.	1904.	1905.	1903.	1904.	1905.
I			2	3	4	5	6	7
A	...	...	3'12	3'15	2'54	'026	'028	'033
B	...	...	3'37	3'15	2'87	'016	'016	'024
C	...	...	2'78	2'75	2'25	'009	'011	'0111

*Measurements of Myinwa Fibre.*

Fibres.			Length in Millimetres. Date of growth.			Diameter in Millimetres Date of growth.		
			1903.	1904.	1905.	1903.	1904.	1905.
I			2	3	4	5	6	7
A	...	...	2'42	1'87	2'50	'029	'029	'033
B	...	...	3'42	3'20	3'37	'016	'018	'019
C	...	...	2'37	2'25	2'06	'009	'009	'009

NOTE.—The measurements shown are average results obtained by taking about 15 to 20 readings in each case. It is obvious that an exact measurement of the values could not be carried out for want of time. The table is, however, useful for the purposes of comparison.

## WOOD PULP.

Wood pulp,  
use of—

48. *Wood Pulp*.—The possibility of utilizing certain species of wood in Burma for paper-pulp has only been suggested of recent years, and this present enquiry is the first step taken to ascertain whether such a project is practicable. It is of course well known that the ordinary wood pulp of commerce is mainly prepared from spruce, fir, pine, poplar, etc., but in view of the many varieties of soft woods found in the forests of Burma, it was considered desirable to investigate these species and determine whether a marketable pulp could be obtained.

Species of  
wood  
available.

49. Many species of wood were mentioned by the Conservators of Forests as likely to be of service. The following table is an abstract of the list of the woods, together with certain information taken from Gamble's "Manual of Indian Timbers." The species finally selected for experimental investigation, mainly because they were fairly plentiful, readily extracted and find but a limited use for commercial purposes, are given first (numbers 1—12).

TABLE XII.—*Soft Woods found in Burma.*

No.	Botanical name;	Vernacular or common name.	Number of page in Gamble's book.	Weight of a cubic foot of dry wood.	Description of Wood.
1	2	3	4	5	6
				lbs.	
1	<i>Bombax insigne</i> ...	Didu (cotton tree)	91	31	Light soft wood. Moist when cut. White, going brown on exposure.
2	<i>Bombax malabaricum</i> ...	Letpan ...	90	24	A light soft wood. White, turning brown when exposed. Grows rapidly.
3	<i>Gmelina arborea</i> ...	Yamane ...	537	36	A greyish white wood of fast growth, durable in water. Not readily attacked by insects.
4	<i>Sterculia colorata</i> ...	Wetshaw ...	93	24	Grey soft wood. Bark used for rope making.
5	<i>Tetrameles nudiflora</i> ...	Thitpòk ...	381	24	White soft wood. Tree of enormous size often 15 feet girth.
6	<i>Odina Wodier</i> ...	Nabè ...	218	60	Reddish coloured hard wood. Grows to large size in moist soil.
7	<i>Ficus glomerata</i> ...	Thapan ...	650	30	Greyish red soft wood. Not very durable.
8	<i>Spondias mangifera</i> ...	Gwe ...	223	29	Soft, light grey wood. Useless for ordinary purposes.
9	<i>Anthocephalus cadamba</i> ...	Ma-u ...	400	40	Yellowish coloured wood, fairly soft. Grows rapidly.
10	<i>Macaranga denticulata</i> ...	Ywetwun ...	620	33	Reddish wood, moderately hard, grows rapidly.
11	<i>Anogeissus accuminata</i> ...	Yôn ...	347	53	A yellowish hard wood. Usually grows on river banks.
12	<i>Homalium tomentosum</i> ...	Myaukchaw ...	380	60	Close grained, hard yellowish brown wood. Trees of large growth.
13	<i>Engelhardtia spicata</i> ...	Taungtamasòk ...	663	33	Reddish grey hard wood. Large growth.
14	<i>Trewia nudiflora</i> ...	Yehmyòk ...	617	28	White soft wood, not durable. Found in swampy places.
15	<i>Terminalia tomentosum</i> ...	Taukkyan ...	341	59	Reddish wood, moderately hard, makes good fuel.
16	<i>Pithecolobium saman</i> ..	Rain tree ...	310	32	Soft. White to light brown.



TABLE XII.—*Soft Woods found in Burma—concluded.*

No.	Botanical name.	Vernacular or common name.	Number of page in Gamble's book.	Weight of a cubic foot of dry wood.	Description of Wood.
1	2	3	4	5	6
				lbs.	
17	<i>Bombax cambodiense</i> ...	Kôkhè ...	91	25	Soft, moist. White when cut, turning dark on exposure.
18	<i>Callicarpa arborea</i> ...	Daungsatpya ...	525	35	Brownish coloured, moderately hard wood, fast growth.
19	<i>Erythrina suberosa</i> ...	Kathit ...	241	19	Soft, spongy but tough wood, fast growth, fairly durable.
20	<i>Mangifera indica</i> ...	Thayet (Mango)	211	40	Grey, dark brown, hard wood. Many industrial uses.
21	<i>Stephegyne diversifolia</i> ...	Binga ...	404	45	Yellowish brown, moderately hard wood.
22	<i>Morinda tinctoria</i> ...	Niba (Nyaw) ...	422	41	Reddish yellow, hard grained wood, fairly durable.
23	<i>Dipterocarpus turbinatus</i>	Ka-nyin ...	70	50	Reddish brown, moderately hard wood. Trees of great size.
24	<i>Hymenodictyon excelsum</i>	Kuzan ...	406	31	Brownish grey, soft wood.

50. *Details of the Experiments relating to the Préparation of Wood pulp.*—

Experiments with wood-pulp.

The process adopted for the isolation of the cellulose or paper-making fibre from the wood was the same in all cases, *vis.*, the digestion of a weighed quantity of wood suitably prepared in a solution of caustic soda of known strength for several hours at a given temperature, a copper digester being used for the purpose.

The samples of wood submitted for examination consisted of logs varying in length from six to twelve feet. From each of the selected trees a disc about two inches thick was cut giving a piece of wood representing a cross-section of the tree. Half of the section was cut into small pieces by means of an ordinary mitre cutter and used for the preparation of pulp, the other half being reserved for the determination of moisture, etc.

TABLE XIII.—*Percentage of Air-dry Wood in the Logs when sampled.*

Wood, percentage of moisture in green wood when sampled.

Wood.	Per cent. of air-dry wood.	Per cent. of water (evaporating by exposure to air).
1	2	3
<i>Bombax insigne</i> (Didu) ...	48	52
<i>Bombax malabaricum</i> (Letpan) ...	52	48
<i>Gmelina arborea</i> (Yamane) ...	55	45
<i>Sterculia colorata</i> (Wetshaw) ...	57	43
<i>Tetrameles nudiflora</i> (Thitpôk) ...	60	40
<i>Odina wodier</i> (Nabê) ...	60	40
<i>Ficus glomerata</i> (Thapan) ...	65	35
<i>Spondias mangitera</i> (Gwe) ...	68	32
<i>Anthocephalus cadamba</i> (Ma-u) ...	78	22
<i>Macaranga denticulata</i> (Ywetwun) ...	81	19
<i>Anogeissus accuminata</i> (Yên) ...	85	15
<i>Homalium tomentosum</i> (Myaukchaw) ...	86	14

## EXPERIMENTS ON THE PREPARATION OF UNBLEACHED PULP FROM WOOD.

51. *First series.*—Digested a known weight of chipped wood with caustic soda solution having a specific gravity of 1.0° Twaddell (1.050 sp. gr.), using 20 per cent. of caustic soda calculated on the moist weight of wood, and boiling for nine to ten hours.

hours at a pressure of 60—70 lbs. Washed the boiled wood with water, reduced it to a condition of pulp, squeezed out excess of moisture by hand, and divided the moist pulp into two portions. Made up the first portion into rough sheets, which were then dried by exposure to air and finally weighed in order to determine the percentage amount of unbleached wood pulp obtained from the original wood. Kept the second portion for testing the behaviour of the wood when bleached.

Wood, yield  
of pulp  
obtained.

52. The yield of unbleached wood-pulp obtained is shown in the following table:—

TABLE XIV.—*Yield of Unbleached Air-dry Wood Pulp.*

No.	Wood.	Reference letters on samples.	YIELD OF UNBLEACHED PULP		Number of solid cubic feet of clean dry wood required to make one ton (2,240 lbs.) of pulp.
			On original moist wood.	On air-dried wood.	
1	2	3	4	5	6
			Per cent.	Per cent.	
1	Bombax insigne ... ..	BI	23'6	50	144'5
2	Bombax malabaricum ... ..	BM	23'0	45	207'5
3	Gmelina arboria ... ..	GM	24'7	45	138'3
4	Sterculia colorata ... ..	S	23'0	40	233'3
5	Tetrameles nudiflora ... ..	D	24'5	41	227'7
6	Odina wodier ... ..	N	27'0	45	83'0
7	Ficus glomerata ... ..	T	25'0	39	191'4
8	Spondias mangifera ... ..	G	32'4	48	191'0
9	Anthocephalus cadamba ... ..	A	34'5	44	127'2
10	Macaranga denticulata ... ..	M	30'7	38	178'0
11	Anogeissus accuminata ... ..	An	37'7	43	162'6
12	Homalium tomentosum ... ..	H	37'7	43	86'8

Wood-pulp,  
colour and  
appearance.

53. All the woods treated by the process described were sufficiently boiled to give a pulp which disintegrated readily when broken up.

The colour and general appearance for the actual samples of wood and of the unbleached pulps are recorded in Table XV:—

TABLE XV.—*Colour and General Appearance of Wood and Pulp.*

Species of wood (names contracted).	Colour of the wood.	Colour of the unbleached pulp.	Remarks.	Reference letter on samples attached to report.
1	2	3	4	5
Insigne ... ..	Whitish grey ...	Brown ...	Pulp slightly specky ...	Bi
Gmelina ... ..	Do. ...	Light brown ...	Clean pulp ...	Gm
Sterculia ... ..	Do. ...	Brown ..	Pulp a little dirty ...	S
Tetrameles ... ..	Do. ...	Light brown ...	Pulp rather specky ...	D
Malabaricum ... ..	Do. ...	Brown ...	Clean pulp ...	BM
Anthocephalus ... ..	Do. ...	Light brown ...	Do. ...	A
Spondias ... ..	Do. ...	Very light brown ...	Do. ...	G
Ficus ... ..	Grey, inclined to red.	Reddish brown ...	Uniform well-boiled pulp	T
Odina ... ..	Do. ...	Do. ...	Do. ...	N
Macaranga ... ..	Very red ...	Do. ...	Do. ...	M
Homalium ... ..	Do. ...	Dark red brown ...	Soft velvety pulp ...	H
Anogeissus ... ..	Yellow ...	Dark brown ...	Do. ...	A

*Bleaching Trials.*—The portions reserved for bleaching experiments were treated in the usual manner as follows. The moist pulp was placed in a dish together with a clear solution of chloride of lime prepared from ordinary bleaching powder. The strength of the bleaching solution was carefully measured, and known quantities employed with each wood, so that the actual weight of bleaching powder required to bring the colour of a given weight of pulp could be determined. The general analytical methods familiar to chemists were adopted in the majority of cases.

54. Most of the woods when bleached gave pulp of good colour though perhaps not quite equal to that associated with the best qualities of bleached spruce, soda wood or sulphite wood pulp. Woods most suitable for pulp.

The woods giving the best results for colour were—

Tetrameles, Sterculia, Odina, Macaranga, Anthocephalus, Malabaricum.

• Slightly inferior in colour were—

Ficus, Gmelina, Spondias, Insigne.

The two woods—Homalium, Anogeissus—did not bleach even with 35—40 per cent. of powder, the pulp being in each case a deep yellow.

55. *Second Series.*—Five of the woods selected for their light colour (greyish white) and general condition of softness were treated as follows:—

Weighed quantities of the wood in the air-dry state were boiled 12 hours at 80 lbs. pressure with weak caustic of 6° Twaddell (1·030 sp. gr.), containing caustic soda equivalent to 20 per cent. of the air-dry weight of wood. The woods in all cases were boiled sufficiently to yield a well disintegrated pulp not containing any shires or any chips of incompletely boiled wood. None of these pulps, however, could be properly bleached, the colour being very poor, the preliminary boiling treatment not having been carried far enough. Wood pulp, second series of experiments.

The yields on unbleached pulp obtained are given in Table XVI.

TABLE XVI.—*Showing Air-dry Unbleached Pulp obtained in second series.*

Wood.	Per cent. yield of air-dry pulp.	Reference letters on sample.
1	2	3
Malabaricum ... ..	44	BM (2)
Spondias ... ..	50	G (2)
Tetrameles ... ..	45	D (2)
Sterculia ... ..	40	S (2)
Gmelina ... ..	44	Gm (2)

56. When the pulps prepared by the methods described were compared as to the general qualities of strength and behaviour when handled, the order of merit was found to be as follows:—

TABLE XVII.—*Quality of Pulps.*

Number.	Name of Wood.	Reference letters on sample.
1	2	3
1	Spondias mangifera ... ..	G
	Gmelina arborea ... ..	Gm
3	Anthocephalus cadamba ... ..	A
	Bombax malabaricum ... ..	BM
	Macaranga denticulata ... ..	M
5	Tetrameles nudiflora ... ..	D
	Bombax insignis ... ..	Bi
	Sterculia colorata ... ..	S
9	Ficus glomerata ... ..	T
10	Odina woderi ... ..	N

In all cases the pulps, though fairly strong and tenacious, consisted of short fibre which did not yield the strong material that one is familiar with as manufactured in Scandinavia, Germany and America from the *Pine* and *Spruce* species.

TABLE XVIII.—*Microscopical Examination of the Paper Pulp prepared from Wood.*

Species of Wood.	General character of the fibres.	LENGTH OF FIBRES IN MILLIMETRES.			Diameter of fibres in Millimetres.
		Maximum.	Minimum.	Mean of all readings.	Mean.
1	2	3	4	5	6
<i>Spondias mangifera</i>	Fibres fairly broad with gradually tapering ends. Characteristic cells.	1'75	1'12	1'39	'037
<i>Gmelina arborea</i> ...	Fibres regular, but short, tapering off sharply to a point.	1'37	1'00	1'21	'026
<i>Anthocephalus</i> ca- damba	Tapering fibres, and cells fairly numerous.	2'00	1'25	1'57	'036
<i>Bombax</i> mala- baricum.	Fibres irregular in shape but tapering gradually.	2'6	2'0	2'37	'037
<i>Tetrameles</i> nudi- flora.	Flat ribbon-like fibres, many broken oval shaped, cells numerous.	2'0	1'25	1'7	'037
<i>Sterculia colorata</i> ...	Fibres irregular in length, some long and slender, others short and broad.	2'3	1'0	1'62	'032
<i>Ficus glomerata</i> ...	Fibres broad with suddenly tapering ends. Cells fairly numerous.	1'20	'60	'80	'022

NOTE.—The average results of the length and diameter measurements were determined on about 25 readings in each case. It is obvious that a thorough and critical determination of the measurements could not be undertaken, and the above record can only be considered as a comparative table of results.

Sulphite process.

57. *Experiments on the Sulphite Process.*—Some few trials with Bamboo and wood treated by the sulphite process were sufficient to show that the pulp could be prepared in this way. But the period allotted to experimental work did not allow of any accurate quantitative experiments, as most of the available time was devoted to an examination of the strength and quality of the fibres by isolation of the cellulose with caustic soda.

The colour of the Bamboo was somewhat yellow, but probably a further investigation would determine the necessary conditions for a white pulp.

Wood pulp, local use for.

58. The pulp produced from the Burmese woods experimented with may certainly find a local use in Burma itself for the manufacture of certain qualities of cheap papers, but would not enter into serious competition with the high-class wood pulps obtainable in England, if exported as paper pulp to that country.

Wood not present in large quantities.

59. Another disadvantage connected with these soft woods is to be noticed in the fact that none of the species can be found together in any large quantity, so that it would be necessary to mix them indiscriminately in treatment. But this could not be done to an unlimited extent. Certain woods which resemble one another in general characteristics and give pulps which appear to be similar in strength and colour, could be mixed so long as the proportions of each did not vary beyond stated limits, but the indiscriminate mixing of any woods would be somewhat detrimental to the manufacture of a pulp uniform in colour and quality.

Pulp of a cheaper quality.

60. In spite of these disadvantages the pulp obtainable from the species of woods experimented with was of a quality both as to colour and strength that would ensure its use for the cheaper classes of paper. Furthermore, if the pulp could be sold in foreign markets at sufficiently attractive prices, it would be taken up by paper-makers. In other words, while the pulp is inferior to high class Spruce wood pulp, it would find a sale in outside markets if the selling price was suitable.

61. *Experiments with Wood on a Manufacturing Basis.*—The Government might readily determine the actual market value of this class of wood by sending a quantity of selected wood to Sweden or Norway for experimental purposes. The most suitable woods appear to be *Spondias Mangifera*, *Gmelina arborea*, *Anthocephalus cadamba*, *Bombax malabaricum*. Of these woods 10 tons of each species in the form of logs 10 to 12 feet in length might be exported for trial to any mill willing to undertake the experiment. The pulp could ultimately be shipped to England for conversion into paper. Wood-pulp, suggested trial on a larger scale.

62. *Cost of Wood for the Manufacture of Paper Pulp.*—The cost of soft woods delivered to a given site for the purpose of paper manufacture has never been taken into account by the Forest Department, and naturally there are no data which can be actually utilized for estimation of cost, except those relative to getting out of teak. Wood, cost of, for manufacture of pulp.

From information supplied at various times to the writer it may be assumed that wood can be delivered at the mill site on a river bank at Rs. 6 per 50 cubic feet (one ton cubic measure).

As the light woods appear to weigh about 30 lbs. to the cubic foot, this gives a cost of about Rs. 9 per ton of 2,240 lbs. of air-dry wood. The cost of raw wood for one ton of wood pulp works out at Rs. 21 or £1-8-0.

#### COST OF MANUFACTURE OF PAPER PULP FROM WOOD.

63. The prices at which the raw material can be obtained compare very favourably with the prices of wood in other pulp-producing countries. In fact if the comparison be made in terms of the cost per ton of manufactured pulp, then the raw material in Burma is much cheaper. Wood, cost of manufacture of paper pulp.

*For Bamboo.*—Raw material to make one ton pulp would cost Rs. 22-8-0 or £1-10-0.

*For Wood.*—Raw material to make one ton pulp would cost Rs. 21 or £1-8-0.

The average price of the Spruce wood in America; *e.g.*, is about five to seven dollars per cord, and as it requires  $2\frac{1}{4}$  cords of Spruce to make one ton pulp would be £2-14-0 for one ton of finished pulp.

64. A ton of unbleached wood pulp could be produced at a mill in Burma in the form of air-dry sheets suitable for export for about £5-10-0 per ton, including manufacturing costs, interest and sundry standing charges. This pulp could not be sold in England under £7-10-0 to £8-0-0 and having regard to the somewhat inferior quality of the pulp, this price does not seem to warrant the idea of opening up a large export trade in wood-pulp. Wood-pulp, export.

65. On the other hand, if the pulp is utilized at a mill in Burma for the manufacture of paper for local consumption, it can be produced at a price which would be very remunerative. Wood-pulp local use.

## OTHER FIBRES.

66. *Rice straw*.—Some few experiments with rice straw proved that this raw material could be easily converted into paper pulp. The pulp was fairly tough, bleached to a good colour and would work up into good paper.

If only partially boiled, the pulp proved to be hard and tenacious, very suitable for the manufacture of a tough cardboard for box-making purposes.

67. *Kaing-grass*.—A grass which grows in great profusion in all parts of Burma, reaching frequently to a height of 10 feet.

The specimens examined gave a good pulp on being treated in the usual way with caustic soda, but the grass appears in many cases to grow very rank and coarse, which would make it difficult to secure a uniform quality of raw material. No doubt, by systematic cutting over properly preserved areas, a splendid fibre would ultimately be obtained in a very short time.

A careful investigation of this grass might amply repay attention

## PAPER-MILL SITES.

### INVESTIGATION AS TO PAPER-MILL SITES.

68. The questions which need to be taken into account in fixing upon a site Sites. ✓ for a pulp or paper-mill are somewhat complicated.

69. An abundant supply of raw material readily accessible and capable of meeting all the requirements of a mill for many years. Raw material.

The cost of such material, whether purchased from contractors or obtained from any reserves which the Government may place at the disposal of a Company, must be reasonable, not only at the commencement of operations but during a long period of years subsequently.

70. The distance of the site from the sources of raw materials from a shipping port or from local markets. Distance from shipping ports.

The cost of getting out bamboos and wood, the cost of local railway or steamer freights are usually the items of expenditure that determine the possibility of any industrial enterprise. Freight not only influences the price of the finished product, but also adds to the price of any chemicals which have to be imported.

71. The natural condition of the site in relation to the waterways, and delivery of raw material. Natural conditions of site.

It may be taken for granted that, other things being equal, the only economic position for a mill is at some point upon a main river which is navigable from the mill to a shipping port or some local market, all the year round. The transport of raw material and chemicals to the mill or of the finished pulp and paper for any distance by rail is practically out of the question on account of high railway charges. In connection with the supply of bamboo and timber it is also obvious that the floatability of the streams and the rivers are matters of great importance in Burma, where the occurrence of heavy rains produces large floods followed by a long dry season with low water.

The great difference between flood level in the rains and the low water level in the dry season must be taken into account, because in many cases the ghaut, or landing stage, cannot be permanently moored at one spot.

72. The supply of fuel needed in a properly equipped mill for heating for motive power, and for recovery of chemicals. Supplies of Fuel.

The amount of fuel required to produce a ton of paper varies from 20 cwt. in the case of news and common printings, to 65 cwt. for high class magazine printing and medium writings, so that the question of fuel needs careful thought. The fuels available are wood, Indian coal, crude petroleum oil, Astatki (petroleum oil refuse) and natural gas (in one locality at least).

### INVESTIGATION AS TO SUITABLE SITES FOR A PULP AND PAPER MILL IN BURMA.

73. At a conference held on December 1, 1905, attended by F. Beadon Bryant, Esq., Chief Conservator of Forests; J. H. Lace, Esq., Conservator of Forests, Pegu Circle; C. E. Muriel, Esq., Conservator of Forests, Tenasserim Circle; R. W. Sindall, Esq., Paper Pulp Expert, it was arranged that visits should be made to certain districts in order to determine the most likely sites for a mill. Conference of Conservators, etc.

The eastern portion of Burma is drained by the Sittang river and the Salween river. The Sittang drains a large area in which certain bamboos (chiefly *Kyathungwa*, *Tinwa*) grow in great quantity, being readily extractable. The Government forest reserves of the Pyinmana and Toungoo Divisions can be operated by means of the Sittang, and in the rainy season the country as far north of Yamèthin becomes accessible. C.E.B.

74. *Toungoo*.—This village is situated on the River Sittang 186 miles from Rangoon, being in communication with the latter by rail. It is the centre of an important timber trade, but its position does not offer any special advantages for a paper-mill site. A much better site can be secured at a point on the River Sittang 17 miles below Toungoo, namely, Kywèbwè. This village possesses a railway station within easy reach of the river by a good Public Works road two miles in length. Report on places visited by R. W. Sindall.

The banks of the Sittang at this point are sufficiently high to be above the ordinary high floods, the river itself widens out into a large bay ; a plentiful supply of bamboos can be obtained from the country drained by the Sittang, Kabaung, Thaukegat and Swachaung rivers, as well as certain species of soft woods, such as *Bombax insigne*, *Bombax malabaricum*, and in addition to these materials, rice straw is available in considerable quantity.

Wood fuel is apparently cheap, though the demand for a large quantity necessary to a paper-mill would cause a gradual rise in price. At present a small saw-mill operating here on the banks of the river could supply a certain quantity.

All goods in the shape of coal, oil fuel or chemicals would have to come by rail, as there is no regular boat service. Bamboos could be floated down all the year round, but in the low water season it would be difficult to get logs.

*Sittang*.—This village situated at the mouth of the river does not answer the conditions necessary for a site. There is no direct railway communication to the village and the absence of any regular boat service renders it unsuitable.

The western side of Burma is drained by the Irrawaddy and its tributaries, the most important of which is the Chindwin joining the Irrawaddy just above Pakókku.

*Pakókku*.—A village situated on the banks of the Irrawaddy, 58½ miles from Rangoon by steamer, does not possess any natural advantages likely to be of service to a paper-mill. The nearest point offering any attractions as a likely site is Kunywa, a little village two or three miles above Pakókku. The banks of the river for some miles north and south of Pakókku are too low except at Kunywa, where there is rising ground seldom covered by normal floods. At the latter village there is a small oil refinery, from which no doubt oil fuel could be obtained in sufficient quantity.

*Yenangyat*.—A busy place situated on the river Irrawaddy, 545 miles from Rangoon, and possessing several desirable features. The banks of the river are high, being formed of rock ; the water channels of the river are navigable all the year round ; bamboos can be landed at any time ; the supply of oil fuel is abundant owing to the operations of the Burma Oil Company at this place.

*Singu*.—Situated on the Irrawaddy below Yenangyat and 530 miles from Rangoon is more suitable. The banks of the river are similar in character ; the river is deep and quiet along the shore ; the available fuel is crude oil and natural gas. This gas is not being used to any great extent at present, so that favourable terms could probably be arranged.

*Thayetmyo*.—A large and important town on the Irrawaddy, 355 miles from Rangoon, appears to be another eligible site. The banks of the river slope down to the water at a convenient angle, and the channel is sufficiently deep all the year round to ensure permanent operations at one spot in the matter of handling bamboos and other raw materials. Oil fuel can be obtained cheaply ; and since oil borings are being carried out at the present time, there is every reason to suppose fuel will be available at the spot.

*Prome*.—A town 311 miles from Rangoon on the Irrawaddy river, which offers no special advantages. The high land in the immediate vicinity of the town is all occupied and the banks beyond are very low. Prome is connected to Rangoon by rail.

*Insein*.—A village, 10 miles from Rangoon, situated on the Hlaing river and also connected with Rangoon by a local railway is fairly representative of the villages on the banks of the river which drains the Tharrawaddy and Prome Divisions of the Pegu Circle. There are many places along the river which could be readily utilized as a pulp and paper mill site, though probably it would be necessary to purchase the land, whereas in the case of sites further away from Rangoon the Government would be in a position to grant land on easy terms. Land can be purchased for Rs. 400 to Rs. 500 per acre, and at this price the capital outlay for a site need not be large. The proximity of the spot to Rangoon would readily compensate for the permanent charges arising from the purchase of land. Fuel, chemicals and other materials can be landed cheaply. While bamboos, wood and rice straw are readily obtainable.



75. The following particulars are inserted to show the price of certain chemicals delivered at or near Rangoon.

TABLE XIX.—*Price of Chemicals.*

				£	s.	d.	£	s.	d.
Caustic Soda, 70 per cent. per ton, cost	...	...	...	9	0	0			
Freight Liverpool to Rangoon	...	...	...	1	12	6	10	12	6
Soda Ash, per ton, cost	...	...	...	5	10	0			
Freight Liverpool to Rangoon	...	...	...	1	12	6	7	6	9
Bleaching Powder, per ton, cost	...	...	...	4	5	0			
Freight Liverpool to Rangoon and cost of packing in zinc lined cases	...	...	...	5	15	0	10	0	0
Sulphur from Sicily, per ton, cost	...	...	...	5	0	0			
Freight estimated at	...	...	...	1	5	0	6	5	0
China Clay, per ton	...	...	...	1	10	0			
Freight Liverpool to Rangoon	...	...	...	1	12	6	3	2	6
Alum, per ton	...	...	...	5	5	0			
Freight Liverpool to Rangoon	...	...	...	1	12	6	6	17	6
Lime (native) per ton	...	...	...	0	10	0	0	10	0
Bengal Coal, per ton	...	...	...	1	0	0	1	0	0
Crude Oil Fuel, per ton	...	...	...	1	4	0	1	4	0

Wood Fuel.—Rs. 6, per stack of 90 cubic feet.  
2½ stacks equals 1 ton coal.

Wood equivalent to 1 ton coal ... .. 1 0 0

TABLES SHOWING CERTAIN RAILWAY RATES.

TABLE XX.—*Rates from Rangoon Station.*

To	Miles.	Sulphur in casks or bags.	Limestone in full waggons.	Bleach.	Alkali.	Coal in full waggons.	Wood pulp.
		Per ton.	Per 6 tons.	Per ton.	Per ton.	Per 6 tons.	Per ton.
1	2	3	4	5	6	7	8
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Prome ... ..	161	11	18	11	8	20	23
Henzada ... ..	82	8	16	8	5	14	15
Tharrawaddy ... ..	123	5	10	5	4	8	10
Pyinmana ... ..	226	16	25	16	11	29	32
Mandalay ... ..	386	28	36	28	18	49	55

TABLE XXI.—*Rates from Bassein Station.*

To	Miles.	Sulphur in casks or bags.	Limestone in full waggons.	Bleach.	Alkali.	Coal in full waggons.	Wood pulp.
		Per ton.	Per 6 tons.	Per ton.	Per ton.	Per 6 tons.	Per ton.
1	2	3	4	5	6	7	8
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Prome ... ..	161	14	22	14	9	25	28
Henzada ... ..	81	6	12	6	4	10	12
Tharrawaddy ... ..	123	8	16	8	5	13	5
Pyinmana ... ..	226	30	39	30	20	52	60
Mandalay ... ..	386	41	54	41	28	65	83

NOTE.—The rates are calculated to the nearest rupee, fractions being omitted.

## RATES QUOTED BY THE IRRAWADDY FLOTILLA COMPANY.

TABLE XXII.—*Carriage of Wood-pulp (per ton of 20 cwt.)*

From					To Rangoon.	To Bassein.
1					2	3
					Rs.	Rs.
Myingyan ... ..	...	...	...	...	15	25
Pakókku ... ..	...	...	...	...	15	25
Prome ... ..	...	...	...	...	6	16
Henzada ... ..	...	...	...	...	6	16

*Carriage of Chemicals.*

To					From Rangoon.	From Bassein.
1					2	3
					Rs.	Rs.
Henzada ... ..	...	...	...	...	6	16
Prome ... ..	...	...	...	...	6	16
Pakókku ... ..	...	...	...	...	15	25
Myingyan ... ..	...	...	...	...	15	25

Copy of letter from Messrs. STEEL BROTHERS & Co., Ltd., to the Conservator of Forests, Pegu Circle, Rangoon, dated the 22nd November 1905.

We have the honour to acknowledge receipt of your No. 2564—41-8 of 21st instant. We regret we are meantime without freight quotations for several of the articles enumerated by you. We are addressing Messrs. P. Henderson by outgoing mail in this connection, but are meantime prepared to accept trial shipments at —

( 31 )

FROM RANGOON.

Wood-pulp 35s. per ton of 20 cwts. *g. w. d.* to London or Liverpool.

Wood-pulp 45s. per ton of 20 cwts. *g. w. d.* to Cardiff, transhipment at London or Liverpool.

FROM GLASGOW OR LIVERPOOL TO RANGOON.

Sulphur 27s. 6d. per ton of 20 cwts.

Limestone 25s. per ton of 20 cwts.

Soda Ash

Soda Bleaching } 32s. 6d. per ton of 20 cwts.

Rates of coal fluctuate a good deal and a special arrangement would require to be come to for each parcel you wish to be shipped.

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Copy of letter from J. R. HALLIDAY, Esq., P. Pro., the Arracan Company, Limited, to R. W. SINDALL, Esq., Rangoon, dated the 24th February 1906.

We have your letter of date.

We now quote freight on Wood pulp to London or Liverpool at 30s. per ton of 20 cwt. gross weight delivered and 40s. to Cardiff with transhipment at London or Liverpool at our option. Both rates are subject to a deferred rebate of 10 per cent.

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Copy of letter from Messrs. BULLOCH BROTHERS & Co., Ltd., Agents, British India Steam Navigation Co., Ltd., Rangoon, to the Conservator of Forests, Pegu Circle, dated the 5th December 1905.

We have the honour to refer to your letter No. 2564—41-8 of 21st ultimo. Our through rate of freight, with transhipment at Calcutta, on wood pulp to London is £2-12-6 per ton of 50 cubic feet or 20 cwts. at our option, and to Liverpool £3-2-6 similar terms. We regret we cannot quote to Cardiff, and also that we are unable to quote rates for cargo outward to Burma.

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		Use of— ...	20
		Yield of— ...	22

**Copy of a telegram dated 22-4-1912.**

**Agent, G. I. P. Railway,—Bombay.**

---

Five thousand bags at Generalganj upwards a week and three thousand bags at Kalpi upwards a month lying for April and May shipment. April shipment lost by delay. Incurring heavy losses. Consignments of Ralli and Lewis loaded every day. Goods Inspector under special instructions showing undue preference. Causing loss. Trade is suffering heavily. Remedy grievance within 4 days or shall move higher authorities.

27th April 1912.

To

The Goods Inspector,

Generalganj, G. I. P. Railway,

Cawnpore.

Sir,

This is to inform you that for the last few months undue preference is shown to Messrs Ralli and Lewis in that their goods are sent first and then those of other Mahajans. We are supplied with a very few wagons, the greater portion being supplied to the European merchants. On being asked by me in the presence of the D. T. S. to explain the reason of this undue preference you said you had instructions to do so from higher authorities. I shall therefore be glad if you will kindly send or let me know the authority in question as I wish to move further.

I really wonder why goods are not sent in serial order as they should have been.

Please take note and oblige.

Yours faithfully,

(Sd.) GOVINDJI JETHA.

**Copy of an application addressed to the District Traffic Superintendent,  
General Traffic Manager, and the Agent G. I. P. Railway, Bombay,  
and the Railway Board, Simla, dated—27th April 1912.**

.. ———

I hereby confirm the telegram of Babu Nalin Kumar Mukerji of the 23rd instant and beg to inform you that the goods of my clients are lying at General Ganj and at Kalpi Stations as noted in the telegram. The time for April shipment has expired and comparatively very few wagons had been supplied to us and some 10,000 bags of seeds are still lying in my godown which could not be sent to the Railway station as those already despatched are lying at your Railway premises. These goods must be cleared immediately or else the May shipment time would also pass away and my clients Messrs. Kuwarji Umarsee would suffer heavy loss and shall have to pay damages. I may inform you that this is not due to any want of rolling stocks, as wagons are supplied daily for Ralli Brothers and Lewis consignments. It has almost become a matter of common practice with the authorities at Generalganj that out of 20 wagons for instance only 5 or 6 are distributed among all the Mahajans while the rest are supplied to Messrs. Lewis and Ralli Brothers alone.

This is evidently unfair and this undue preference is causing much loss to my clients. The Goods Inspector, Cawnpore, informed my clients that he is loading goods of these European merchants on special instructions. If so, I like to know on whose orders he does so. This is highly objectionable; and unfair treatment or undue preference is causing heavy loss to my clients and I trust you would try to put a stop to these state of affairs immediately. Failing to receive proper attention I shall be compelled to move higher authorities on the subject. Kindly try to clear consignments lying at General Ganj and at Kalpi within 4 days and make room to receive further consignments. In any case all merchants—Messrs. Lewis and Ralli Brothers including—should be supplied with rolling stock in proper order.

Hoping to receive your attention.

Yours faithfully,

Sd. GYANENDRA NATH MUKERJI,

VAKIL HIGH COURT.

The 6th May 1912.

To,

THE GOODS INSPECTOR.

G. I. P. Railway, Cawnpore.

..

Dear Sir,

Since the settlement was made before the District Traffic Superintendent on the 2nd instant, that out of 20 wagons 12 should be supplied to the merchants not on a single day the wagons have been supplied to the just proportion, while to-day not a single wagon has been supplied to us up to 3 p. m. though you had promised our Mr. Govindji in the morning to give one wagon out of three. Our Mr. Govindji had called at your office again at 2-30 p. m. but he could not see you in the office and he was told that not a single wagon was given to us. If the wagons are now supplied to us after 4. p. m. they mean nothing but inconvenience to us. It is quite clear that goods perishable and those lying in the open maidan are more apt to be loaded before those lying in the sheds, yet the wagons are to-day, first supplied by you to those whose goods are lying in the sheds.

Will you please explain us the cause of this ? What more proof can there be of your partiality to the European firms than this?

Yours faithfully,

Sd. GOVINDJI JETHA & Co.



The 6th May 1912.

To

THE GENERAL TRAFFIC MANAGER,

G. I. P. Railway Bombay.

Dear Sir,

We beg to enclose herewith the application given to the D.T.S. who had come here, to which no reply has been given to us nor a single grievance of ours remedied.

We cannot understand whether the Goods Inspector here does not pay any regard to D.T.S's orders or D.T.S. himself does not pay any regard to our correspondence.

We had written to you and had telegraphed also, but we regret to say we have not received any reply from you excepting your formal letter of "receiving attention".

Should We expect any justice from you for our grievances mentioned in our application to the D.T.S.

Yours faithfully,

GOVINDJI JETHA.

The 6th May 1912.

To,

THE GOODS INSPECTOR,

G. I. P. Railway,

Cawnpore.

Dear Sir,

As for the settlement made by you in the presence of the D. T. S. on the 3rd instant that our goods such as poppy seeds and linseed etc., will be allowed to be stocked under the tin sheds, we despatched 94 bags of poppy seed to-day and which were being stocked under the shed our men were refused to do so and were ordered to stock the same in the open maidan.

Our *Thelas* were the first to enter your yard in the morning and in spite of our Mr. Govindji's—agreeing with you to stock our goods under the shed in the higher piles of 10 bags high each, we are at a loss to understand why our goods were not allowed while those of others which arrived later than ours had been allowed by you under the tin shed.

Will you please explain us the cause of this ? As our poppy seed was not allowed to be kept in the shed we had to call back our *Thelas* containing linseed.

Please note the weather is cloudy and if any goods are damaged by rain we shall hold your company responsible for the loss.

Yours faithfully,

Sd. GOVINDJI JETHA & Co.,

Copy of a telegram dated 7th May 1912 to G.I.P. Railway.

---

Much cloudy<sup>..</sup> expecting rain  
Very soon will you  
Instruct Goods Inspector to  
Load goods from open  
maidan and presently stop  
loading from tin shed  
otherwise heavy loss occur.

GOVINDJI JETHA.

Dated 7th May 1912.

To  
The Consulting Engineer,  
Railway Board,  
Simla.

Sir,

We the merchants of Cawnpore beg to approach you with this petition hoping you would be kind enough to redress our grievances.

We had sent petitions, telegrams to various Railway officials but to no effect. There are various lines of communication but unfortunately our whole grievance is with the G. I. P. Railway. The Goods Inspector of this Railway shows decided undue preference to rival merchants and he treats us with contempt and at times in unbecoming language. We herewith beg to file copies of our telegrams and applications to various Railway officials and which would show you our various grievances.

We trust you would be kind enough to take our petition into consideration and would arrange that no undue preference could be in future shown and would ask the Goods Inspector Cawnpore to treat us with kindness and gently.

Yours faithfully,  
(Sd.) GOVINDJI JETHA & Co.

N. B.—Any reply to this may kindly be communicated to us through Messrs. Govindji Jetha and Kuwarji Umarsi Couperganj Cawnpore.

**Copy of a telegram dated 13th May 1912, sent to the Secretary to  
Lieutenant Governor. Naini Tal.**

..

We	merchants	complained	our
grievances	against	G. I. P. Railway	G. T. M.
D. T. S.	Secretary	Railway	Board
but	no	effect	our
goods	for	April	and
May	shipment	lying	unloaded
for	months	European	merchants
goods	loaded	partiality	and
undue	preference	continues	suffering
heavy	losses	Further	loss
would	induce	us	to
poverty	Being	helpless	seek
your	honour's	protection	our
condition	pitiable	if	goods
not	loaded	in	time
insolvency	would	result	Pray
protect	and	kindly	intimate
us	feeling	grateful.	

GOVINDJI JETHA & Co.,

Dated 7th May 1912.

To

The Consulting Engineer,  
Railway Board,  
Simla.

Sir,

We the merchants of Cawnpore beg to approach you with this petition hoping you would be kind enough to redress our grievances.

We had sent petitions, telegrams to various Railway officials but to no effect. There are various lines of communication but unfortunately our whole grievance is with the G. I. P. Railway. The Goods Inspector of this Railway shows decided undue preference to rival merchants and he treats us with contempt and at times in unbecoming language. We herewith beg to file copies of our telegrams and applications to various Railway officials and which would show you our various grievances.

We trust you would be kind enough to take our petition into consideration and would arrange that no undue preference could be in future shown and would ask the Goods Inspector Cawnpore to treat us with kindness and gently.

Yours faithfully,

(Sd.) GOVINDJI JETHA & Co.

N. B.—Any reply to this may kindly be communicated to us through Messrs. Govindji Jetha and Kuwarji Umarsi Couperganj Cawnpore.

**Copy of telegram dated 13-5-12 sent to the General Traffic  
Manager. G. I. P. Railway, Bombay**

---

Your letter OM 89-74 of tenth  
instant to hand goods Inspector contradicts  
your letter says he has no  
instruction to load our goods  
refuses to hear anything treats very  
meanly continues still partiality about  
twenty five hundred bags lying in  
your yard others in our godown  
five thousand in Kalpi suffering heavily  
Please arrange soon

**Copy of a telegram dated 14th May 1912, sent to  
G. I. P. Railway, Bombay.**

---

Goods	Inspector	showing	bare
partiality	to	those	who
please	him	as	far
example	Chhagan	Girdhar's	our
wagon	of	Joonar	for
Bombay	being	not	shipment
goods	entered	yard	yesterday
and	loaded	forthwith	wagon
36905	mark	643	many
such	examples	daily	thosands
of	our	shipment	bags
lying	for	months	please
investigate.			

GOVINDJI JETHA & Co.,



Cawnpore, 14th May 1912.

To,

The General Traffic Manager,

G. I. P. Railway, Bombay.

Sir,

Re: Letter No O. M 89-7-4 dated 10-5-12.

We are obliged for your above reply. We went to the Goods Inspector forthwith with your letter and showed it to him. He denies having received any instruction from you to this effect.

So long our goods being loaded accorded according to serial number (excepting European firms) but Goods Inspector loads the goods randomly at his own will i. e. the goods of the merchants he chooses.

We are at a loss to understand the cause of this. On telling of his this attitude we receive such mean treatment from him as cannot be described in a letter. Every Railway servant we know is bound by the rules of the Company to act civilly with the public while we regret to see the Goods Inspector here acts quite on the contrary not with us only but with all the Indian merchants here.

Can we expect an investigation of this from you? Nearly 2500 bags of ours are lying in yard, so many in our godown and about 500 at Kalpi.

Weather is irregular. May shipment is being passed and we are suffering heavily. Each day past without your interference now in the management of loading the goods here adds more and more to our losses. Please do not trouble the D. T. S. Jhansi to investigate because from his last two unsuccessful visits we can see that he is either under the influence of the Goods Inspector, or Goods Inspector disregards his orders.

The matter has gone to such a criss that it is essential for a higher authority to take up the matter.

We confirm our to-day's wire and give you a few examples of Goods Inspector's injustice, he has now freely began to load the goods of those who please him. The following consignments are the examples.

By Chhagan Girdhar on a wagon Juar Wagon No. 36,905 Mark 643 entered the yard yesterday and loaded instantly.

Shiv Mukh Rai Ram Kumar 2 wagons seeds wagon No. 30692, 51105 Marks 635 entered yard yesterday and loaded forthwith.

There are many others but we do not quote them here and you will find them out if you start the investigation and examine the Gate Register Book and Loading Book and Receipt Book.

Can we expect justice from the Company.

Yours faithfully,

(Sd.) GOVINDJI JETHA & Co.,

Cawnpore 23rd May 1912.

To,

The Collector,

Cawnpore.

..

Sir,

In compliance with your personal orders I herewith beg to hand you copies of correspondence that passed on the subject of undue preferences shown openly and publicly by the Goods Inspector G. I. P. Railway Cawnpore and which caused considerable loss to merchants of Cawnpore.

These papers would show under what extreme circumstances we had to approach His Honour the Lieutenant Governor of our province. We beg to submit that your honour would be pleased to send for, from the Railway officials, Gate Goods Register Book, Loading Book and Receipt Book from 15th April 1912 upto date which would already show when our consignments were sent to Railway Goods Shed and when they were loaded as also when consignments of Messrs Ralli Brothers and of Messrs Lewis Dreyfus & Co., and of Messrs Volkart Brothers were received and loaded.

Please send for also such register by which it can be ascertained how many empty wagons arrived at the station and to whom they were given and when they were loaded and despatched.

Above papers will clearly establish our allegations and we trust your honour would be pleased to recommend for a judicial enquiry in the matter and for awarding compensation for the loss we sustained during the season. We have been further informed, though we are not in a position to assert positively at present, that the consignments of Messrs Ralli Bros were received from out stations have been loaded forthwith. An inspection of Railway books concerned would make the position clear.

Yours obediently,

(Sd.) GOVINJI JETHA & Co.

The 1st May 1912.

To

THE DISTRICT TRAFFIC SUPEINTENDENT,

G. I. P. RAILWAY CAWNPORE.

SIR,

We, the undersigned méfchants of Cawnpore, beg to bring to your kind notice that our consignments remain lying for a considerable period on the railway premises and they being shipment goods our loss owing to this delay is incalculable. The loss is not due much to lack of wagon supply as to partiality and undue preference given to special customers. On reference to your gate pass book and loading book, you would be satisfied that the goods of Messrs. Rolli Brothers and Lewis & Co., have been loaded in numbers—whereas our shipment goods have been lying unloaded for days together. The April shipment have been delayed and the May shipment is also being delayed. As our stock of goods remain uncleared we are unable to make fresh purchases and the benefit of trade goes to the merchants whose consignments receive undue preference. When you had been to Cawnpore on 21st April 1912 and directed the goods Inspector Cawnpore to load consignments in serial order the latter gentleman stated that he had instructions from Bombay to clear consignments of Messrs. Ralli Brothers and Lewis & Co., before those of any other merchants.

This state of affairs is indeed highly unjustifiable and I trust you would be kind enough to let me know why this undue preference is shown to our prjudice. We may further point out that our goods are not allowed to be placed under the tin sheds where those of Messrs. Lewis and Ralli are unloaded, and even if after some difficulty a few wagons are supplied to us we are not allowed free services of gang of Palledars to load our goods. Only a gang or two are given to us to load our goods and that too generally after mid-day when it is most inconvenient to load goods in the sun. As a result in spite of the supply of wagons we cannot load them completely and on the following day we lose these wagons again. The Goods Inspector will not allow us to load our consignments by our own men. These difficulties are created for us to give preference to other rival firms and is clearly illegal. We may further state that the goods marked and allowed inside the railway premises lie there in the open and remain in danger of being damaged by rain and no railway receipts are handed to us for those consignments for days together. In fact orders should be issued that the Railway Receipts should be given as the consignments are marked and weighed. We trust you would be pleased to enquire about these facts and we are prepared to prove our allegations and on your satisfaction, we hope you will kindly remedy our grievances.

We further beg to request you that you should be pleased to issue orders directing that our May shipment consignments be cleared by the 15th May latest and if rolling stocks be not available kindly direct the Goods Inspector Cawnpore to close the gate and not to receive goods of all merchants (both European and Indian) for such time as would be necessary to clear the goods in hand. Hoping to receive your immediate personal attention.

Yours faithfully,

(Sd.) NALIN KUMAR MUKERJI VAKIL.

Bombay 17th June 1912.

To,

THE DISTRICT TRAFFIC SUPERINTENDENT,

The Great Indian Peninsula Railway,

J H A N S I.

Sir,

I beg respectfully to bring to your notice that the arrangement which you were kind enough to promise with regard to the consignment of goods from Cawnpore by Indian merchants has not been, as my reports go, followed as yet by the authorities there. The arrangement was that the Indian merchants were to be given the privilege of having all the remaining wagons after one third of the total number of wagons available were given to Messrs Ralli & Co., The Collector even was present when this arrangement was proposed and it is therefore with regret I write that this is not yet followed. I hope that nothing further has transpired since our aforementioned meeting to make possible any change in the arrangement. I again appeal to you as I have appealed to you so many times to look to the convenience of Indian merchants and to give us the facilities we pray for. I am for the present for some business in Bombay and you will be kind enough to write your reply to me here.

My impression when I came down here was here that the arrangement alluded to above must be being followed there but I learn that it is not so and hence only I am forced to write this letter to you. Before I conclude my latter may be allowed to remind you of the fact that the arrangement comprised as one of its conditions that each side of the platform should be cleared of its goods before any other side was taken up for loading the goods. This condition is also, it appears not observed.

I beg to remain,

Sir,

Your most obedient servant,

(Sd.) GOVINDJI JETHA,

C/o. The Indian Merchants' Chamber and Bureau,

77-79, Apollo Street, Fort,

BOMBAY.

**The Hon'ble Sir John Prescott Hewett G. C. S. I., C. I. E., Lieutenant  
Governor for the U. P.**

..

Govindji Jetha, Kuwarji Omarsi and others. }  
Indian Merchants Cooperganj, Cawnpore ... } ... Petitioners.

May it please Your Honour :—

We the undersigned humble petitioners beg to bring to your honor's notice the following facts for favour of your kind and indulgent consideration in continuation of our telegram dated 13th May 1912.

1. That your humble petitioners purchase various sorts of seeds at Cawnpore and neighbouring districts for the purposes of export. Some European merchants such as Messrs Ralli Brothers and Messrs Lewis Dreyfus and Co., also deal in like business.

2. That your petitioners make forward bargain and ship consignments to reach customers in time.

3. That your petitioners tendered for carriage to the Goods Inspector G. I. P. Railway at Cawnpore consignments of seeds for April shipment but unfortunately a greater portion of those consignments are still lying at the Railway premises and the time has now expired.

4. That your petitioners sent further consignments in May and they are also lying in Railway premises unloaded and that time for May shipment is also passing away.

5. But consignments of European firms noted above are being daily loaded and carried and that the Goods Superintendent, Cawnpore, is openly showing undue preference and partiality to these firms at our cost and in spite of repeated letters and telegrams to higher Railway Authorities our grievances have been substantially unheeded.

6. That our consignments lie unloaded in open and in danger of being destroyed by rain or otherwise and whereas consignments of European merchants remain under Tin shed and are loaded soon after they are received. A reference to Railway Books would corroborate our statements.

7. That owing to these unfair practices directly opposed to the principles of free trade, your humble petitioners cannot make fresh purchases as their own godowns are full and those sent to Goods Shed lie unloaded. The loss to your petitioners is twofold and if immediate steps are not taken to clear our stock your petitioners would be reduced to poverty and Insolvency.

( 2 )

8. That your petitioners made representations by means of letters and telegrams to Railway Authorities, Secretary Railway Board, showing various practices of Goods Inspector of Cawnpore in showing undue preference to rival European merchants. That your petitioners beg to invite your honor's attention to the enclosed copy of an application to the District Traffic Superintendent G. L. P. Railway dated 1st May 1912.

9. That your petitioners' present trouble is not due to any lack of Rolling Stock but is the result of partiality and undue preference openly practised by the Goods Inspector apparently with the knowledge of higher Railway Authorities.

Your humble petitioners therefore most respectfully beg to approach your honour with the request that your honor would condescend to take pity on the helpless condition and take such steps as to save us from impending dire poverty and loss, and to order an enquiry by any Court of Justice or by appointment of a Commission for the purpose of compensating your humble petitioners.

For which act of condescension your petitioners shall as in duty bound ever pray,

22nd June 1912.  
77-79 Apollo Street,  
C/o. The Indian Chamber and Bureau,  
BOMBAY.

..  
*The Private Secretary to,*

HIS HONOUR THE LIEUTENANT GOVERNOR.

U. P. ALLAHABAD.

SIR,

I beg respectfully to draw your attention to the telegram sent by myself and other Indian merchants of Cawnpore regarding the hardships being undergone by us with respect to loading of goods at Generalganj Station, Cawnpore.

We were going to send a letter, confirming that telegram and setting forth all our grievances fully when you were pleased to ask the Collector to make enquiries and take necessary steps in the matter and we gave all our documents and the said letter to him to be forwarded to you, which you must have received by this time.

The Collector made these inquiries and passed an order in presence of the District Traffic Superintendent of the G. I. P. Railway to the effect that one-third of the total number of waggons on hand might be given to Messrs Ralli Bros., while the rest be given to Indian merchants and that goods from the open maidan should be loaded from one side of the platform, while those from the tin sheds should be loaded afterwards. And that new goods were to be placed in the Sections and loaded serially.

Unfortunately this order is not yet followed by the Station Authorities and our hardships continue the same.

I beg therefore to pray that His Honour, The Lieutenant Governor who was kind enough to order an enquiry, for which I tender our deep thanks, will be good enough to take necessary steps & to remove inconveniences under which we are labouring.

It is a matter of great surprise and deep regret to the Indian merchants of Cawnpore, that notwithstanding the order of the Collector and so many appeals from the public the Railway authorities remain obdurate and do not alter the situation.

Will you also be pleased to send me a copy of the report of the Collector of Cawnpore regarding this matter.

In conclusion, I may be allowed to observe that hardships of Indian merchants are not so much to the shortage of waggons as to the undue preference & injustice in the manner of giving waggons.

I have the honour etc.,

**REPORT**  
**ON THE**  
**SUITABILITY OF THE PRESIDENCY OF BENGAL**  
**FOR**  
**GLASS MANUFACTURE**

**BY**  
**N. B. WAGLE.**

---

[15th February 1906.]



**Calcutta :**  
**BENGAL SECRETARIAT PRESS**



## PREFACE.

IN writing this report, I have not aimed to make it a guide to the manufacture of glass. My chief object is to point out how the manufacture of glass may be successful in India ; how the indigenous raw materials could be utilised ; how the fuel available in India could be brought in use, and how to establish the Glass Industry in this country.

I have not dwelt at length on such points in the report which, I believe, any one having a fair scientific knowledge of the industry would know. Moreover, I have tried to explain the details of the more obscure but vital points of the trade. The principles which I thought were neglected in the past attempts, made in India, have been more fully dealt with, than those which an average scientific man ought to know. Lastly, I have carefully omitted all scientific terms, etc., in order to make the report as practical and intelligible to the general reader as possible.

In the appendix I have given the analysis of such sands which I thought deserved some consideration in glass manufacture. The others which were far wide of that mark have been omitted.

N. B. WAGLE.

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# REPORT

ON THE

## SUITABILITY OF THE PRESIDENCY OF BENGAL

FOR

### GLASS MANUFACTURE.

---

#### I.—THE APPOINTMENT.

I was appointed from the 1st of January 1904 for three months to survey the province of Bengal and test its suitability for glass manufacture. The appointment was extended to a further period of two months, and consequently I was engaged on this work for five months in all. I had a free hand and no official hindrance whatever. And I was ordered to submit a report after the completion of my abovementioned labours.

#### II.—PLAN OF WORK.

2. As will be seen from the above, I was appointed to carry on the survey of the sand resources of Bengal from the 1st January 1904; and as the appointment was at first made only for a period of three months, time was too short for entering into the minutest details of such question. It became therefore necessary to adopt a certain plan for examining only such places as were more important than others in the point of view of a glass manufacturer. As fuel is an important consideration in glass manufacture and as investigations have been already carried on to a great extent by the Geological Survey Department of the Government of India, to ascertain the coal resources of Bengal, I called at their office, and with the information that was placed at my disposal by that office, the task of laying out a convenient plan for my tours and work was much simplified. I had to consider two points in connection with my survey, and these were the obtainment of good sand and plenty of coal near each other, as both ingredients constitute important factors for consideration in the selection of places suitable for the establishment of a glass factory. No information was available at the Geological Survey Department with regard to the sands of Bengal. But information with regard to the important coal-mines of Bengal could be had, and I made up my mind to discover any good supply of sand near such coal-mines. Some more places on the banks of principal rivers of Bengal were selected in consequence of their being conveniently placed for transit of either sand or coal.

#### III.—AREA COVERED.

3. At first I visited the Sodepore and Titaghur Glass Works, which were closed a long time ago, and made full enquiries as to the cause of their failures. A detailed account of these will be found later on in this report:

Then I set out on my survey of other places, among which I visited Raniganj, Titagarh, Sodepore, Hooghly, Chinsurah, Barrackpore, Burdwan, Rajmahal, Mangalghat, Colgong, Jamalpur, Madhupur, Sitarampur, Giridih, Barakar, Katrasgarh, Damodar and Naya rivers, Dhanbaid, Jherria, Assansol,

Patna and many other places which need not be enumerated here, as they for purposes of this report are not of much importance.

In addition to this, I secured samples of sand from Dacca, Bramhawart, Hazaribagh, Midnapore, etc., where I was not able to go myself.

Trips were also made along the Hooghly, Ganges, Barakar, Damoda, Naya rivers and streams to test whether the sand from the river was uniform in quality all over the banks of the river, or whether it changed in consequence of its being mixed with any extraneous ingredients peculiar to different towns and different strata of earth.

I have, besides, examined about a dozen qualities of different quartz which were being kindly supplied to me by friends from various parts of India, although none of these seemed to be of much consequence, in comparison with the good quality of sand available, and in consideration of the additional expense of grinding quartz before using it as sand in glass manufacture.

I give below the summary of my diary :—

11th	January 1904	...	Sodepur.
12th and 13th	" "	...	Inspection of the Sodepur Glass Factory.
14th	" "	...	Raniganj.
15th, 16th and 17th	" "	...	Raniganj—Inspection of coal, sand and paper-mill refuse.
23rd, 24th and 25th	" "	...	Titagbur Glass Works.
28th and 29th	" "	...	Hooghly Town.
30th	" "	...	Ohinsurah.
31st	" "	...	Arrival in Rajmahal.
1st, 2nd and 3rd	February	...	Rajmahal.
4th	" "	...	Mangalghat.
5th	" "	...	Colgong.
6th	" "	...	" (up river).
7th	" "	...	Sitarampur (no river here).
8th	" "	...	Malhubpur.
9th	" "	...	Giridih.
10th and 11th	" "	...	"
12th	" "	...	Barakar.
13th	" "	...	Katrasgar.
14th	" "	...	Dhanbaid.
14th	" "	...	Jheriah.
15th and 16th	" "	...	Assansol.
17th	" "	...	Calcutta.
18th to 25th	" "	...	Construction of an experimental furnace at Titagbur.
1st to 4th	March	...	Up the river Hooghly at several points.
5th to 10th	" "	...	Calcutta.
11th to 14th	" "	...	On the River Ganges.
15th, 16th and 17th	" "	...	Raniganj with Mr. White.
18th	" "	...	Damoda river.
19th	" "	...	Assansol.
20th	" "	...	Calcutta.
24th	" "	...	Patna.
26th and after	" "	...	Calcutta and Titagbur.

#### IV.—MATERIALS.

4. In the consideration of establishing a Glass Factory in India, nothing can be more important than the supply of proper fuel at the place where such factory is to be located. A few years ago Mr. (now Sir George) Watt, agreeing with Mr. Baden-Powell, opined that "a serious difficulty in the way of the extension of a glass-making industry in this country is the lack of fuel. It would probably be cheaper to carry such glass-making materials as are to be found in the Punjab to the hearths of Staffordshire and bring them back made up into glass than to attempt the manufacture on a large scale here" (*vide* page 504, *Dictionary of the Economic Products of India*, Volume III, 1890). I agree with the importance given by such eminent writers to the supply of fuel in the successful working of a glass factory, but at the same time I must observe that the above opinion is much antiquated. The discovery of good coal in Bengal, the cheaper processes of making gas out of coal as well as the invention of more effective gas furnaces for glass-making, make this province the future centre of the glass trade in India; for Bengal has found out fairly abundant quantity of bituminous coal, which burns with smoke in

fire and yields on distillation volatile hydro-carbon, tar or bitumen, and which also possesses what are called the properties of caking. Such coal, I understand on reliable enquiries, could be found in inexhaustible quantities in Kumardibhi, Barakar, Patna, Loyabad, Nimobu, Borra, Madhubpur, Searsole, Dhadka, Kustore and Jherria mines in Bengal. This coal of course is most useful for gas furnace.

At the same time, I am of opinion that anthracite or steam coal, such as is found in equally abundant quantities in Giridih, Katraagarh, Barakar and Jherria, could be used with great advantage for ordinary cylindrical pot furnaces in a glass factory, as it burns with less smoke and gives out great heat on combustion. Although I am doubtful whether it would give the same degree of heat as the best Staffordshire coal, a selection of the good quality of coal, sprinkled with small quantities of saltpetre, can certainly ensure the degree of heat necessary to, not only melt the sand, but also for the perfect fusion and amalgamation of ingredients and for the expulsion of impurities from the glass in the furnace, within 24 hours. I must not forget to mention certain experiments I made with the coke obtained from Barakar. Although coke is supposed to contain a higher percentage of carbon than coal, the coke which I used did not give me any satisfaction. It was hard to burn, and could only be used with advantage mixed with three or four times as much quantity of coal. I must remark, however, that the heat-generating power of the fuel can be effectively regulated by the skilful methods of building a furnace; and taking all things into consideration, I do not think there will be the least hindrance in obtaining the right quality and quantity of fuel in the Bengal Province wherever the glass factory may be started.

The consideration of firewood as fuel in a glass factory can be summarily dismissed, in consequence of the difficulty in obtaining the necessary heat as well as the change in the degree of temperature each quality of wood supplies. It is essential in a glass factory to keep the furnaces at a uniform temperature and not allow any flickering changes in the same. The degree of heat generated by different qualities of wood varies a good deal which does not much matter to a steam-boiler, where quantity of heat alone is considered, but which may seriously endanger the safety of glass furnace, where a uniform quality or degree is to be preserved. A small quantity of firewood no doubt is needed at a glass furnace, but the quantity is not so large or important as to make its consideration necessary in this report.

#### V.—THE CHOICE OF FUEL

5. Fuel which will be most suitable for a glass factory in Bengal is undoubtedly coal.

The Ahmedabad Factory in the Bombay Presidency, I learn, used firewood; the Titagbur Factory used coal, and the Sodepur as well as Umballa and Rajpooora Factories employed gas as fuel.

In old days firewood was only used for boiling glass. But since coal has been found in such abundant quantities, pit coal has taken the place of firewood. The use of coal in the place of wood was first made at St. Gobain Factory, with such advantages that the latter has entirely driven its predecessor out of the field. In these works above alluded to, there were two melting furnaces—one using wood and the other coal, while the glass turned out by both was without any perceptible difference.

But I must remark, in spite of the above and in spite of the opinion of many people in India who advocate the use of firewood (for the Ahmedabad people are much in favour of using firewood), that wood fuel is not suited for glass furnaces in India. In the first place the construction of coal furnace differs from that of the wood furnace. Instead of an iron grate in the coal furnace, through which the air enters and the waste ashes descend, there must be a close-bottomed hearth for the wood furnace which diminishes the intensity of heat in the furnace. And for the last-named reason the pots inside the furnace are to be kept open, and there is always the chance of the glass in the pots being discoloured by the gaseous discharge of the wood fuel. The coal furnaces allow closed crucibles, and hence coal must and has entirely superseded firewood as fuel.

The Ahmedabad Factory always had complaints of insufficient heat; the Sodepur Factory, which had a very brief working existence, experienced difficulties in properly generating the gas in the furnaces. In this case no complaint could be made that the heat was insufficient, for when I examined the tank as well as the pot furnace in this factory, I found glass which bore distinct marks of being overboiled. The quantity of glass strewn around this factory shows unmistakably that the glass was well boiled. No air bubbles, no glassy waves, no wrinkles and no clouds are to be seen in these. The clearness of the glass proves beyond doubt that the quality of heat in both the furnaces was sufficient. This fact leads us to expect that gas furnaces in India ought to be successful for glass manufacture.

The use of gas in the manufacture of glass has been, however, unsuccessful at Umballa in the past, and even in Great Britain gas has not attained great popularity. The White Friars Works, one of the most artistic glass-making places in the world, presided over by Mr. Harry Powell, who is a great scientist and authority on glass manufacture, contain but coal furnaces, although Mr. Powell has reorganised and improved every department of his factory on up-to-date principles. Alison's Glass Works at Gateshead, which are supposed to be the second largest glass works in Great Britain, have coal furnaces. At Birmingham, St. Helen's, Bradford, most of the glass furnaces use coal or coke, and there may be perhaps three or four in the whole of the United Kingdom who use gas.

Gas, however, is mostly used on the Continent where good coal is not freely obtainable; so the position stands thus:—Where good coal is obtainable coal furnaces are preferable, but where difficulty exists in securing good coal and inferior coal is freely procurable, gas is generally resorted to for fuel in glass furnaces.

The introduction of gas as fuel in a glass factory makes the working of it more complicated, specially in a country where the level of scientific knowledge is so low as it is in India. It necessitates expert knowledge in two departments, and I think on the whole it is unsuited to the primitive conditions of labour available in India. But the inferiority of Indian coal drives scientifically inclined people to resort to gas more than coal.

In the Titaghur Factory coal was wholly used as fuel, and I tried my very best, by interviews with the proprietors as well as the workers in the factory, to find out whether there was any difficulty in obtaining the proper degree of heat in their furnace. And I am assured that no such difficulty arose. The factory was in working order for three years and their goods were presented in Calcutta market about seven or eight years ago. And since then superior quantities of coal have been discovered at Barakar and Giridih, which I think will be good enough for any glass factory. I am therefore inclined to recommend coal as fuel for pot furnaces and gas for tank furnaces. More information on this subject will be found under the head of furnaces.

#### VI.—MATERIALS.

6. *Sand*.—I do not propose to give any scientific explanation of the raw materials of glass. But there are certain conceptions of science, without understanding which practical application becomes futile. From what I have seen of the attempts made in the past in making glass, I find that a wrong notion is rampant about the scientific constitution of glass. It is often taken for granted that glass is a combination of "siliceous alkaline matter," and such people as are not conversant with the nature and process of the fusion of the raw materials in the furnace are apt to spoil even the best raw material found in the country. Such a thing, I have reason to presume, has happened in India, and some scientists or persons who interested themselves in this industry have expressed the opinion that sand, good enough for glass purposes, does not exist in India.

To make good glass even of the very best materials requires great skill. In the first place glass is not a combination of silica with other substances, but it is a combination of silicates. The laws of chemical combinations should be very strictly adhered to in the manufacture of glass. Glass is chemically both a "compound" as well as "mixture." The slightest disregard of the laws of

Molecular combinations will be seen to affect the quality of the glass produced, and hence it becomes necessary to explain the process of the combination of glass before making a choice of the sand.

Silica (*Silicon Dioxide*  $\text{Si}_2\text{O}_2$ ) in the first place unites with certain metallic and other oxides and forms itself into silicates, and all sorts of glasses are mixtures of such silicates. The silica is generally divided among several bases to form silicates which more or less resemble glass. These silicates, under further influence of the heat of the furnace, mix by fusion; and the greatest care must be taken when introducing the raw materials in the crucible at this fusion will be complete and bring about a perfect and desired combination, and leave no alkali in excess of the quantity which is just necessary to saturate the amount of silica with any base. For instance, if the silicates contain, in the whole, too much metallic oxides than what could chemically combine with silica, the glass produced will be entirely of inferior quality, tainted and not durable. In the same way glasses which contain an excess of alkali are brittle, acted upon by water, and whenever the quantity of alkali is too much in excess, the whole glass is soluble in water. It is extremely difficult to lay down any rule by which the mixture could be properly guided, because silica enters into different formations of silicates at different degrees of temperature. For instance, silica forms several compound silicates with, say, sodium, such as  $\text{Na}_2\text{O} \cdot 5\text{SiO}_2$ ,  $\text{Na}_2\text{O} \cdot 4\text{SiO}_2$ ,  $\text{Na}_2\text{O} \cdot 3\text{SiO}_2$ ,  $\text{Na}_2\text{O} \cdot \text{SiO}_2$ , &c. I need not dwell upon this point further, as this report does not profess to be a scientific guide to glass-making. Suffice it to say that here lies the secret of turning out good glass from available raw materials. And it is with this eye that the raw material should be searched for in any country.

Glass in ancient days was known to be made by powdered flints. But actually ground quartz were very largely used. In India the quantity of quartz available press upon the consideration of glass manufacturer the claims of this kind of raw material. At Umballa ground quartz were used and glass of very inferior quality was produced. But the quartz in these parts was not sufficiently pure to give a perfect white glass.

A sample of the quartz from Umballa gave me the following analysis:—

Silica	...	...	...	90.05 per cent.
Alumina	...	...	...	1.97 "
Oxide of iron	...	...	...	5.93 "
Water	...	...	...	0.32 "
Organic matter	...	...	...	0.62 "
Lime, magnesia, etc	...	...	...	1.11 "
Total				100.00 "

It must be remarked that this was the best quality of quartz available in those parts. The analysis of the other two inferior sorts I had examined will be found in the appendix to this report.

In such a material what tempts the glass manufacturer is the abundant quantity of silica. I believe the Umballa people, in locating their factory in Umballa, calculated their success wholly and solely on this apparent advantage.

But, judging scientifically in the light of the principle laid down above, a careful analysis of the component ingredients of this quartz must at once lead one to the conclusion that this quartz is of not much value to the glass-maker. Although the quantity of silica may be 90 per cent., the iron is nearly 6 per cent., which can never make the glass white. The very 'poor' composition of the quartz places it at a disadvantage, although not very great.

Much purer samples of quartz are available in Bengal. One piece of quartz obtained from Dhonera was found to be composed as follows:—

Silica	...	...	...	95.94
Alumina	...	...	...	.52
Oxide of iron	...	...	...	2.80
Oxide of tin	...	...	...	.15
Lime	...	...	...	Trace.
Water and organic matter	...	...	...	.04
Salts of alkalies	...	...	...	.55
Total				100.00

This piece of the Bengal quartz is much superior both in its general quality as well as the quantity of silica contained in it, but even this fails

to meet the scientific requirements of glass-making. The large quantity of iron and the scantiness of alkalies render this quartz much inferior as raw material for glass, to some sand containing a much less quantity of silica. In fact one good colourless glass has been found by analysis to consist of 71.49 of silica, 14.67 of potash and 8.84 of lime. A shrewd glass-maker therefore looks for something else in the raw material to be used over and above the quantity of silica in it.

One great serious drawback in using quartz as raw material for glass is the uncertainty of the composition of the quartz. The composition of several quartz may differ considerably in one and the same place. It may contain any serious impurity which one was not prepared to meet and which may spoil the whole glass in the crucible.

Nevertheless, this raw material is much more expensive than sand, as it always adds the cost of grinding the stones before using it as sand. One can rely much more on the composition of sand than on that of the quartz.

For these and several other minor well-known reasons, quartz has gone out of use nearly in all European countries and sand has come into more or less universal use. Especially in India sand is so abundant that one may dismiss at once the idea of using quartz in glass-making.

When one goes in search of sand he must proceed on certain principles. As samples are collected many difficulties arise in accounting for the differences observed in consequence of the dissimilarity of surface ingredients. "In a country of sandstone and arenaceous beds, we should find sand, in one of limestone more or less calcareous; in one of the schistose rocks more or less clayey. But even in tracts of the same geological formation there exists great differences in the upper stratum, arising from the prevalence of one or other member of the series, or from greater or less inclination of the strata by which the *débris* of the different beds are more or less mixed together on the surface. The action of water too in denuding the surface at one part and carrying the *débris* in greater or smaller quantity to another exercises everywhere an important influence on the character of sands." The surface examination is not enough. The true position of the strata should be discovered. And it is then an opinion whether a sample of sand belongs to a particular place or not can be expressed.

Such has been the case in Bengal. The rivers have carried sand of one part to another, and many a time it has happened that two feet below the layer of a fairly good quality of sand it was all black brown clay.

I collected in all 56 samples, which in my opinion were worth examination. Although the appearances of many differed, they chemically seemed to be similar. On an attempt to class them properly, many of them were found to be quite duplicates. About 24 of these were rejected because they were duplicates, although belonging to different localities and parts. Six more were of no possible use. The analysis of many of these will be found classified in the appendix.

On a very careful consideration of the apparent as well as the chemical constitution of all these samples, I think I can safely divide all the Bengal sands in three groups, marked by different areas, viz., the first and most plentiful of them is the Ganges sand. The sand at Rajmahal, Colgong, Hooghly (river and town), Titaghur and wherever the Ganges has spread her waters, the sand is nearly the same, of course possessing such differences as could be accounted for by the local conditions. The second I may call Barakar group, which is spread from Ranigunge, Barakar, Katraagarh, Damodar, Assansole and places in their neighbourhood. Of course the sand at Ranigunge is much coarser than that of Barakar, and that of Barakar differs from that of Damoda, but still, small differences being blurred out, I can include the sands of the places abovementioned in one group. The third group is the Giridih sand, which differs much less from the second group than the second group differs from the first. The Bramhaputra sand is little better than the Ganges sand, but the difference I observed on a small portion of the river I travelled does not justify my making that a separate group by itself. I wish I had more time to explore the sands of that river, but I had to collect the samples and return to Calcutta for my analytical and practical experiments.

It must be mentioned here, however, that all the samples were collected with the greatest care; they were never taken on the surface; they were never picked up arbitrarily, but after the ground and the possibility of supply was



well considered. Besides this, each sample picked up represents a group of sands which, in spite of their slight differences, may be classed together for the purposes of this report.

The samples picked from the banks of rivers were also selected with greatest care, after satisfying myself that the sample really and truly represented the sandy formation of that particular locality. All samples are taken two or more feet beneath the upper surface of the ground, and after satisfying that the sample was a true representative of the sand available in those parts. I journeyed up the river Hooghly as far as Goalundo before I selected my samples of the sands of the Hooghly. I went as far as Maniharighat to select my samples of the sand in the Ganges river. At Barakar I walked up through the dried-up rivers of Barakar, about three miles on both the sides of the bridge connecting Barakar and Mansurah and as far as the junction of Barakar and Damodar rivers in the south and even further, marking out every little nullah to assure myself that the sand was indigenous of the place. At Giridih also, about three miles on each side of the great railway bridge the river was explored in addition to the inspection of many pits, where sand was available. In the same manner at Rajmahal and every other town or village the whole place was made well familiar with, before samples were picked, and every possible precaution, so far as lay in my power, was taken to collect reliable samples of sand.

Dealing first with the river sands, I have samples of Hooghly, Ganges, Barakar, Damodar, Naya Ranigunge, Giridih rivers, besides small nullahs which join these rivers, taken from their various points as mentioned below:—

Samples where taken.

1. Hooghly River ... Titaghar, Barrackpore, Hooghly town 2, Chinsura 2, Narayangunge.
2. Barakar ... Goalundo, Kaligunge, Saraghat Boalia, Rajmahal 3, Maniharighat.
3. Damodar ... Katraagarh, Jherria, Damodar (Railway Bridge Station), Assansole 2, north of the station and another in a stream near the residence of Mr. Fogs, Ranigunge (near Paper Mills).
4. Bramhaputra ... Outangil and Munshiganj (a sample was also sent for from Dacca and Brumhawart).

The sands from river Hooghly and Ganges are nearly similar in their fineness and uniformity of constitution, although the Ganges sand is much superior in the point of view of a glass manufacturer. Both these rivers wash a considerable quantity of clay during monsoons, as can be seen by the invariable muddy deposits from 10 to 18 inches thick all over the banks. And beneath this layer of clay fairly good sand was found. This raised a hope that going deeper still may bring better samples of sand, which turned out true in the case of the Ganges, but not in the case of river Hooghly. The fineness of Ganges sand is unsurpassed; and if the sand could have been saved from being mixed up with such an enormous quantity of clay and considerable quantity of mica and iron dust, the sand would have been ideal. The best sample of Hooghly sand taken on the surface at Barrackpore near Mr. Nobin Chandra Bural's house after being washed of its clay gave the following composition:—

Silicic acid	...	...	80.32
Alumina	...	...	10.40
Oxide of iron	...	...	2.15
Manganese	...	...	0.15
Lime	...	...	2.90
Magnesia	...	...	1.02
Alkalis (by difference)	...	...	2.31
Moisture	...	...	0.75
Total	...	...	100.00

This sample is not a bad one, for inferior glass, and if not for the enormous amount of alumina, the sand would have been more valuable. Alumina is insoluble in water, but it is soluble in acids and alkalis in a peculiar manner. With alkalis it plays the part of an acid, while in acids it combines to form the salts of alumina. These qualities of this substance make it less mischievous than iron in glass manufacture. Another sample which was taken contained a

same proportion. I am told that the Hooghly sand was used for making glass in the Titaghur Factory, and I was shown the tanks made there for the purpose of washing the sand. The washing which was done seems to me, judging by the position of tanks, no doubt of a practical kind, but not very scientific. Moreover, the glass turned out was considered by the proprietors as fairly good. Judging from the nature of the sand and its analysis, I think the sand could be improved upon by scientifically washing and burning the same under flame for the purposes of glass-making. I base my belief on the fact that the same stratum of sand gave me a similar but better quality of sand at Rajmahal on the banks of the Ganges. Both these samples were similar in texture and seemed alike except that the Ganges sand was just a little whiter than the Hooghly sand. The choice of sand cannot be made by its excellence alone, but the locality where the factory is going to be started must be considered along with the quality of sand. For a glass factory situated on the banks of the Hooghly river, say at Titaghur, Hooghly sand no doubt could be used for all sorts of black, blue, and bottle-green glass of an inferior quality. The composition of Hooghly sand does not allow it to be used as a raw material for any superior sort of glass. The Ganges sand may be more useful in this direction. The sample of sand picked up at Rajmahal, about two miles on the opposite bank of the town, disclosed the same nature of sand as that of Hooghly, but it was considerably of a superior quality. This sample is the best sample of the Ganges sand. The analysis is as follows:—

			Per cent.
Silicic acid	...	...	83.31
Alumina ...	...	...	7.45
Oxide of iron	...	...	1.95
Manganese	...	...	0.20
Lime ...	...	...	2.95
Magnesia ...	...	...	1.02
Alkalies (by difference)	...	...	2.37
Moisture ...	...	...	0.75
Total			100.00

Now this sand is decidedly superior to the Hooghly sand both in the quantity of silica it contains and the lesser quantity of alumina and other impurities. This sand is just good enough for coloured glass, and that is all. I was at first much impressed with this sample of sand, and I carried on numerous experiments to find out the real value of this sand for glass manufacture, but not one experiment in about 20 gave any satisfactory result, and I have come to the conclusion that no good white glass can be made out of this sand. At the same time it must be said that it is quite good enough for all coloured and opaque glass, and can be drawn upon for use on a large scale in a glass factory, for an Indian glass factory will have to produce a considerable quantity of inferior glass, for black and green bottles, for country bangles and other miscellaneous use such as tumblers and *lotas*, etc., for the lower classes.

If a glass factory is started at Titaghur or on the banks of Hooghly or Ganges, the Rajmahal Ganges sand could be made easily procurable, as the sand could be brought down in big sailing barges. This easy transport of the Ganges sand I consider as an important factor in the consideration of that sand as suitable raw material for glass.

The Barakar and Damodar rivers practically give the same quality of sand. The former gives a better quality at Giridih than at Barrakar or at any other place, the analysis being as follows:—

*Barakar River sand at Barakar.*

			Per cent.
Silicic acid	...	...	79.77
Alumina ...	...	...	10.14
Oxide of iron	...	...	2.71
Manganese	...	...	0.20
Lime ...	...	...	1.35
Magnesia ...	...	...	0.54
Alkalies (by difference)	...	...	4.66
Moisture...	...	...	0.63

100.00

*Barakar River sand at Giridih.*

			Per cent.
Silicic acid	...	...	82.07
Alumina	...	...	9.26
Oxide of iron	...	...	1.61
Manganese	...	...	0.50
Lime	...	...	1.25
Magnesia	...	...	0.31
Alkalies (by difference)	...	...	4.45
Moisture	...	...	0.55
Total	...	...	100.00

Attention must be drawn to the smaller quantity of iron in the Giridih sand, which makes it preferable to the Ganges sand, although the quantity of silica may be slightly large in the latter. I need not enter into the deeper shades of difference which a glass manufacturer can mark in a sample of sand, almost as if by an instinctive faculty, attained by long experience, and which may at any time puzzle an ordinary chemist in accounting for the choice he makes. It is enough to record here that I placed the Rajmahal and Giridih sand on almost equal level, with a preference, other circumstances being equal, in favour of the Giridih sand.

The Bramhaputra sand need not be separately treated, but it stands almost in the same predicament as the Ganges sand. I have heard that further up the river the sand is much purer, but time was too short for me to go that side. The sample I have examined of the Bramhaputra sand contains the following components:—

			Per cent.
Silicic acid	...	...	82.65
Alumina	...	...	8.55
Oxide of iron	...	...	2.15
Manganese	...	...	0.19
Lime	...	...	2.90
Magnesia	...	...	1.02
Alkalies (by difference)	...	...	2.45
Moisture	...	...	0.77
Total	...	...	100.00

This practically closes our consideration of river sands, the verdict being far from satisfactory, namely, that the river sands could with great advantage be used for all coloured glass, but they are incapable of producing good white glass. But this verdict need not discourage anybody, for Bengal does contain sand, which although may not be equal in quality to the sand at Alum bay or Fontainebleu, yet is good enough for the manufacture of good white glass. I should say even if sands equal to that of Fontainebleu were found in India, the excessive purity of the sand would have been a natural waste, for, as I have said before, and I say again, the manufacture of glass depends in an equal degree on the purity of the raw materials as well as the skill of mixing materials and controlling the heat in the furnaces, which part will be dealt with later on. Excessive purity of sand in unskilful hands may itself become an evil; for when there is a large percentage of silica, the heat must be so great as to compel all the amount of silica to combine with the alkali. If the heat may be a little less, lower silicate compounds will be formed, and the excess of silica will remain as impurity, and thus it being loose will leave the glass with minute holes which will make it wholly useless. It is therefore evident that the raw material cannot be considered independent of the fuel which is available in a country.

Although river sands have not satisfied my expectation I have discovered a hill sand at a most convenient place in Bengal, which is capable of answering all our requirements in the cause of establishing the Glass Industry in India. In the year 1900, the late Sir John Woodburn, then Lieutenant-Governor of Bengal, at the request of Sir Charles Stevens, K.C.S.I., on my behalf, had also

sent for samples of sand from all parts of Bengal. Almost all the Subdivisional Officers were good enough to report to Mr. Slacke, then Deputy Commissioner, Sonthal Parganas, all the qualities of sand their respective divisions possessed. In all, more than about 60 places were suggested to me as containing good sand, the most important of which I had occasion to inspect personally at the time of my last tour in Bengal.

For this locality, where I found the hill-sand alluded to above, which I believe will answer all the requirements of glass manufacture in India, I am indebted to Mr. R. B. Bainbridge, then Subdivisional Officer, Rajmahal, who sent to me some information regarding this sand along with many others. He also sent to me a piece of glass which he was given to understand was made out of this sand. There must have been some misunderstanding about this, as the piece of glass could not have been made out of this sand, because the analysis of that piece showed to me that it contained considerable quantity of lead and exceedingly small quantity of alumina—a result which was not justified by the analysis of the sand. However, the sand I think is most valuable for the purpose of glass manufacture in India. The map enclosed with this report shows the locality of this sand and the nature of communications thereto. The site is naturally very advantageously situated. The communication appears peculiarly good inasmuch boats of 500 maunds burden may run up Tandua nullah, which washes the foot of Hadapp. A metalled road renders Talghar station of the East Indian Company easily accessible during the hot and cold seasons. The site is about 6 miles from Rajmahal Railway station and town. The supply of this sand is inexhaustible. There are four hills joined together which enclose an area of nearly a mile in diameter, and I presume the stratum of this calcareous sand has gone deep under earth.

The place belongs to one Mr. Roy, who has lately formed a joint-stock company which has bought a steam engine to crush the sand and bring it in use to a certain extent for pottery, as the sand contains some quantity of kaolin. I have seen in the locality certain articles of pottery made out of this sand, which are good only for temporary ornamental purposes, as they are not much durable.

A sample of this sand washed and burned gives the following composition:—

			Per cent.
Silicic acid	...	...	92.03
Alumina	...	...	3.64
Oxide of iron	...	...	0.81
Manganese	...	...	0.20
Lime	...	...	0.32
Magnesia	...	...	0.09
Alkalies (by difference)	...	...	1.36
Moisture	...	...	1.55
Total			100.00

Another sample from the same locality was examined without washing and burning and it gave the following composition:—

			Per cent.
Silicic acid	...	...	91.20
Alumina	...	...	3.18
Oxide of iron	...	...	0.97
Manganese	...	...	.22
Lime	...	...	1.05
Magnesia	...	...	1.09
Alkalies (by difference)	...	...	1.34
Moisture	...	...	1.95
Total			100.00

Two more samples picked round about the place gave out the same composition, the qualities varying between the two above-mentioned proportions. This, combined with other evidence, conclusively proves that the whole place contains inexhaustible supply of the same kind of sand.

This sand is most suitable for glass-making in India. It contains just the quantity of silica which the heat generated by Indian coal would absorb and

possesses satisfactory general composition. The iron it contains can easily come under arsenical control, and its evil can be practically done away with. The only adverse criticism it admits is in the quantity of alumina, a substance very difficult to deal with. It is not soluble in water, hard and does not fuse in ordinary temperatures. But, I anticipate, the mischief which is likely to be caused by the excessive quantity of this substance in this sand may be reduced to a minimum by increasing the temperature of the furnace. This sand, therefore, can give us the white glass for the manufacture of table glass, all sorts of hollow-ware, chimneys and even window glass. This sand should satisfy all our present requirements.

I learn from Mr. Roy, the owner of these hills, that he is willing to supply this sand either in Calcutta or Titaghur at the rate of two annas per maund. And the way in which he urged me to make an arrangement shows that he will be glad to do so. But the cost may be still lessened by paying him royalty and using the factory's own barges to go from Calcutta or Titaghur to fetch this sand. This cost, as well as the other incidental expenses of washing the sand, could be easily recoverable by selling the clay which contains kaolin in a considerable degree.

The only other sand which deserves a mention here is the Patna sand. This sand contains a small quantity of alumina and a considerable quantity of lead which makes the sand considerably heavy in weight. The Patna sand gives beautiful amber-coloured glass in consequence of the peculiar metallic combination. The fame of Patna glass attracted my attention, and when I visited the place I found that there are many people who blew glass articles by melting broken glass. I am glad I visited the place because I found many people who are quite conversant with almost all the manipulations necessary in the art of glass-blowing. They could not make glass out of sand, nor could they make good and clean glass even out of the broken glass which they used. Their furnaces—*blattis* as they called them—were so thin and unsuited for the development or accumulation of heat that it was almost impossible to make good glass in them. But it must be said that when I saw them at work, engaged in making lots of articles, fancy as well as simple, I could assure myself that with a little training in the new scientific and labour-saving manipulations and use of latest tools, one could depend upon the city of Patna for the supply of skilled labour for a glass factory in India. Patna sand is useful in glass-making, as it produces strong, good amber glass. But the sand is of no use for any other purpose. Other conditions necessary for the success of a glass factory cannot be seen at Patna, and therefore I doubt whether that sand could be largely utilised in the manufacture of glass in India. The composition of the sand is as follows:—

			Per cent.
Silicic acid	...	...	64.45
Alumina	...	...	6.07
Oxide of iron	...	...	4.72
Manganese	...	...	3.60
Lead (sulphide)	...	...	18.42
Lime	...	...	0.30
Magnesia	...	...	.09
Alkalies (by difference)	...	...	1.11
Moisture	...	...	1.24

Dr. (now Sir George) Watt draws attention to some sands called "Reh" in Punjab and "Us" in Kabadganj in Kaira district of the Bombay Presidency which evidently he considers (*Dictionary of Economic Products of India*) very important to a glass-maker. I visited Kapadganj in consequence of these remarks and collected samples of the "Us" and also watched the processes of the native glass-makers over there, who mostly manufacture bangles of a very inferior quality. The glass which they mostly produce is black or blue, adding considerable quantity of cobalt in the latter. Their furnaces are ingenious, although very unscientific and crude.

The composition of both these substances is most valuable. The samples of "Us" I brought with me and the samples of "Reh" obtained disclose that it is a mixture of sand varying from 60 to 75 parts, and sulphate of soda in the case of "Reh" and very impure carbonate of soda in the case of "Us" varying considerably between 12 to 34 parts.

The object before us is not to produce glass for scientific purpose, but to produce good glass for commercial purposes. And in the production of glass of good and desired quality, it is essential that the manufacturer ought to know the exact nature of his materials. He cannot depend upon chance and he cannot rely upon a material which is so variable in its constituents. He cannot go on experimenting all his life and waste his glass. He must use material whose character he is thoroughly conversant with and over which he will have perfect control, so far as the production of a certain quality of a glass is concerned. Under such conditions both the "Us" and "Reh" are of no practical use to the modern glass-maker in India.

Before I leave the subject of sand I must make a few concluding remarks. Sand was always supposed to exist in India for the purposes of glass-making, while fuel was supposed to be the want. This statement in the light of modern discoveries stands subject to great modifications. The coal discovered in India is quite good enough for the purposes of making glass, and besides, this coal could be directly used as fuel in pot furnaces. Although we have been unsuccessful in finding sand equal to that of the forests of Fontainebleau or Alumbay, which contains 99 and 97 per cent. of silica respectively, we have picked up a sample of sufficient purity, and even if a purer quality were found, it would have been too pure for the other conditions existing in India. The sand found in Bengal should by no means discourage the enterprise of glass manufacture in this country. The Hooghly sand, the Ganges sand, the Colgong sand and the Mangalghat sand could all be brought in use in an ascending scale in the superior quality of glass desired.

#### VII.—MATERIALS—*contd.*

7. *Alkali*.—After sand the next raw material in importance for glass manufacture is alkali. The substances which are mostly used as alkali and mixed with sand for the purpose of its fusion are potash and soda. Potash in the form of the refuse of a soap factory or gas works was mostly used in the past, but it is gradually giving way to soda, which is coming more or less in universal use, owing to the discovery of a reliable process of extracting soda out of sea salt. Potash is known to give a more brilliant and harder glass than soda and alumina also helps the result in that direction. The celebrated Bohemian glass is a potash glass. But in recent years many continental glass works have brought soda in great use. They generally use sulphate of soda mixed with about 8 to 12 per cent. charcoal for the purpose of decomposing and dissipating its acid portion. Glass produced by the mixing up of soda sulphate without charcoal is a very poor quality, and without charcoal the fusion becomes always very tedious. It is supposed that carbonate of soda produces a better glass than the sulphate of soda, and as carbonate of soda is gathered from sea salt attempts were made to mix the ordinary salt as alkali. In fact at Newcastle black beer bottles are actually made by the use of salt. But the attempt is yet in its experimental stage.

Potash produces a better glass than soda, although the latter is used mainly for its cheapness. It is, however, quite inadmissible as an ingredient in the manufacture of the better class of crystal and plate glass, as, however pure it may be, it imparts to the product a slight greenish tinge, which always marks it as an inferior quality of glass. In calcareous sand, however, potash does not give good results, and therefore with a sand found at Mangalghat, I should use soda, but potash could be used with other river sands, such as Hooghly, Ganges or Colgong sands.

But these rules could not be strictly adhered to. In most glass factories in Europe, it is found advisable to add both soda and potash together to bring about good results in glass-making. The proportion of these mixtures must be decided by the nature of other materials used and the shade or colour of the glass desired. The French Chemist Berthier proved a long time ago that many neutral salts combine together by fusion in atomic proportions. For instance, carbonate of potash and carbonate of soda when mixed atom for atom unite and produce a compound more easy of fusion than the more fusible of the two. A mixture of silicate of potash and silicate of soda in atomic ratios fuse much more readily than either of them alone.

At any rate if it be soda or potash one thinks of using in Bengal for glass-making, either of these could be had in abundant quantities. Sulphate of soda in natural condition is found in considerable quantities in some parts of Punjab, and soda carbonate is easily prepared from sea salt.

Potash could be obtained from wood ashes or from sulphate of potassium. The carbonate of potash used for glass manufacture is called "pearlash," which contains the following ingredients :—

Carbonate of potash	...	...	...	79.17
Sulphate of potash	...	...	...	17
Carbonate of soda	...	...	...	3.55
Miscellaneous	...	...	...	1.05

There is another substance which is found in the north of England and is gradually coming into greater use in glass, and that is the carbonate of Baryta, which can be obtained cheap. But as I am not aware of this substance being found in India, I need not enlarge on the uses of the same.

There are gas works and a soap factory in Bengal. The refuse of these works could be most usefully employed by a glass factory. Close to the Titaghur Glass Works there is a paper mill, and I was trying to find out whether I could utilise the refuse of this paper mill as alkali in the glass factory. Investigations are still going on very carefully, and I am in correspondence with some expert in Europe on the subject. As soon as we come to a definite conclusion, I will submit the information as supplement to this report. Personally, I am favourably inclined towards the feasibility of the idea.

#### VIII.—MATERIALS—concl'd.

*Other ingredients.*—Red lead— $Pb_3 O_4$  or sindhoor is a compound of the protoxide with the dioxide of lead ( $2PbO, PbO_2$ ) which is also necessary for glass manufacture in considerable quantities. Litharge can be substituted in place of red lead, but the latter is preferable since the oxide lets loose its oxygen in the high temperature of the glass furnace. Oxide of lead is an essential constituent of the denser glasses and forms silicate of lead.

Chalk—Calcic carbonate  $CaCO_3$ . Lime improves the quality of glass and renders it less brittle and less liable to change. For the manufacture of glass, the purest material is not essential. A little impurity in the form of clay, alumina, silica or even oxide of iron easily regulates itself in the furnace. Oxide of iron, oxide of manganese, nitre and arsenic are also used with a proportion which only experience and skill can dictate.

Different colours are produced in glass by the addition of metallic oxides. Oxide of manganese gives an amethyst, oxide of cobalt a blue, oxide of iron a brown, blue oxide of copper a green, oxide of gold a purple, suboxide of copper a ruby red, oxide of tin a white, oxide of silver a yellow and so on. But experience and skill is a great factor in producing the desired colour in glass. With a good furnace and good sand wonderful colours could be produced in glass by skilful combination of materials.

When considering the question of the manufacture of glass in India, we are accustomed to try to find all the materials in the country. That may be patriotic, but it is by no means reasonable. For a glass manufacturer, the purity of, and thorough acquaintance with, the material he deals in, is essential. The combination he makes by hand must be clearly defined first in the head. Until India produces all the above articles in pure or in some uniform standard, such materials as are treated in this chapter should be imported from Europe. Such a course would add to the superiority of glass produced and also will be economical at the start. The cost of these materials is almost nothing compared to the necessity of producing superior glass. People in India do not treat glass as a curiosity, but they are now accustomed to the superior qualities of the material, and therefore placing Indian glass in the market inevitably presupposes a superior quality of manufacture.

#### IX.—MIXING OF RAW MATERIALS.

The precise proportions in which the glass-maker ought to mix his ingredients must of necessity greatly depend upon what nature of materials are within his reach locally or at his command. The attention of the manufacturer should be directed to the use of his materials in such proportions

as will furnish in the melting pot the proper quantities of ingredients as determined from the known composition of the glass he has to produce. The purity of the raw materials and the accuracy of his proportions and quantities are proved or disproved by the excellence of the glass produced; and the general rule is that if satisfactory results are not attained, the glass-maker must turn his attention to carefully examine the quality of the ingredients employed, and the composition of the defective glass produced.

In the manufacture of glass, practice is considered to be the sole need, and many a time ambitious glass-makers have neglected the science. In England more than in any other country this mistake is often made. In India it is popular opinion, which is given out almost with the certainty of an axiom that practice is the secret of the glass trade. But in this report I wish to impress most powerfully upon every one who wishes to carry on the glass trade to a successful finish, and establish the trade in the country, the vital need of science for the manufacture of glass. A good manufacturer in order to anticipate the results of his several processes and to carry out his various plans with certainty must depend more than any one else, first, on science and, secondly, on experience. All his most essential operations depend on chemical principles. The products of his furnaces are not formed by the mere mechanical admixture of their several ingredients whilst in the state of fusion, but result from the play of delicate affinities, which only act under certain conditions and when the materials are presented to each other in uniform and definite proportions. Glasses in which the ingredients are mixed regardless of their atomic ratio to each other can never be good; they will more or less be striated and of unequal colour and refractive power. I have already pointed out that glasses are mixed silicates or, accurately speaking, supersilicates of the respective bases which enter into their composition, such as, for instance, potassium, calcium, lead, etc. These compounds must, by the laws of nature, for laws of chemistry are laws of nature, combine only in certain proportions.

A man who has analysed samples of glass on a large scale can lay this down authoritatively that the more costly and regular, as well as the finest quality of glasses, are found on analysis to contain ingredients in relative proportions, consistent with the above laws, and the bad glasses are mostly striking illustrations of unscientific mixture of their components.

The disregard of these laws of atomic proportion between the components of glass disables the English plate and mirror glasses to occupy the same level of excellence which is occupied by the continental glass of the same kind. Of course the English glass-maker enjoys the reputation of producing best flint glass; that is more due to the natural advantage he possesses, namely, of superior coal, which gives most intense heat in the furnace, in consequence of which more silica enters into composition, making the glass bright, clear and durable. The right degree of temperature and its duration corrects to a certain extent the mistake made in mixing up the constituents. And this is the principal reason why the theory of atomic proportions has been so neglected by glass-makers. English glass-manufacturers can afford to do so to a certain extent, as the evil is counterbalanced by the advantage of good fuel. Their failings are remedied by nature. The continental people cannot neglect it as much as their English fellow-traders can, as the fuel they use is inferior and more costly. In India we can least afford to neglect it, because in point of fuel we are at a much greater disadvantage than our continental colleagues.

No doubt in England glass-makers much rely on practice. And the trade is so complicated that a glass-maker is driven to it by the varying results of his experiments. And although the chemist has not yet discovered all the secrets of the trade which may ensure the production of the best quality of glass, it is nevertheless certain that a knowledge of skilful and scientific combination must be of invaluable help to all the glass-makers in general and of vital utility to those who wish to launch their fortunes in this trade in India. This must be borne well in mind, that ingredients which yield proper equivalent proportions in the melting pot and under sufficient degree of temperature to bring about perfect fusion, must unfailingly and inevitably produce good glass. Any disregard of the laws of nature must result in disasters. Science must ever take the lead of prejudice and custom.



## X.—FURNACES.

A good furnace is essential or perhaps more so than raw materials. The chief characteristics of a good furnace are four, viz., (1) the regularity, (2) durability, (3) capability of intense heat and (4) economy of fuel.

*Regularity.*—What is meant by regularity is that the degree of heat should be regular. The furnace should not be irregular in its degree of heat. This is the most important point, as it is impossible to produce good glass from an irregular furnace, whatever may be the purity and excellence of the raw materials. Every deviation in the temperature will be indicated on the glass, which will come out from the furnace in a striated condition. When fusion begins, it is necessary that silica should be allowed to enter into composition to make silicates in one uniform density, which can only be ensured by uniform heat. The heat may be intense for a short time and the glass may fuse, but if it immediately changes its temperature, striated glass will invariably result. The position and capacity of draft chambers must be properly attended to, and the whole of the furnace must be mathematically correct. In a furnace which gets hot and cold and keeps up such variations, the crucibles will always crack, which is immense loss to the glass manufacturer. There can be no greater misfortune to a glass-maker than the frequent cracking of his crucibles, and therefore this point must be attended to with the greatest possible care. I have found it necessary to emphasize this point here, as I had found both at Umballa as well as Titaghur that sufficient attention was not paid to it.

Another mistake which I have noticed in all the Indian furnaces, which of course are not correctly built, was the probability of simultaneous irregularity in the concentration of heat. This has been also a fatal mistake made on the continent of Europe, but the loss arising thereby has demanded corrective measures. When the pot is placed in the furnace it generally happens that the top of the crucible gets more heated than the bottom. Even this destroys the glass, as we know the densities of the raw materials introduced into the pot vary considerably. The oxide of lead has a specific gravity of 8 and silica only 2.7; consequently these substances are apt to form higher and lower layers in the pot which, if heated unequally, the glass formed on the top will differ in every respect and even in appearance from the glass produced at the bottom, and when the material is agitated two different qualities of glass will mix to make a "cordy" glass which is most disastrous. Care must, therefore, be taken to construct the furnace in such a manner that the bottom of the crucible may receive the same heat, and, if anything, a little more heat than the top.

Unless therefore the furnace is regular, the glass-maker could not ascertain when his glass will be ready for work. He cannot be certain of his material. That he should be in a position to know when his material will be ready for work is essential for the profitable working of the factory.

*Durability.*—A furnace, if well constructed and if kept properly clean, is expected to last for nearly three or four years. Some people pay so much weight to the exactness of the furnace that they prescribe a new furnace every year. To construct a good durable furnace, great skill and experience is required in making the selection of clay as well as accurately planning the construction of the furnace.

All the furnaces I saw in India are built of firebricks. But the method adopted on the Continent is of building a furnace of moulded fire-clay blocks. All sizes and shapes of blocks are kept ready without being burned, and then one block is rubbed against the other so as to form an impervious joint, the only cement which is used being fire-clay and water. Once when the furnace is completed, it requires to be very gradually warmed. It takes nearly five to seven weeks to bring the furnace to a condition in which it can stand the heat necessary for the fusion of glass. A sudden rise in the temperature means crack and destruction of the furnace. Care must be taken to test that no moisture is left in the clay before firing it.

Clay which crumbles when exposed to an intense heat is entirely useless for a glass furnace. The crown as well as the bed of a furnace are most liable to corrosion. Soot or dirt should not be allowed to accumulate on them and they should always be kept clean. Attention to such details will determine the life of a furnace.

*Capability of intense heat.*—This depends as much upon the quality of fuel as the regulation of draughts and also on the general construction of the furnace. Glass can be fused at many different temperatures, but good glass can only be fused at a very high temperature. For this reason, if a furnace cannot retain intensity of heat, the glass produced will always remain inferior.

*Economy of fuel.*—I have specially put this last, although it is not less important as any of the above characteristics of a good furnace. The financial prospects depend mostly upon the quantity of fuel which is used, as that is the chief factor in determining the cost price of glass. But if the above three points are well attended to, this end can be attained as a matter of natural consequence.

I need not enumerate, much less describe, the construction of glass furnaces here, as they differ very widely for different qualities of glass. There are five different species of glass, each of which necessitates a different kind of fabrication and furnace—(1) bottle glass, which is the coarsest; (2) broad or spread window glass, which comes next in its quality; (3) crown glass, which is also window glass, but made through big circular discs and not spread, as the last one; (4) flint glass or lead glass, which is the best quality of glass which Great Britain is noted for, and (5) plate or fine mirror glass. The first and third qualities are most successfully manufactured in Germany, the second in Belgium, the fourth in England and the fifth in France. Recently attempts have been made at St. Helen's to make superior glass of the third quality, and is known as British-German plate glass.

Each quality of glass, as I have said above, necessitates a different variety of furnace—a principle which is utterly disregarded in India. In all the factories I have seen, there was only one furnace except at Sodepore, where there were two—one continuous tank furnace for bottle making and a pot furnace for other ware, from which all sorts of work was expected. This is as ridiculous as attempting to make a chair with sh emaker's implements or a pair of boots with the carpenter's. It neither adds to the excellence nor to the economy of its production.

Besides the several furnaces differ so much in shape, in the position and formation of crucibles, in the construction of flues and various other things that I consider it impossible to dispense with the difference.

In India, under the present conditions, only the first, second and fourth qualities of glass may be attempted. After some time the third may be attempted too. It will take, however, a long time to attempt the fifth, with the skill and raw materials at present available in this country.

For a bottle house, the furnace is usually an oblong square chamber, built of large fire-bricks. The arch over this could be constructed either of the same material or of fire-stones which are found in Newcastle, containing silicious matter in a firm grit. The base of this is divided into three chambers separated by two sets of iron bars. Semi-circular working-holes about 1 foot or 10 inches are provided for just over the pots for the ingress and egress of the material to and from the furnace.

Spread window glass is best made by Messrs. Chance & Co. of Birmingham. They use a furnace with a reverberatory arch, and the construction of this differs wholly from the previous one. So also the construction is different for crown and mirror glasses. For ordinary holloware, the furnace constructed at Titaghur and Sodepore are good enough although they could have been improved upon by a little more attention to their draughts and accumulation of heat in the furnace.

Besides these furnaces, there are annealing kilns. The British annealing kilns are long chambers; the glass travelling 20 or 25 yards in a gradually lowered temperature until it comes out in the open air. The German annealing kilns differ very much from these. The Sodepore Factory has these kilns on the German style, but the Titaghur Factory has the British and in my opinion the right ones.

Clay suitable for constructing furnaces is found in abundant quantities in India. Mr. Whyte, Manager of Messrs. Burn & Co.'s Pottery at Ranecgunge, took me over his works, where I saw some exceedingly good samples of clay which seemed quite suitable for a glass furnace of any sort.

But great care must be exercised in selecting fire-clay. I do not know whether clay equal to Stonebridge clay in Staffordshire exists in India, but I believe a little inferior quality of clay can be found from beneath coal mines of

Bengal. In examining clays it must be remembered that such clay will have to stand in white heat; and clay containing larger quantity of silica and alumina are less fusible than those containing lesser quantity of the same and more of other ingredients. If silica will fall short of certain standard in the clay, the clay may fuse in the ordinary heat of the furnace. Colour is no guide in this connection, as a whitish clay which may be taken as containing more of silica may contain calcic oxide to which its whiteness may be due.

In addition to infusibility and stability, its plasticity must also be considered while appreciating the real value of a clay, because clay containing more silica is less contractible, but the contractibility must be mostly judged by the fusible ingredients it contains. It must also be highly refractory and free from lime to be useful both for the furnace as well as crucibles.

Indian fire-clay of which bricks used for furnaces of other sorts than glass are made seem to me suitable for a glass furnace also. Mr. Whyte, who has had considerable practical experience in this line, has assured me on this point in our interview at Raneegunge.

#### XI.—LABOUR.

The skilled labour which a glass factory demands is of an exceedingly high degree. The problem has stared in the face of many glass manufacturers in Europe, and perhaps all over the world. The manipulations are so many and so widely different that a man's life is not long enough to master them all. Thus, for instance, in the making of a bottle, the glass passes through six hands, each man doing his part, in the formation of the bottle. The first gathers sufficient quantity of glass on the blow pipe and hands it over to the second, who rolls the metal on a stone or cast-iron slab till he brings it to the very end of the tube. He then passes it to the third who blows the same into a mould of desired shape and the bottle becomes ready. The fourth picks it up in long iron frame and makes the neck to it. The fifth anneals it and the sixth finishes the same.

In the same manner in the making of a wine glass the article passes into eight or nine hands. It will thus be seen how tediously different the several processes and manipulations are. This difficulty led many ingenious persons to devise machines to take the place of hand labour. But hitherto the use of these is much limited. During the last ten years, great improvements have been made to substitute machines for human labour, which marks distinct classes in glassware, viz.—

- (1) Blown ware,
- (2) Moulded ware, and
- (3) Pressed ware.

*Blown ware.*—I mean by this all articles of glass which are blown and converted into desired shapes by sheer manipulations of human labour with the help of tools. The articles made by this process are the most finished ones and therefore more costly in price and fine in appearance.

*Moulded ware.*—This class includes most of the articles used for domestic purposes which are made by the partial substitution of mechanical for manual labour of blowing glass into iron moulds of desired shapes. This process is much easier than the first, as it saves considerable labour of converting the blown glass into desired shapes by hand. The process of blowing into the mould brings about at once the shape desired. Bottles, globes, phials, etc., belong to this class. Two machines have been recently invented, which practically dispense with most of the human labour and do away with skilful blowing. One is Ashley's patent, which first makes the neck of a bottle by a little pressure and then blows the bottle in to each of the moulds placed in the machine. A plunger is provided which brings the neck of the bottle into shape, and the compressed air issuing forth through a pipe completes the bottle. All that is required to be done by human labour is to gather sufficient quantity of metal from the pot and place it promptly into a funnel-shaped receiver. Automatically the neck is formed by a plunger and moulds rise up, and by the compressed air the bottle is completed.

The above patent is improved upon by another American patent called the Owen's patent by which not only bottles but chimneys, tumblers and even

electric bulbs could be made. This machine dispenses entirely with the skilled labour, which had been hitherto a great barrier in the progress of glass manufacture. The work which the men are required to do in this case differs from what is being done in the case of the Ashley's patent. In this case a sufficient quantity of glass is to be gathered at the end of a blowpipe and the whole blowpipe is placed in the machine. The blowing end of the pipe is connected with the air jet and the glass is enveloped at the other end by the sections of the mould. The compressed air escaping from the air jet does the rest, and the article is ready as if it is taken out of an ordinary mould. Decidedly this machine produces much greater work than what human blowing could do. At West Bromwich, where I saw this machine in working order, it produced about 400 chimneys per minute, and I was told that it can produce equal numbers of tumblers within the same time. These inventions have no doubt considerably obviated the worst difficulty which, in the past, every glass-manufacturer had to battle against.

*Pressed ware.*—This ware also includes most of the glass articles of domestic use, and many of the articles which could be made by partial blowing into a mould could also be made by a press, without any necessity of blowing. The factory which has most successfully brought such inventions in use is "Alison's Glass Works" at Gateshead; sufficient quantity of glass is gathered either by a blowpipe or an iron rod, and is placed on a receiver and a metallic plunger presses the same against a mould of desired shape, and the article is ready. Tumblers, dishes, small phials are most quickly and wonderfully made by these presses. There is one disadvantage in pressed ware, and that is the pressed articles, having come in contact with comparatively cold metal, gets its surface slightly roughened and consequently loses its polish. To avoid this, the outer film has to be remelted, which is done at Gateshead by introducing the pressed article into an oil chamber furnace with steam blasts. Mostly hand pressure is applied by means of a lever except where the article to be turned out is exceptionally heavy, in which case steam-power can be easily used. It is necessary to change the raw material to a certain extent, for the glass that can be best pressed should be of a softer quality than the flint glass.

I have dwelt at length on these labour-saving machines, as the want of highly-skilled labour, which was hitherto considered essential for glass manufacture, not only threatened some of those who launched themselves on this enterprise in the past, but also crushed one or two very promising attempts made to establish the glass trade in Bengal. The Titaghur Glass Factory had to be closed because of skilled labour being unavailable. The Sodepore Factory also shared the fate nearly for the same reason. The proprietors of Titaghur Works applied to Father Lafont, I understand, and he sent some orphan boys to learn the trade. But as soon as the Sodepore Works were opened, they left the Titaghur Works to join the Sodepore Factory, being tempted by higher wages. The Sodepore Factory people wanted blowers, and I hear about a dozen European blowers were ordered out to teach the natives the art of glass-blowing. The malarious climate, which drives the Europeans back to their homes, ruthlessly interfered with this experiment and the factory was closed.

No doubt a number of native glass-blowers could be collected in India. Such an experiment was, I believe, tried at Ahmedabad in the Bombay Presidency with success; for I met a few of the blowers at Kapadganj, in Kaira district, who had returned home after the works at Ahmedabad were closed. From Kapadganj, Patna and Sitarampur many glass-blowers could be collected, but the native way of blowing and their method of work are so different from the European methods that I am afraid they would be next to useless for the first few months until they get accustomed to the new work and their hand balanced to the new material. No such attempts seem to have been made by either the Titaghur or the Sodepore Factory people.

A glass manufacturer in India should begin with the pressed articles first. He cannot afford to keep a huge factory running at dead loss, just for the purpose of teaching his men. The bulk of the work, in the first few months or years, should be the pressed glass ware. Many articles of domestic use, such as tumblers, dishes, inkstands, lamps, shades and medical requirements, could all be made by the use of the press. Then gradually as the men begin

to grow familiar with the furnace and glass, the more complex manipulations could be tried. The above-mentioned patents could also be used with advantage. And, lastly, the Indian workman with his naturally active fingers will soon pick up the art of scientific blowing until the difficulty of labour may wholly vanish.

I have not the least doubt about the result of collecting such blowers together. When I had gone to Patna I saw nearly ten persons, who were quite willing to come with me to Calcutta on a pay of Rs. 15 per mensem, and these were good blowers too, judging by the articles they blew before me. The same was the case at Kapadganj. At any rate with the number available in India and with the latest machinery obtainable, skilled labour should not be any hindrance to the establishment of glass industry in India.

#### XII.—FAST FAILURES.

Attempts to establish the manufacture of glass in India were made five times that I know of, but with little success. The first of these glass factories was started, I understand, at Titaghur; the second at Ahmedabad in the Bombay Presidency; the third at Sodepore; the fourth Umballa and the fifth at Rajpore. The last two have been or are in working order; but still in a point of view of permanently establishing the manufacturing industry in India, I include them amongst failures. From the preceding portion of this report, it will be clear that, so far as the raw materials are concerned, so far as fire-clay is concerned, and so far as even capital is concerned, there was not much difficulty; for I have found out that the Sodepore Factory, which belongs to Messrs. Heilgers & Co. of Calcutta, was amply provided with capital. I have collected as much details of these undertakings as I could possibly secure, and I have specially visited and studied the Umballa, Titaghur, Sodepore and Rajpore Factories. It is interesting to note that the causes which led to the failure of these several attempts were not the same. But they demand enquiring into for marking out the right course for a new and lasting enterprise.

The first of all these attempts was the factory at Titaghur, which was started under the supervision of a European specialist, who was successful. I hear that glass articles were produced in the factory and were sold in the Calcutta market. The men were gradually trained in the art of blowing, and it seems that only moulded ware was turned out. The presses or any other skilled labour-saving machines were not brought into operation. But at no time the supply of labour was satisfactory both in point of quality as well as quantity. The first specialist left and another was appointed who was not of much use. The proprietors applied to Father Lafont for some orphans from the orphanage at Calcutta, and the orphans were partly trained to the work. While thus this small concern was making a headway, as it is bound always to happen in such new enterprises, the attempt and the success it met attracted the attention of wealthier persons, who started the Sodepore Factory on a very big scale. The demand for labour in the Titaghur Factory was limited, as the concern was a small one. But the Sodepur Factory being a big one demanded labour in the same proportion. Higher wages at Sodepore attracted many of those who were working in the Titaghur Factory, and consequently the Titaghur Factory was left with no skilled labour. The second specialist also left the Titaghur Factory; and a third one who had learnt his art in Japan was obtained. This man constructed some crucibles and laid out the foundation for building a new furnace, which was on more correct lines than the one which was built before. The crucibles also were good. When this man left, the Titaghur concern was wound up.

The Titaghur scheme was not well thought out. They built a pot furnace containing ten crucibles and made mostly bottles and other inferior glass. Now a pot furnace is a very costly thing for ordinary bottle glass. It engages more than necessary capital, consumes more coal and altogether multiplies its expenditure to a very considerable degree. Pot furnaces are proper only when the material produced is of a superior and costly nature. It requires more fuel and more supervision, and entails constant delay in boiling fresh metal. For such ordinary glass a tank furnace is much cheaper, which requires much less capital and is much more easily worked.

The Sodepore Factory remedied this fact and they had a tank furnace for ordinary and a pot furnace for superior glass. Unlike Titaghur, gas was used in

this factory for fuel which was perfectly suitable for the tank furnace. But the position of the pot furnace was faulty. The draughts were not properly arranged.

But fairly good glass articles were made at this factory. This factory was enormously big. It need not have been so at the very start. The consequence therefore was that sufficient labour was not available and the charge of upkeep ran frightfully high. Want of skilled labour, it seems, has been the greatest misfortune which overtook this concern. The proprietors brought half-a-dozen or more Germans to train natives in the art of glass-blowing. But illness having interfered the experiment proved abortive.

In this factory also I did not see presses brought in much use. Most of the articles I saw there were tumblers and bottles. It is surprising to me how the pressed ware did not receive the attention of the proprietors of both Titagurh and Sodepur Factories. In all class of glass articles, the one that needs the least skilled labour is the pressed ware. That being so, the new man in the field should always attempt it first. But, strange as it is, both factories went in at the very start for blowing bottles and tumblers in the moulds. At Gateshead tumblers are made by the use of presses and without any blowing. Such tumblers are not equal in quality to those made by blowing into the moulds, but at any rate this process of bringing out pressed ware ought to have been mostly adopted in new factories until skilled labour could be plentifully obtained.

At Umballa the glass factory was not commercially well conceived. The construction of the furnace is faulty; the draughts are not such as to give the highest temperature necessary to thoroughly liquefy glass. I went into the air passages to examine them and found them too narrow for the proper supply of air in the furnace. Besides the furnace is built very thin. When the factory was built, the Directors had no working capital, and so before making any satisfactory start the concern was wound up.

I hear the same has been now bought up by one of the Directors, who is working it as a Joint-Stock Company, but I cannot place great hope in the concern even now.

I did not visit Ahmedabad, but it is understood that they never made glass out of sand. But they imported crystal balls and only converted them into glass articles. An attempt was subsequently made to build a furnace for making indigenous glass, but somehow the experiment does not seem to have been successful. The Rajpoor factory, which I recently visited, has, no doubt, made considerable progress. This factory had been a failure, like all others, but lately it is being worked with fresh capital and the help of four Austrian experts. This factory has also a gas furnace, which fails to accumulate sufficient heat to purify glass, and the result is, cloudy and cordy glass, full of air bubbles. The raw material used in this factory is found in a kind of sandstone of the Himalayas, and therefore the difficulty of uncertainty of composition, which I had noticed in the several qualities of quartz, remains as a permanent hindrance in producing good glass. I observed that the glass turned out suffered much in quality in consequence of the weakness of the furnace. The glass produced was of a low and inferior kind, but dear in cost, and I could not be convinced that the concern was still a success. I understand that a fresh amount of capital has been brought up to its aid, but all the faults I have dealt with in the preceding pages of this report have not been yet removed.

It is not a very pleasant task to criticise other people's efforts in a good and in every way beneficial cause, while yet some of the well-meaning starters are still smarting under the heavy loss they incurred, nor it is fair to attribute to them faults and failings upon a general consideration of their endeavours.

I am therefore anxious to explain that whatever may have been said above about the past attempts has not been said in any captious or deriding spirit, as they all indicate a liberal and generous impulse in the interests of the industrial development of the country. My only object in taking such a retrospect is to utilise as much as possible the past experience for future guidance.

I came in personal touch with the promoters of most of these past attempts, and a careful investigation of the circumstances regarding each attempt has

convinced me that the failures were preventible. Perhaps it will be better to note here such points as I thought were chiefly responsible for the failures of the past attempts with no disparagement to any of those who were concerned in the several attempts—

(1) Except at Sodepore, nowhere the furnaces were regular nor perfect. The crown of the Titaghur furnace was too flat and the Umballa furnace is too thin. I have laid great stress on this point in the preceding pages of this report. None of these furnaces came up to the proper standard except the Sodepore one. The tank furnace at Sodepore was too big and practically unworkable. The annealing kilns also at Sodepore were small chambers on the German type, which in my opinion are not suitable in India. The Titaghur Factory had the best annealing kilns.

(2) None of the concerns correctly anticipated the difficulty of securing sufficient skilled labour. No doubt in each case a specialist was requisitioned from outside, but a most important fact in the industry of glass manufacture was lost sight of. The different branches of the manufacture of glass are of so distinct a nature that it necessitates one specialist for each branch of the industry if that industry is to be successful in its results. For instance, constructing a furnace, constructing crucibles, mixing raw materials, converting glass into articles by various manipulations, and the finishing of glassware differ so much that it is impossible for one specialist to manage all the departments. In Europe these several departments have their own specialists who do their work only in the special branch of their knowledge. But the expert ordered out in India is expected to carry out all the above-mentioned departments, in addition to cutting and painting glass, which is absurd. Of course a good all-round man is sometimes available, but such men of general knowledge cannot surpass experts, nor can they be equally successful. India has not simply to produce glass, but to manufacture it in such manner as to enable it to stand in the market, side by side with the European product. And it is needless to mention that if we have to attain results achieved by European manufacturers, we must also employ their methods. Such distribution of labour is essential in the establishment of a glass factory.

Again, it seems to me that in all the past attempts the greatest difficulty was experienced in securing skilled blowers. That being so, attempts should have been made to produce the moulded and pressed glassware on a large scale to keep up the factory, while means were being gradually adopted to train such skilled blowers. All the factories seem to be bent upon beginning their enterprise with bottles and other hollow ware. It seems to me also that efforts were not made to collect men engaged in this industry in different parts of India, who could have been brought together by inducements of increased wages. Such an attempt would have simplified matters.

But such difficulty is not likely to arise for a new enterprise, for in the first place, unlike previous attempts pressed glass ware will receive its full consideration at the start. Secondly, the new bottle and tumbler-blowing machines will solve a difficulty on which many ambitious and enterprising people have hitherto stumbled. Thirdly, blowers could now be easily collected from different parts of India, as one result of the past attempts has been to bring the manufacture of glass from its mystic stage to a practical and intelligible form. People, especially those who were engaged at these several factories, know more about it now than they used to in the past. Fourthly, it is probable that many men who had worked in the old glass factories and had received some sort of training may gather together in a new concern, as those whom I met were anxious to return to their former occupation.

(3) None of the concerns except the one at Sodepore was well capitalised. All of them seemed to suffer from want of capital, which considerably reduced the efficiency of the whole concern. The Umballa Factory was the worst in this respect.

It must be remembered that in any industrial concern undertaken in the present keen commercial days, sufficient capital is as great a necessity as the raw material itself. No concern can be safe and no concern can work profitably without sufficient capital at its command.

It will be seen from the above that the barriers which proved insurmountable to the past attempts are not really so. So far as producing good glass out



of Indian raw material they have been successful, the Sodepore Factory having proved it beyond doubt. The question of procuring labour, sufficient capital, agreement in the Administrative Board, etc., are matters which form the details of an efficient organisation and not a technical difficulty nor a natural barrier in establishing the glass industry in India.

A glass manufacturer who really wishes to establish the industry in India cannot afford to be content himself by simply making his way clear in a technological point of view. There are many commercial considerations which are as potent as the technical one in deciding the fate of a new enterprise. In this chapter I have chiefly dealt with the difficulties of production of glass. Much greater are the commercial difficulties of distribution and sale of the glass trade, which I discuss in another place.

### XIII.—SUITABLE PLACE.

One important point still remains to be discussed before this report can be considered complete, and that is about the most suitable place for a glass factory in India.

Although my report refers only to the Province of Bengal, I can as well discuss the merits of several places in India which were suggested to me as best suited for glass-making.

The best place for a glass factory is one which contains the raw materials, fuel and cheap means of transport. Raw materials are found in many places and many places could be suggested as favourable on this score, such as, Bombay, Kanara, Ahmedabad, Kathiawar, Rajpore, Saharanpur, Calcutta, Rajmahal, and many other places in Bengal and Punjab. But the consideration of fuel eliminates most of these, such as all places in Bombay and Punjab as well as United Provinces. Bengal naturally takes the palm in consequence of the coal it possesses.

In the Bengal Presidency itself coal is found at many places and to a certain extent sand too, namely, at Ranegunge, Barakar, Giridih, Rajmahal, etc; good sand is available at Giridih and Rajmahal. Giridih contains coal also on the spot, but the sand from that place cannot equal that of Rajmahal. I was told that coal was found at the latter place, but when I went there no trace of coal-mine was found. Giridih sand is good and Giridih coal is the best in Bengal. There is a plot of ground near the railway bridge on the banks of the river which may be considered a suitable place for a glass factory, from which rails may be laid to Giridih station and the goods may be transported to Calcutta.

Although Rajmahal has no coal, it is easily available at a very cheap price, and a plot of land could be selected for a glass factory on the banks of the Ganges river, which will simplify the question of cheap transport.

I have found that the Rajmahal sand both on the banks of the Ganges as well as at Mangalghat is the best in Bengal. Giridih sand is good enough for ordinary glassware, but if at any future time best flint glass will have to be produced, for, as time goes on, improvements are sure to take place, I am doubtful whether Giridih sand will answer the purpose. Giridih has a good climate which also may be considered along with other considerations. Mangalghat sand could be taken to Giridih if superior glass is to be made, or coal may be brought down to Rajmahal, and so far as these considerations go, any place may be chosen, as they are both equally suitable. Labour is fairly available at both places.

But there is another consideration which cannot be lost sight of. Wherever the glass may be made, the chief market for the glassware will be Calcutta, and if the factory would be located either at Giridih or Rajmahal, all goods will have to be brought down to Calcutta. Rajmahal is more suited for this purpose, as the glassware could be cheaply brought down by river boats, while goods from Giridih will only have to be brought by rail, which will mean costly freight and considerable breakage.

These reflections suggest another *modus operandi*. It is worth our while to consider the economical result, if, instead of manufacturing glass on the spot where coal and sand could be found and then conveying the ware to the market, the sand and coal is brought down and glassware manufactured within easy reach of the market itself. I am inclined to favour the last proposal. Glass is a commodity which does not suffer much knocking about. The freight is bound to be expensive by the very nature of the packing it



necessitates; the breakage which may not fall at any time under fifteen per cent. may always exceed that proportion if the glass may be inferior in quality; while the freight for conveying raw materials is bound to be much cheaper than that of finished glassware. Coal has been already carried at special rates and sand also may be treated alike. Considering all the *pros* and *cons* of the question, I think it will be best to select a place near the market for the factory, and bring down coal and sand if necessary. The owners of Titaghur Factory have in my opinion selected the best site for a glass factory. It is about 150 yards from the Hooghly river, which secures a river passage for Calcutta. The Sodepore Factory is a little farther away from the river. I therefore consider Titaghur and any other place on the banks of Hooghly near Calcutta as the best one for a glass factory. The Hooghly river sand could itself be used for inferior glass; Mangalghat sand can come by the river boats easily and cheaply. Coal also may be made available without much extra cost. When the articles are ready they could at once be placed in the market without any breakage or additional cost. So three places could be mentioned now—(1) neighbourhood of Calcutta (Titaghur), (2) Giridih, or (3) Rajmahal. I am, however, inclined to favour the first of the three.

#### XIV.—THE REAL DIFFICULTY.

In the preceding chapters of this report I have shown that there can be no difficulty in successfully establishing the glass industry in India. I have tried to point out how the furnaces which were built in the past could be considerably improved upon and made thoroughly reliable by erecting them scientifically; I have also drawn attention to the principal points in the construction of a furnace, if it should be regular, durable and serviceable in every manner. I have discussed the quality of the fuel available in India for the purpose of glass-making and how to utilise the same. The different qualities of sand are also considered and its usefulness discussed, and I have come to the conclusion that sand good enough for making glass and suitable for the quality of fuel India does possess and can be obtained in abundance. The question of skilled labour has also been considered and means are shown how to overcome the difficulty. The suitable places are also indicated for preference. In short, so far as the considerations treated in the preceding pages of this report are concerned, there seems to exist no difficulty whatever in successfully establishing the industry in India.

But it must be remembered that the said successful establishment of the industry depends upon two facts—*first*, the successful manufacture of glass, and, *second*, the successful trade in the same. The first part, which has been hitherto considered, refers only to the technical portion of the subject, and a hopeful aspect of the same leads us into yet another and more important question of the commercial development of the glass trade in India.

In the glass trade India has competitors. And these are chiefly Austria, Belgium and Germany. Almost all the bottle glass and domestic inferior glass in India is imported from Austria and Germany and the window glass from Belgium. This industry has been very firmly established in these countries which have practically taken Indian glass-market under their complete control. That being so, it will be most difficult for an Indian glass-maker to wrest them away from the firm grip of these wide-awake competitors.

In addition to the usual advantage of a long-established industry, these European countries adopt certain commercial methods, especially in the glass trade, which makes it next to impossible for even a home factory to get root on its own soil. In Germany when glass is produced, it is always assorted into three classes, according to the superiority of the article and the flaws it contains. The very best quality of glass is sold in France and mostly in England as these are two countries which import glass, but always of a very superior kind. The second quality is consumed in Germany itself and other parts of the Continent, where the quality is not much in demand. The sale of these two qualities of glass practically meets all the expenses of the factory and also includes a fair proportion of profit. The third class of articles, which is considered as the refuse of the factories, is sold at clearance prices which nearly approximate the cost price. Most of the glass imported in India belongs to this last quality, and being purchased at the clearance prices, competition with such imported article must necessarily become most difficult. To compete

with this very cheap stuff, with articles made in a new factory by hands not properly trained will not be an easy matter.

This difficulty has not yet been felt simply because no glass factory in India entered in the competition of Indian glass trade. Most of the factories died in the embryo, and the production of those which succeeded in the start was next to nothing compared to the commercial demands of the country. But the difficulty is real and must be considered with all the gravity it deserves.

Attempts were made some time ago in India to import crude glass and convert the same into articles with cheap labour in order to place them on the market. The news reached Germany and the whole trade unanimously resolved not to export crude glass, as it might be detrimental to the permanent interests of the trade. This resolution affected the Indian glass trade in quite unexpected quarters.

India consumes a very large quantity of bangles. The common qualities of these are made in India itself. But the finer qualities are made in China out of the broken glass. There are many Indian merchants dealing in bangles who export broken glass of the desired colour to China and import the same formed into nice bangles for high-class ladies' use. These merchants, when superior shades of colour are wanted, import crude glass of the desired colour and send the same to China and get bangles made out of the same. The above resolve of German glass-makers not to export crude glass affected this trade considerably, and now these merchants have to import solid salt-cellars or some such heavy stuff, break it and then turn them into bangles as they wish.

The above instance points out with what wide-awake, well-established, wealthy, and enterprising competitors India has to measure her strength. In order to obviate this difficulty as far as possible, one must approach the Government of India. Here lies the insuperable difficulty which the Government of the country can alone remove.

#### XV.—PROSPECTS OF GLASS INDUSTRY IN INDIA.

In correctly estimating the prospects of a firmly established glass industry in India the following figures representing the imports and exports of glass-ware for a period of five years may be instructive :—

IMPORTS.	Value.				
	1899-00.	1900-01.	1901-02.	1902-03.	1903-04.
	Rs.	Rs.	Rs.	Rs.	Rs.
United Kingdom ...	16,88,818	15,08,680	15,59,723	17,70,289	16,79,226
Africa, East (British) ...	2,060	375	21	55	1,833
Aden ...	1,648	739	2,180	349	1,108
Ceylon ...	10,407	7,059	15,660	23,279	18,895
China—Hongkong ...	1,50,077	1,44,738	1,66,644	1,27,286	1,25,176
Straits Settlements ...	1,77,494	3,05,997	2,41,492	2,34,850	1,99,462
Other British Possessions ...	812	731	695	647	665
<b>Total British Empire ...</b>	<b>20,31,816</b>	<b>19,68,319</b>	<b>19,86,415</b>	<b>21,56,755</b>	<b>20,21,365</b>
<b>Anstria-Hungary ...</b>	<b>22,54,799</b>	<b>24,02,681</b>	<b>32,63,378</b>	<b>34,91,852</b>	<b>37,36,499</b>
Belgium ...	12,98,605	12,11,263	17,47,660	15,37,937	15,76,217
France ...	3,24,471	3,12,097	3,03,992	3,22,316	3,31,364
Germany ...	8,27,249	7,72,813	10,03,856	8,08,423	9,71,743
Holland ...	10,086	6,275	1,613	2,449	2,576
Italy ...	4,49,124	3,36,835	3,53,567	3,29,025	4,11,974
Egypt ...	10	1,586	9,631	38,230	83,672
United States ...	10,828	21,422	25,919	26,591	46,473
Arabia ...	373	1,309	188	89	414
China—Treaty Por ...	3,11,007	3,50,570	3,83,969	5,53,537	5,68,967
Japan ...	1,39,328	1,65,455	1,72,386	1,90,789	1,68,935
Other Foreign Countries ...	819	1,037	693	147	560
<b>Total Foreign Countries</b>	<b>56,35,199</b>	<b>55,83,443</b>	<b>72,66,855</b>	<b>73,01,435</b>	<b>78,99,394</b>

A glance at the above figures will at once show that the total imports of glass-ware into India have increased by 30 per cent. during the period of five years, viz., from 1899-1900 to 1903-04. Classifying the general imports into India in two Divisions, one from the British Possessions and the other from foreign countries, it will be seen that the imports into India from the British Empire have remained stationary, while the whole of the increase of imports has been monopolised by foreign countries. Amongst the latter Austria-Hungary has increased her imports of glass into India, from 22½ lakhs in 1899-1900 to nearly 37½ lakhs in 1903-04, an increase of 68 per cent. in five years. Belgium shows an increase of 25 per cent., Germany 18 per cent., China Treaty Ports 83 per cent. and Japan 21 per cent. in their respective imports into India during the same five years, while the figures for France and United Kingdom are stationary, if not on the decline.

The above figures also indicate that the demand for glass articles in India has arisen by about 6 per cent. year after year, and all this increased demand is supplied by foreign countries, who have also shown to some extent their capability to successfully compete with the United Kingdom, even in her established Indian glass trade. In other words it can be said that the rising demand for glass articles in India, helps to foster the glass industry of foreign nations, such as Austria, Belgium, etc. Even supposing the rising demand was supplied by the United Kingdom or any other part of the British Empire, still, the case for establishing the industry in India was very strong indeed. But the regrettable fact which one has to observe, is, that India has to pay nearly a crore of rupees in perhaps her agricultural produce, as price for these vast imports of an article, which, as I have shown in the preceding chapters of this report, she can produce at home comparatively at less cost.

There is another consideration which should be rightly calculated. The prices at present paid, by people in India for glass articles, not only represent the cost of production of the article, but also include freight and breakage. Both these latter items involve an exceptionally heavy addition to the cost price of the article at the place of its manufacture. For, glass articles take much more space in their packing than any other articles and where freight is charged by its superficial capacity, the amount swells up to a considerable sum. To this must be added 15 to 25 per cent. breakage, which also raises the market price of glass in India. Now my argument is, that if glass can be manufactured in India, certainly the amount of freight and breakage will admit of considerable reduction, which will ultimately lower the market price of the article. And when glass could be sold cheaper, and when the articles are shaped to Indian tastes and fashions, the annual rise in the demand for glass in India, which at present can be calculated at 6 per cent. only, will automatically multiply itself. It will not, in my opinion, be an idle dream to expect glass taking the place on a large scale of brass, copper, and to a certain extent silver utensils, in Indian homes, to see Indians using glass *lotas*, dishes and plates, *kathorees* and *pyalas*, spoons and ladles, cups and saucers and many other articles of house hold use—all made of glass instead of any other metal. For, it will cheapen the cost and also admirably answer the gradually refining tastes of the Indian population.

Considerable trade exists at present in glass bangles in India. The bangles turned out are of an inferior quality, but the difficulty of the bangle-makers lies chiefly in obtaining crude glass. There are a few people who obtain crude glass from Us and Reh found in some parts of India, but as their processes of extracting glass out of such raw materials are costly, and as the glass produced is not of good and uniform quality, they as a rule prefer to use broken glass or any other crude crystal they can secure. The few attempts made in the past in establishing glass factories, during their short existence, mostly turned out 'glass cakes' which were quickly sold to these bangle-makers. If organised efforts are made to supply such cakes of well-defined colours to these bangle-makers, I believe a considerable trade can be secured for the factory as well as a great encouragement given to the bangle-making trade in India, which is now gradually being wrested away from us by China and Japan.

It must also be stated that there are many countries in our neighbourhood which do not possess any glass factory. No doubt, in China there are factories which convert crude glass into bangles and other fancy articles, but

there are no works in which glass is manufactured out of sand. Broken glass, as well as solid salt cellars (as crude glass) goes to China in considerable quantities from European countries for the manufacture of articles which China exports on a large scale. If India can manufacture glass from sand, China can be counted as a sure and large customer for Indian crude glass. Persia, Afghanistan, China and East Africa as they begin to get a liking of crystal articles may be safely considered as valuable customers for Indian glass trade.

Before I close this chapter, I should try to give some explanation of the figures of exports and imports of glass, given in the annual statement of the 'Seaborne Trade of British India' issued by the Government of India. The classification made therein of glassware, into beads and false pearls, bottles—common, sheet and plate and other ware, in my opinion, does not give a sufficiently clear idea of the present condition of Indian glass trade.

It will be seen that countries who export glasses on a large scale in India are mostly United Kingdom, Austria, Belgium, France, Germany, Italy, China and Japan. Now United Kingdom sends us glass of miscellaneous kind, but it is all of a very high quality and price. Mostly Table glass, cut glass, ornamental window glass, articles generally made of excellent flint glass and a certain quantity of scientific apparatus, is imported from Great Britain into India. But since Austria, Germany, and France entered seriously into the competition, it can be predicted that Great Britain will not ultimately be able to hold her ground in the Indian glass trade. For, the glass trade is so speedily being developed in Germany that she has already begun to beat Great Britain in her own markets. The high rate of wages, the increasing power of Trades Union which effectively handicap the employers, and restricts production, and the abolition of the apprenticing system, in England is sadly affecting her glass trade, while Germany, with her greater freedom for the employers, low wages, longer hours of work, her apprenticing system, and improvements in the science and art of glass-making is steadily winning an advantage over Great Britain. As a matter of fact, the glass trade in Great Britain is on the decline, which fact has led some firms in England to open branches of their glass-works in Germany or to import in Great Britain glass articles from Germany and Belgium, for decorating and finishing them before export. It can be safely remarked that the glass trade of the United Kingdom with India is hitherto protected to a certain extent by the pushful commercial methods and enterprise as well as personal influence of some of the leading firms of the United Kingdom. But the trade, judging by economical principles, must decline. Because English articles are highpriced, although they are of the best quality, and German cheap-priced imitations are steadily improving.

Germany sends us chiefly cheaper qualities of table and other sorts of glass, the higher qualities of which are imported from Great Britain, and also other kinds of hollow-ware, such as bottles, tumblers, and partly medical phials, lamps and chimneys. Pressed glassware of a superior quality also form a considerable part in the Indian glass imports from Germany.

Belgium chiefly sends sheet glass for windows, as well as some flatware, while France exports glass articles commonly used for scientific experiments and investigations, such as chemical, astronomical, and other apparatus.

Austria-Hungary is far the biggest importer of glass in India. Her imports amount to nearly 48 per cent. of the total imports, or, in other words, Austria supplies us with as much glass as all other countries, foreign or British, combined. The above comparison is in value, but in quantity the proportion is likely to be still in favour of Austria, as the major portion of glass, Austria sends to India, is of a very cheap quality; lamps, chimneys, tumblers, cheap table glass, bottles—common, lamp-shades, medical phials and a very large portion of holloware consumed by the masses of India, are brought here from this country. Their make is rough, their article is undurable, but their prices are cheap, which conditions have made them popular in Indian markets and allowed them to monopolise gradually the Indian glass trade.

The imports from China and Japan mostly consist of fashionable bangles for the high-class Indian ladies, and partly of glass globes, silvered or otherwise.

China does not manufacture glass out of sand, but collects the broken glass, and imports crude glass from Europe which, when turned into these bangles and other fancy ware, is imported into India.

Italy sends, mostly, false pearls, Bohemian and other artistic glass for the exclusive use of the well-to-do classes of India.

The question which now arises is this:—Supposing India establishes the glass industry, which country or countries she will have to compete with at the start?

From the broad description of articles, imported into India from several countries, given above, it will at once be seen that United Kingdom sends such articles, which even the continental countries find difficult to produce. It is impossible for India, in her nascent condition of glass industry, to produce anything similar to the articles of the United Kingdom and rival that country. It is also doubtful whether she can do so for many years to come, as the advantages, nature has conferred on that country in the form of good fuel and sand, are very great.

Neither it is possible for India to produce that fine and regular quality of glass which is imported from France. I do not think any attempt to compete with United Kingdom or France will be justified, at least in the first ten years of the industry.

Germany sends to India certain articles which it will be possible to produce in this country, although for the first few years, I doubt, whether the production will be as cheap. The higher qualities of glass imported from Germany will receive no competition from the home industry, but the inferior qualities certainly will. But the question is whether Germany will consider the Indian industry as her rival, I think not. For Germany is trying, and has partly succeeded, in improving the quality of her glass articles, and she is quite absorbed in competing with the United Kingdom and to a certain extent with France. Her trade with Europe is decidedly much more profitable than that of India, and for this reason, it will not be worth her while, nor will she care, in my opinion, to rival the rising industry of India.

If India produces glass articles, it will no doubt have to compete with Austria and Germany, as it will produce such articles as are now being imported from these two countries. I have expressed my opinion that Germany will not care to compete with India, but such I do not expect will be the case with Austria. In case the glass industry will be established in India, in a few years, she shall be able to produce at home all such articles as are now imported from Austria. Austria therefore is her rival and a rival, whose strength we shall have to measure with great care. Her cheap labour, her trained skill, and up-to-date methods, as well as her being long in the field, certainly gives her an advantage in the competitive race, and unless some measure is devised to protect the nascent industry, at least for a few years, glass industry has little chance of being firmly established in India.

It is on account of these considerations, that one is forced to look-up to the Government, for strong support and substantial assistance.

#### XVI.—WHAT CAN THE GOVERNMENT DO.

In all Asiatic countries, the Government has always led the people. It has been their tradition, and their past history. The ruling monarch was looked upon as the Lord and Master of the country and its people, and nothing which he disapproved, was right. India as an Asiatic was not an exception to the rule. That a country was a common wealth of all its citizens and people, is, comparatively, a new idea, and no doubt, under the British Rule, this principle has gained much force. But the old notion is still lurking in the land. India certainly requires good leading, and if the Government with the superior knowledge and varied experience does not lead, she stands the chance of being led astray. It must also be remembered that the leading must be in consonance with the spirit of the age and progress. The wisdom of ancient monarchs in India was judged by this quality alone, and such of them who took note of the sentiments of the people, and led them safely and wisely to their ideals, have immortalised their name, as wise and good rulers. The ambition of Industrial Development of India

is pervading the Indian atmosphere just now, and this ambition is giving rise to many enthusiastic outbursts. At such a time, if the Government of the country declines to lead, the enthusiasm is sure to flow in wrong channels, and result in waste of energy and lead to most unpleasant consequences.

I am sure that the question of Industrial Development of India occupies the foremost position in the deliberations of the Government of India, and what remains now for them, is to devise some means suitable to the country, for its practical achievement.

I am not one of those who think that protective tariffs are essential for establishing new industries in India. For myself I welcome the views embodied in the Resolution of the Government of this subject. But there is an influential opinion in India that until Indian industries are placed on a sound and sure footing, protective duty on imports is advisable. Even Western Economists have advocated such a policy. John Stuart Mill\* was of opinion that a protective duty is justifiable under certain conditions.

There are many other economists, who advocate protection for nascent industries, on the same ground as Mill has, and I have no doubt the Government must have given full consideration to the same.

America, Germany and the British Colonies have all abandoned the orthodox policy of free trade, and it may be considered how far India can claim the benefit of the experience and practice of these self-governing Colonies.

In appealing for State help, I must suggest alternatives, as the question is apt to be looked at from many points of view. The remedy suggested above is more or less general, and if I were to appeal to the Government for a protective duty on all glass imports, they will have to judge the merits of my demand on the considerations of the general policy they have preferred to follow.

If the policy of protection will not be looked upon with favour, some pioneering effort may be undertaken by the Government, in order to stimulate private enterprise, in this direction. Such a policy is more suitable to Asiatic countries, than even protection. I understand that the Japanese Government first started small industries, and after they had attained a certain degree of success, the concerns were handed over to the private capitalists. The success, which attended such a measure, in Japan, may be a reliable guide to our attempts in India.

The Government of India have not been backward in adopting such a policy, in the past. They have helped the working of iron and coal-fields, they have spent vast sums of money in carrying experiments made about cotton and tobacco, tea and coffee, and chinchona plantations. They have also helped with financial, as well as, moral support leather factories, iron companies and have even established factories, to carry on Military works at State expense. Agricultural experiments and improvements are every year carried on with great liberality and generosity. And it may be contended that the commercial and industrial development of a country has a prior claim on the Nation's purse than even agriculture. For, commerce and manufactures are more powerful in their influence, on the education of the intelligence, skill and enterprise of a community, than agriculture. In a purely agricultural country there is a tendency to stagnation, absence of enterprise, and the retention of antiquated prejudices. The function of the Government is therefore to help such tendencies, which lead to secure a general progress, more than the lines which indicate progress, but only in an isolated direction. I therefore strongly advocate, that the pioneering effort may be made by the Government of Bengal, by buying over one of the old concerns and receiving the same under State control and official superintendence. Such glass as is necessary for the Government of India, as well as other coarsest sorts, may be first manufactured

\*The case in which on mere principles of Political Economy, protecting duties can be defensible, is when they are imposed temporarily (especially in young and rising nation in hopes of naturalising a foreign industry, in itself perfectly suitable to the circumstances of the country. The superiority of the country over another, in a branch of production, often arises only from having begun it sooner. There may be no inherent advantage on one part, or disadvantage on the other, but only a present superiority of acquired skill and experience. But it cannot be expected that individuals should, at their own risk, or rather to their certain loss, introduce a new manufacture, and bear the burden of carrying it, until the producers have been educated up to the level of those, with whom the processes are traditional. A protective duty continued for a reasonable time, will sometimes be the least inconvenient mode, in which the nation can tax itself for the support of such an experiment.—[See Section I, Chapter I, Book V; Principles of Political Economy.]

in this factory and after a successful working of three or four years, the factory may be handed over to a private or joint-stock company. Such encouragements are given in other countries and were given even in India, in the past, and it will not be improper to make a similar attempt in the establishment of the glass industry, in a country which is so backward in its industrial development. I need not discuss the details of this scheme here, but if the proposal finds favour with the Government, I shall only be too pleased to supply every information which may be necessary to carry it out. I am confident that such experiment will entail no loss on the Government.

If even this appeal does not induce the Government to take some steps on the lines indicated above, I propose yet another alternative which I have no doubt will be considered as the minimum that could be asked for from the Government.

The Government of India buys enormous quantity of glass from Europe for their various departments. Over and above this new glass articles may be introduced, where hitherto crude pottery has been in use. A few concessions with regard to the sale and transport of articles may induce some capitalists to invest their money in such an undertaking.

In the first place, coal and sand, used by the glass factory, and the glass articles sent out, should receive special consideration from the railway companies. The freight rates, at present in force, make it impossible for a new manufacturer to compete with the European prices of glass ware. The railway companies should not charge more than one-fortieth of the pie per mile per maund on raw materials and one-thirtieth of a pie per mile per maund on finished glassware. They may also be induced to provide, goods-waggons specially fitted with arrangements to avoid as much breakage as possible in the transport of all glass ware.

*Secondly.*—The Government may be pleased to bind itself to buy such glass as they require, and such as the factory can produce, from the new factory alone. Prices of articles may be fixed by mutual consent, on the consideration of an average price of different articles, paid for, during the past five years. A contract can be made with the firm thus guaranteeing the sale of at least a considerable part of the produce, of the factory.

*Thirdly.*—They may allow to the new company free use of Government land and water for a term, of 15 years.

Other minor concessions may be put forward, if the Government may be inclined to approve of the general principle underlying such a request.

I must state here that in the ordinary course of things, much encouragement is not needed, as I feel confident that a lower price in production will easily win over the Indian markets for the indigenous industry. But if the German, and Austrian merchants, develop their already injurious system of 'dumping markets' which they are sure to do, then all such help and anything more that can be obtained, will be desperately needed.

I may in conclusion mention here that if the Government may not think it advisable to conduct the pioneering attempt at its own cost, they may at least be pleased to consider the last alternative suggested above. I believe, I shall be able to successfully float a joint-stock company if some of the concessions are generously given to me, for which I am perfectly willing to be bound by an agreement with the Government.

I think, the time has now arrived when the Government should recognize this function of developing new industries in the country, to be as legitimate a part of its duty as it now regards railway construction, Agricultural improvements, and opium farming. The principle underlying all these efforts is the same. The alternatives I have suggested above are not entirely foreign to the genius of British rule in India, nor inconsistent with their policy. I rejoice to observe that the Government of India have taken up an extremely sympathetic attitude towards the development of manufactures in India. It should be borne in mind that on this attitude and the extent of help they are disposed to give, will depend the destiny of this movement.

N. B. WAGLE.

## .. APPENDIX.

I give below the analyses of several sands which I had analysed. It must be said, that as I was much handicapped in not having all the apparatus necessary, the proportions may be slightly incorrect. Such inaccuracy, I can state, will be inconsiderable, and at any rate will not affect the considerations for which the sands have been analysed:—

### 1. Sample of Quartz at Umballa.

Silica	...	...	90.05
Alumina	...	...	1.97
Oxide of Iron	...	...	5.93
Water	...	...	.82
Organic matter†	...	...	.62
Lime, Magnesia, etc.	...	...	1.11
			100.00

### 2. Another sample of Quartz from Umballa.

Silicic Acid	...	...	83.91
Alumina	...	...	4.43
Oxide of Iron	...	...	6.09
Manganese	...	...	.85
Lime	...	...	1.20
Unknown quality	...	...	2.90
Moisture	...	...	.63
			100.00

### 3. Sample of Quartz from Dhunera.

Silica	...	...	95.94
Alumina	...	...	.52
Oxide of Iron	...	...	2.80
Oxide of Tin	...	...	.15
Lime	...	...	Trace.
Water and organic matter	...	...	.04
Salts of Alkalies	...	...	.55
			100.00

### 4. Sample of Hooghly Sand at Barackpore.

Silica Acid	...	...	80.32
Alumina	...	...	10.40
Oxide of Iron	...	...	2.15
Manganese	...	...	0.15
Lime	...	...	2.90
Magnesia	...	...	1.02
Alkalies (by difference)	...	...	2.31
Moisture	...	...	0.75
			100.00

### 5. Sample of Hooghly Sand at Hooghly.

Silicic Acid	...	...	81.62
Alumina	...	...	16.30
Oxide of Iron	...	...	2.97
Manganese	...	...	.18
Lime	...	...	3.10
Alkalies (by difference)	...	...	1.07
Moisture	...	...	0.76
			100.00



6. *Sample of Hooghly Sand at Chinsura.*

Silicio Acid	...	...	...	81.19
Alumina	...	...	...	10.69
Oxide of Iron	...	...	...	2.95
Manganese	...	...	...	.22
Lime	...	...	...	3.21
Alkalies (by difference)	...	...	...	1.15
Moisture	...	...	...	0.69
				<hr/> 100.00 <hr/>

7. *Sample of Ganges Sand at Rajmahal.*

Silicio Acid	...	...	...	83.31
Alumina	...	...	...	7.45
Oxide of Iron	...	...	...	1.95
Manganese	...	...	...	0.20
Lime	...	...	...	2.95
Magnesia	...	...	...	1.02
Alkalies (by difference)	...	...	...	2.37
Moisture	...	...	...	0.75
				<hr/> 100.00 <hr/>

8. *Another sample on the opposite side of the Dāk Bungalow at Rajmahal.*

Silicio Acid	...	...	...	82.31
Alumina	...	...	...	8.45
Oxide of Iron	...	...	...	2.15
Manganese	...	...	...	0.15
Lime	...	...	...	2.90
Magnesia	...	...	...	1.02
Alkalies (by difference)	...	...	...	2.27
Moisture	...	...	...	0.75
				<hr/> 100.00 <hr/>

9. *Sample of sand at Colgong (on the other side of the ferry).*

Silicio Acid	...	...	...	85.19
Alumina	...	...	...	8.30
Oxide of Iron	...	...	...	1.82
Manganese	...	...	...	.15
Lime	...	...	...	1.22
Magnesia	...	...	...	.37
Alkalies (by difference)	...	...	...	2.21
Moisture	...	...	...	.74
				<hr/> 100.00 <hr/>

10. *Sample of Barakar River Sand (near Barakar Railway bridge).*

Silicio Acid...	...	...	...	79.77
Alumina	...	...	...	10.14
Oxide of Iron	...	...	...	2.71
Manganese	...	...	...	0.54
Lime	...	...	...	1.35
Magnesia	...	...	...	0.54
Alkalies (by difference)	...	...	...	4.66
Moisture	...	...	...	0.63
				<hr/> 100.00 <hr/>

11. *Sample of Sand at the junction of Barakar and Damodar rivers, three miles from Barakar.*

Silicic Acid	...	...	...	...	80.57
Alumina	...	...	...	...	10.25
Oxide of Iron	...	...	...	...	2.04
Manganese	...	...	...	...	.42
Lime	...	...	...	...	1.57
Magnesia	...	...	...	...	0.66
Alkalies (by difference)	...	...	...	...	4.71
Moisture	...	...	...	...	.22
					<hr/> 100.00 <hr/>

12. *Barakar Sand at Giridih.*

Silicic Acid	...	...	...	...	82.07
Alumina	...	...	...	...	9.26
Oxide of Iron	...	...	...	...	1.61
Manganese	...	...	...	...	0.50
Lime	...	...	...	...	1.25
Magnesia	...	...	...	...	0.31
Alkalies (by difference)	...	...	...	...	4.45
Moisture	...	...	...	...	0.55
					<hr/> 100.00 <hr/>

13. *Another sample at Giridih.*

Silicic Acid	...	...	...	...	82.56
Alumina	...	...	...	...	8.42
Oxide of Iron	...	...	...	...	1.20
Copper	...	...	...	...	3.56
Lime	...	...	...	...	0.89
Alkalies (by difference)	...	...	...	...	3.85
Moisture	...	...	...	...	0.52
					<hr/> 100.00 <hr/>

14. *Barakar River Sand at Rnnigunge.*

Silicic Acid	...	...	...	...	76.23
Alumina	...	...	...	...	11.64
Oxide of Iron	...	...	...	...	3.40
Manganese	...	...	...	...	.21
Lime	...	...	...	...	3.88
Magnesia	...	...	...	...	.93
Alkalies (by difference)	...	...	...	...	3.61
Moisture	...	...	...	...	.76
					<hr/> 100.00 <hr/>

15. *Sample of Bramhaputra Sand.*

Silicic Acid	...	...	...	...	82.65
Alumina	...	...	...	...	8.56
Oxide of Iron	...	...	...	...	2.15
Manganese	...	...	...	...	0.19
Lime	...	...	...	...	2.90
Magnesia	...	...	...	...	1.02
Alkalies (by difference)	...	...	...	...	2.45
Moisture	...	...	...	...	0.77
					<hr/> 100.00 <hr/>

16. *Another sample of Bramhaputra River Sand.*

Silicic Acid	...	...	...	...	89.04
Alumina	...	...	...	...	5.22
Oxide of Iron	...	...	...	...	2.52
Manganese	...	...	...	...	.43
Lime	...	...	...	...	1.32
Magnesia	...	...	...	...	.95
Alkalies (by difference)	...	...	...	...	.80
Moisture	...	...	...	...	.72
					<hr/> 100.00 <hr/>

17. *Sample of Mangalghat Sand.*

Silicic Acid	...	...	...	...	91.03
Alumina	...	...	...	...	4.64
Oxide of Iron	...	...	...	...	0.81
Manganese	...	...	...	...	0.20
Lime	...	...	...	...	0.32
Magnesia	...	...	...	...	0.09
Alkalies (by difference)	...	...	...	...	1.36
Moisture	...	...	...	...	1.55
					<hr/> 100.00 <hr/>

18. *Another sample washed and burned.*

Silicic Acid	...	...	...	...	92.03
Alumina	...	...	...	...	3.64
Oxide of Iron	...	...	...	...	0.81
Manganese	...	...	...	...	0.20
Lime	...	...	...	...	0.32
Magnesia	...	...	...	...	0.09
Alkalies (by difference)	...	...	...	...	1.36
Moisture	...	...	...	...	1.55
					<hr/> 100.00 <hr/>

19. *Another sample from the same locality.*

Silicic Acid	...	...	...	...	91.20
Alumina	...	...	...	...	3.18
Oxide of Iron	...	...	...	...	0.97
Manganese	...	...	...	...	.22
Lime	...	...	...	...	1.05
Magnesia	...	...	...	...	1.09
Alkalies (by difference)	...	...	...	...	1.39
Moisture	...	...	...	...	1.95
					<hr/> 100.00 <hr/>

20. *Quartz found near Raniganj (kindly supplied by Mr. White).*

Oxide of iron	...	...	...	...	5.08
Alumina	...	...	...	...	1.00
Oxide of Tin	...	...	...	...	.16
Sulphuric Acid	...	...	...	...	.99
Water and organic matter	...	...	...	...	.34
Silica	...	...	...	...	92.84
Salts of Alkalies and loss	...	...	...	...	.49
					<hr/> 100.00 <hr/>

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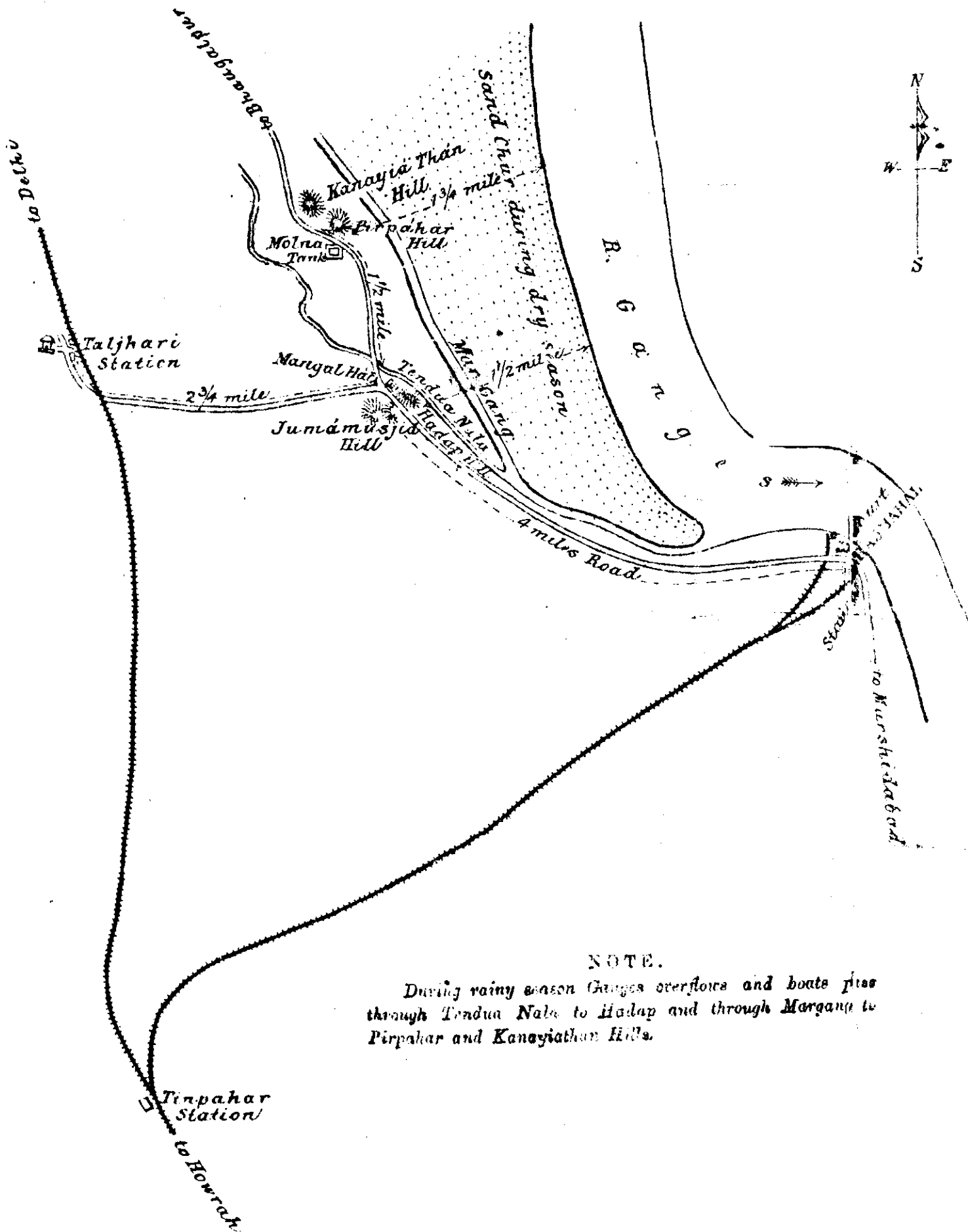
21. *Sample of sand from Patna.*

Silicic Acid .	...	...	...	...	64.45
Alumina	...	...	...	...	6.07
Oxide of Iron	...	..	..	...	4.72
Manganese	...	...	...	...	2.60
Lead (Sulphide)	...	...	...	...	18.42
Lime	...	...	...	...	0.30
Magnesia	...	...	...	...	.09
Alkalies (by difference)	...	...	...	...	1.11
Moisture	...	...	...	...	1.24
					<hr/>
					100.00
					<hr/>

# PLAN

SHOWING

River and Railway Communication from KANAYIA THAN, PIRPAHAR and HADAP HILLS from which Flint Sand and White Earth available for Glass and Pottery manufacturing in the RAJMANAL Sub-Division SONTHAL PARAGANA.



## NOTE.

During rainy season Ganges overflows and boats pass through Tindia Nala to Hadap and through Mangal Hat to Pirpahar and Kanayia Than Hills.