



REPORT
OF THE
WORK OF THE
Indian Industrial
Conference

INCLUDING A
RECORD OF GENERAL INDUSTRIAL ACTIVITY
IN THE COUNTRY.

1907.

Madras :
PRINTED BY THOMPSON & CO.,
AT THE "MINERVA" PRESS, 53 BROADWAY.

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CONTENTS

	PAGE
Report of the Conference Work ...	1
Summary of Accounts ...	11
Report submitted by the Assistant Secretary Governments of British India and Indian States, and Industrial Development ..	17 20
Industrial Activity of the People :—	
Bombay	42
Bengal	50
Madras	57
The United Provinces ...	62
The Punjab	63
The Central Provinces and Berar	66
The Indian States	66
Appendices :—	
I. Memorial on Industrial Survey	68
II. Technical Education in the Central Provinces ..	82
III. Report on Handloom Competition ..	98
IV. Answers to Industrial Survey Questions ...	110
V. Report on the Work of the Berar Committee ..	167
VI. Communication to the Conference Provincial Committees	169
VII. Technical Department of the Bengal National College	173
VIII. Joint Stock Companies	176
IX. Indian Joint Stock Companies : A Year's Progress... .. .	185
X. Indian Patents	188

REPORT

OF

Industrial Conference Work and Record

OF

General Industrial Activity in the Country in the
Thirteen Months ending with November 1907.

PART I.

INDUSTRIAL CONFERENCE WORK.

November and December 1906

1. The report submitted to the Second Indian Industrial Conference at Calcutta covered the ten months from January to October 1906. The work that mainly occupied the time of the Conference Office in the months of November and December was the seeing the first edition of the Directory of Indian Goods through the press, the preparation of the Annual Report, and arrangements in connection with the last session of the Conference.

2. A meeting of representatives of the several Provincial Committees and a few others specially invited by the General Secretary, was held at Bombay on the 17th and 18th November 1906, and the nomination of President of the last Conference, the selection of subjects to be placed before it and the drafting of Resolutions on them were dealt with on the occasion. The draft Resolutions were circulated among the Provincial Committees for opinion and they were reconsidered, discussed and finally settled at a second meeting of representatives of the Provincial Committees and of prominent delegates held at the rooms

of the Bengal Landholders' Association on the 25th December.

3. The Assistant Secretary, Mr. Chintamani, after completing his work for the year at the central office, visited Calcutta, Benares and Allahabad in the last week of November and the first week of December, and spent the latter month at Calcutta assisting the local Committee in making arrangements for the Conference.

4. The meetings of the Conference were held at Calcutta on the 29th and 31st December under the presidency of the Hon'ble Mr. Vithaldas Damodher Thackersey of Bombay. His Highness the Maharajah Gaekwar of Baroda did the movement the honour of delivering an Inaugural Address on the opening day of the session. The papers read, the addresses and speeches delivered, and the Resolutions passed at the Conference are now issued in a book form. We regret greatly that the publication did not take place earlier.

January to November 1907.

5. By Resolution VI of the last Conference Rao Bahadur R. N. Mudholkar and Mr. C. Y. Chintamani were re-appointed General and Assistant Secretary respectively, and the President and the General Secretary were empowered 'to appoint an Additional Assistant Secretary and establishment on suitable pay, so that the Assistant Secretary may be free to visit the different provinces and help the Provincial Committees in all matters in which they may require assistance.' The Conference further resolved to allot 'a sum of Rs. 10,000 for meeting the expenses for the next twelve months, and also for issuing a quarterly bulletin of industrial information under suitable management.' In point of fact less than a half of the sum voted has been subscribed. Consequently, an Additional Assistant Secretary could not be appointed nor could a quarterly bulletin of industrial information be issued.

6. The Assistant Secretary visited Calcutta ; Bombay ; Allahabad, Benares and Cawnpore in the United Provinces ; Vizagapatam and Vizianagram in the Madras Presidency ; Nagpur in the Central Provinces, and Akola in Berar, during the course of the year. He actively assisted the United Provinces Committee of the Conference in organising the First United Provinces Industrial Conference and the Exhibition Committee at Vizagapatam in organising the Second South Indian Industrial Conference. He was unable to visit more places, as unfortunately he fell ill in April and after first trying to work in spite of his sickness, had to take a long leave,—and no second Assistant Secretary having been appointed as was contemplated, his presence was required at the central office immediately he was in a position to return to duty. Mr. Chintamani has submitted a separate report similar to last year's. It is annexed to this report.

7. The General Secretary submitted the Resolutions of the Calcutta Conference to the Government of India and the various Provincial Governments.

8. A Memorial on Industrial Survey has been submitted to the Government of India in accordance with Resolution III of the Calcutta Conference. (*Vide* Appendix I.)

The General Secretary regrets that on account of continued ill-health and other unexpected difficulties he has not been able to prepare a Memorial on Technical and Commercial Education in accordance with Resolution I of the Calcutta Conference. He, however, hopes to do so at an early date. The subject itself has not been overlooked by him, as the correspondence between him and the Central Provinces Administration, printed as Appendix II, will show.

9. A Hand-loom Competition was held at the Calcutta Exhibition, under the auspices of the Industrial Conference, and prizes of the value of Rs. 500 were awarded to the winners in the competition. A report on the same written by two of the judges, Rao Bahadur Raoji Bhai Patel of Baroda and Mr. M. A. Sampath Iyengar of Mysore, was published recently, and it is appended. (*Vide* Appendix III.) The

thanks of the Conference are due to these gentlemen for their very informing, useful and interesting report.

10. It had been settled by the General Secretary that there should be a handloom weaving competition along with this year's Conference as there was last year and that prizes should be given to the successful competitors. But owing to the uncertainty which prevailed for a long time about the place of meeting of the Congress and therefore of the Conference, no definite steps could be taken to give effect to this intention. Meanwhile came communications from Madras that there would be an All-India Weaving Contest there in February next under the auspices of the National Fund and Industrial Association, which is also the Provincial Committee of the Conference, and that the Local Government had offered to make a substantial grant-in-aid of it. If the Conference would have been held in Madras as it seemed probable at one time, there was no object in having a Competition in Christmas when another on a bigger scale was to be held two months later. Eventually it was settled that the Conference would meet at Surat where the Congress would be held. This was decided too late for arrangements to be completed for a successful competition of the sort we had last year, the more so as there would be no Exhibition this year. The idea had, therefore, to be regretfully given up.* Both for this reason and in response to suggestions from friends in Madras we have decided, to cooperate with the Madras Committee in the All-India Weaving Competition which they have arranged and to offer some prizes in connection therewith.

11. With reference to the Industrial Survey questions framed by the General Secretary last year, it was stated in last year's annual report that although about 1,000 copies had been sent to different persons and bodies only 20 replies

* Since this was in type the Surat Committee have announced their intention of holding an exhibition of local manufactures and a handloom demonstration along with the Conference. If so, the Conference will give prizes at the latter.

had been received, and that 'renewed efforts would have to be made to complete this enquiry.' Accordingly they were again sent to about 300 persons this year. The number of replies received is 15. These are appended. The questions also are reprinted to facilitate reference. (*Vide* Appendix IV.) The thanks of the Conference are due to the gentlemen who have kindly responded to the Secretary's appeal for supply of information.

12. The whole of the first edition of the "Directory of Indian Goods," which was published in December last, having been sold out, and it appearing that there is a considerable demand for it, a second edition, revised and enlarged, has been prepared by the office. A slight change in the title of the compilation has been rendered necessary by the addition of several new features which, it is hoped, will, to some extent, enhance its usefulness as a book of reference. "The Directory of Indian Goods *and Industries*," as it will be known, is in the press and will be ready for use about the 20th December.

13. The First Bombay Provincial Industrial Conference was held at Surat in the Easter holidays under the presidency of Mr. R. C. Dutt, C. I. E. Several interesting papers were read at it, and Resolutions were passed on Industrial Survey, Technical and Commercial Education, Handloom Weaving, the Gujarat Silk Industry, Sugar Industry and Co-operative Associations, among other subjects. There was a splendid Industrial Exhibition at Surat on the same occasion, and its opening ceremony was performed by the Hon'ble Mr. J. W. P. Muir-Mackenzie, Senior Member of the Bombay Executive Council.

Another Conference, the First Karnatak Industrial Conference, was held at Dharwar in the month of May with the Hon'ble Mr. Daji Abaji Khare as President. The principal Resolution of the Conference was that a Technical School be established at Dharwar at a cost of nearly Rs. 75,000. We believe the promoters of the Conference have been exerting themselves to give effect to this.

14. The Second South Indian Industrial Conference and the South Indian Industrial Exhibition were held at Vizagapatam in June. The Hon'ble Mr. J. N. Atkinson, Member of the Madras Board of Revenue, presided at the opening ceremony of the Exhibition, and the Hon'ble the Rajah of Kurupam was the Chairman of the Committee of Management. The President of the Conference was Dewan Bahadur L. A. Govindaraghava Iyer. An interesting feature of the Conference was a long discussion on the address delivered by Mr. Alfred Chatterton, Director of Technical and Industrial Enquiries, Madras, in which several delegates took part. The Conference passed Resolutions on Technical Education, the Organization of Capital, Agriculture and Mining in Zamindaries, and the Weaving Industry, among other subjects.

The Committee of the National Fund and Industrial Association, which acts as our Provincial Committee for the Madras Presidency, has done useful work during the year. It has sent students to foreign countries to receive Technical Education. It has arranged to hold an All-India Weaving Competition at Madras next February with the assistance and co-operation of the Local Government. The Hon'ble Mr. V. Krishnasawmy Iyer has offered Rs. 5,000 for starting a weaving school at Madras, and the matter is engaging the Committee's attention.

15. The United Provinces Committee held their first Provincial Industrial Conference at Allahabad on the 1st April. Rai Bahadur Lala Baij Nath presided over it. His Honour Sir John Hewett, Lieutenant-Governor of the Provinces, sent a message of sympathy with the movement through Mr. W.H. Moreland, Director of Land Records and Agriculture, U.P., who attended the Conference with two of his Assistants, and read a paper on the Sugar Industry. The noteworthy feature of the Conference was the decision which was arrived at to found the United Provinces Pioneer Sugar Mills Co., Ltd., with a capital of one lakh of rupees, of which Rs. 53,600 were subscribed on the spot. The latest we

heard about this was that the promoters intended to start a factory at Allahabad. The United Provinces Industrial Association was formed at the Conference and its Committee acts as the United Provinces Committee of our Conference. Other Resolutions passed related to the Weaving Industry and Technical Education. Major E. Atkinson, R.E., Principal of the Thomason Engineering College, Roorkee, contributed an important paper on Technical Education to the proceedings of the Conference.

Early in the year the Oudh Industrial Association was formed at Lucknow with the object principally of promoting the aims of the Indian Industrial Conference, and it resolved "to place itself in communication with the central office of the Indian Industrial Conference and seek its advice and help."

16. The Central Provinces and Berar Industrial Conference was held at Raipur in the Easter holidays, Mr. M. B. Dadabhoj, one of the Directors of the Berar Manufacturing Company, presiding. At this Conference two separate Industrial Committees were formed for the Central Provinces and Berar, with head-quarters at Nagpur and Akola respectively. Rao Saheb Deorao Vinayak, Secretary of the Berar Committee, has kindly sent in a report on the work done during the year, and it is appended. (*vide* Appendix V.) We have already referred to the correspondence between Rao Bahadur R. N. Mudholkar and the Local Administration on the subject of Technical Education, which is the outcome of the Conference held last year at Jabalpur.

17. Towards the end of October a communication was addressed by the General Secretary to the Provincial Committees touching several important matters relating to the Conference. It is printed as Appendix VI.

18. The Third Indian Industrial Conference, which is to

meet in Christmas week, as usual, will be held, not at Nagpur as originally expected, but at Surat, where the National Congress will hold its session. At a meeting of the representatives of the Provincial Committees held at Bombay on the 10th November, several important questions relating to it were considered. The Assistant Secretary will be deputed to Surat early this month to assist the Committee that will be formed there in making the necessary arrangements for it.

19. Interest in the industrial movement continues unabated on the part of the people, as testified to by the record of the general industrial activity in the country which is printed in Part II of this Report. The Government of India and the Provincial Governments as well as the Governments of Indian States, too, continued to evince sympathetic interest in the movement. A brief account of the steps taken by them will be found in Part II. We desire to make special acknowledgments of the most valuable and greatly needed work begun by the United Provinces Government for the furtherance of industrial development. It is to the large-hearted sympathy and broad-minded statesmanship of Sir John Hewett that the new policy owes its origin.

20. We may perhaps say a few words at this place on the future organization and working of the Conference movement. That it has done some useful work during the very short period of its existence, will, we take it, be conceded. Though it may not be able to advance a valid claim to having carried out any important original or constructive work, it has shown its usefulness at least as an agency for the collection and dissemination of valuable information on subjects in regard to which there is the greatest necessity to add to the knowledge of the public. It will, we trust, not be out of place to quote the observation made by the *Indian Textile Journal* in one of its recent issues, that "if the Indian National Congress leaves no other record to posterity than the annual Industrial Conference, it will still have strong claims on the good will of progressive Indians,"

This organization has been the means of influencing Provincial activity in matters of industrial development, and there need be no doubt that the movement will filter downwards. The opinions expressed and the proposals made at its meetings may be said to have attracted attention in influential quarters as is evidenced by the proceedings of the Industrial Conference held at Naini Tal in August last under the auspices of the United Provinces Government. This is satisfactory so far as it goes. But it is only a modest beginning and a great deal more can be done and ought to be done to make the Conference a better organized and more efficient body achieving substantial and enduring results. We realize that progress can only be the work of time and must be slow to be lasting. But there will be progress only if the supporters and well-wishers of the movement, who we are glad to think are many, work earnestly in furtherance of its aims. We invite their active help and co-operation in this patriotic duty and are confident of a cordial response.

21. We are indebted to the managers of several prominent newspapers and periodicals for their kindly supplying their journals to the office of the General Secretary. They have been of great help in the work which the office has been carrying on. We beg to repeat our acknowledgments to the Supreme and the Local Governments and Administrations for their kindness in giving to our office their Gazettes and other publications bearing on industrial matters.

22. Statements of Receipts and Disbursements of the office of the General Secretary are published with this Report.

23. We would again place on record our appreciation

of the valuable services which Mr. C.Y. Chintamani, the Assistant Secretary of the Conference, has been rendering to the cause of industrial development in India by his devotion, earnestness and self-sacrificing zeal.

VITHALDAS DAMODHER THACKERSEY,

BOMBAY,
3rd December 1907.

President,

Second Indian Industrial Conference.

AMRAOTI,
1st December 1907.

R. N. MUDHOLKAR,
General Secretary,
Indian Industrial Conference.

**Summary of Accounts of the Indian Industrial Conference for the two months,
November and December 1906.**

Receipts.		Disbursements.	
	Rs. A. P.		Rs. A. P.
On " Directory of Indian Goods " Account ...	260 11 0	Pay of the Assistant Secretary, and other Estab- lishment Charges	595 0 0
Donation by the Hon. Ras Nihal Chand Ba- hadur, Muzaffarnagar	100 0 0	On " Directory of Indian Goods " Account ...	412 9 9
Donation by Munshi Raghū Nandan Prasad, Bareilly	25 0 0	On Handloom Competition Account ...	225 0 0
Sundries	6 0 0	Travelling expenses of the Assistant Secretary (and of a Clerk with the General Secretary on one occasion)	172 8 0
		Telegrams	37 6 0
		Railway freight	20 0 0
		Postage	16 0 0
		Printing	15 7 0
		Binding	12 15 0
		Stationery	2 15 0
Total ...	891 11 0	Total ..	1,509 12 9

11

AMRAOTI,
29th April 1907.

R. N. MUDHOLKAR,
General Secretary,
Indian Industrial Conference

Summary of Accounts of the Indian

Receipts.	Amount.	
	Rs.	A. P.
Collections in Baroda through Mr. R. C. Dutt ...	1,500	0 0
The Hon'ble Munshi Madho Lal, Benares ...	500	0 0
The Hon'ble Pandit Sunder Lal, Allahabad ...	250	0 0
Dayaram Gidumal, Esq., Surat *	250	0 0
Rai Bahadur Lala Bajji Nath, Allahabad †	150	0 0
The Hon'ble Rai Nihal Chand Bahadur †	150	0 0
R. C. Dutt, Esq., Baroda ...	100	0 0
Harkishen Lal, Esq., Lahore ...	100	0 0
Sir Bhalchandra Krishna, Kf, Bombay...	100	0 0
Lajpat Rai, Esq., Lahore ...	100	0 0
The Hon'ble Mr. Justice P. C. Chatterjee, Lahore	100	0 0
Rai Bahadur Lala Ganga Ram, Lahore	100	0 0
R. P. Karandikar, Esq., Satara *	100	0 0
N. Subbarao, Esq., Rajahmundry ...	100	0 0
Ramanuj Dayal, Esq., Meerut *	100	0 0
T. Rangachariar, Esq., Madras ...	100	0 0
Dewan Bahadur Ambalal S. Desai, Ahmedabad	50	0 0
Rai Saheb Lala Kedar Nath, Delhi *	50	0 0
Rai Saheb Lala Girdhari Lal, Delhi ...	50	0 0
Pandit Sundar Lal Pathak, Patiala ...	50	0 0
Thakurdas Fatehchand, Esq., Karachi ...	50	0 0
Mathuradas Ramachand, Esq., Karachi ...	50	0 0
Dr. M. N. Ganguly, Cawnpore ...	30	0 0
Dr. H. D. Pant, Lucknow ...	25	0 0
G. A. Natesan, Esq., Madras ...	25	0 0
Fandit D. Gopalachariu, Madras ...	25	0 0
V. M. Mahajan, Esq., Akola . .	25	0 0
Rao Bahadur G. V. Joshi, Satara . .	25	0 0
C. R. Thiruvengkatachariar, Esq., Madras ...	25	0 0
Munshi Raghunandan Prasad, Bareilly ...	25	0 0
The Humalaya Glass Works, Rajpur ...	25	0 0
Rsms below Rs 25 ...	109	8 0
On " Directory of Indian Goods " Account ...	282	3 0
Sundries ...	17	14 0
Total...	4,739	9 0

* For handloom prizes.

† Rs. 50 for handloom prize.

Industrial Conference for the year 1906.

Disbursements.	Amount.	
	Rs.	A P.
Pay of Assistant Secretary and other Establishment charges	1,920	0 0
On " Directory of Indian Goods " Account ...	816	15 9
Travelling charges of Assistant Secretary (and a clerk with General Secretary once)	339	12 9
On Handloom Competition account	225	0 0
Postage	83	7 3
Printing	60	1 0
Telegrams	57	12 0
Books and Papers	35	15 0
Stationery	31	8 0
Railway freight on sundry things	20	0 0
Binding	12	15 0
Sundries	10	14 0
		.
	3,614	4 9
Balance on 31st December 1906 Rs...	1,125	4 3
Total Rs...	4,739	9 0

AMRAOTI,
29th April 1907.

R. N. MUDHOLKAR,
General Secretary,
Indian Industrial Conference.

Summary of Accounts of the Indian Industrial Conference

Receipts.	Amount.	
	Rs.	A. P.
Opening Balance	1,125	4 8
On "Directory of Indian Goods" Account	1,758	8 6
The Hon'ble Mr. Vithaldas Damodher Thackersey, Bombay	500	0 0
Seth Damodar Dasji Khemrajji, Bankers, Beawar	500	0 0
R. C. Dutt, Esq., C.I.E., Baroda	250	0 0
V. Krishnaswamy Iyer, Esq., Madras	200	0 0
H. H. The Maharajah of Moubhanj, Moubhanj	200	0 0
Lalubhai Samaldas, Esq., Bombay	150	0 0
Rao Bahadur R. N. Mudholkar, Amraoti	150	0 0
Rao Bahadur Lala Baij Nath, Allahabad	150	0 0
Dr. Harold H. Mann, Calcutta	100	0 0
Messrs. Morarji Gokuldas & Co., Bombay	100	0 0
R. N. Mookerjee, Esq., Calcutta	100	0 0
R. Ramachandra Rao, Esq., Kurnool	100	0 0
Sir Bhalchandra Krishna, Kt., Bombay	100	0 0
Maharajah Manindra Chandta Nandi, Cossimbazar *	100	0 0
The Hon'ble Mr. Gokuldas K. Parekh, Bombay	100	0 0
Rai Yatindra Nath Chaudhuri, Calcutta	100	0 0
Ghulam Ali Chagla, Esq., Karachi	100	0 0
The Hon'ble Pandit Sundar Lal, C.I.E., Allahabad *	100	0 0
C. Vijaraghavachary, Esq., Salem	50	0 0
A. Rangaswamy Iyengar, Esq., Mysore	50	0 0
The Hon'ble Mr. H. S. Dixit, Bombay	50	0 0
Harkishen Lal, Esq., Lahore	50	0 0
Vishwanath P. Vaidya, Esq., Bombay	50	0 0
Pandit Motilal Nehru, Allahabad	50	0 0
Dr. Tej Bahadur Sapru, Allahabad	50	0 0
N. Subbarao Pantulu, Esq., Rajahmundry	50	0 0
The Hon'ble Babu Jogendra Nath Mukerji, Purnea	50	0 0
S. N. Pandit, Esq., Rajkot	50	0 0
Dewan Bahadur Ambalal S. Desai, Ahmedabad	50	0 0
Mathuradas Ramchand Jhaveri, Esq., and Rao Bahadur Hiranand Khemsingh Advani, Hyderabad (Sind)	50	0 0
Dewan Bahadur L. A. Govindaraghava Iyer, Madras	50	0 0
N. M. Bedarkar, Esq., Amraoti	50	0 0
G. A. Natesan, Esq., Madras	30	0 0
C. Y. Chintamani, Esq., Vizagapatam	30	0 0
R. P. Karandikar, Esq., Satara	30	0 0
R. Muthukrishna Iyer, Esq., Pudukotah	25	0 0
Boikunt Nath Sen, Esq., Behampore	25	0 0
Rao Bahadur Waman Madhav Kolhatkar, Nagpur	25	0 0
D. E. Wacha, Esq., Bombay	25	0 0
J. N. Tagore, Esq., Calcutta	25	0 0
Krishna Rao Phatak, Esq., Nagpur	25	0 0
The Hon'ble Mr. P. S. Sivaswami Iyer, Madras	25	0 0

* For handloom prize.

Summary of Accounts, etc —contd.

Receipts.	Amount.	
	Rs.	A. P.
Lal Ruchi Ram Sahni, Lahore... ..	25	0 0
Keshavalal M. Mehta, Esq., Ahmedabad	25	0 0
Rao Bahadur Raoji Bhai Patel, Baroda	25	0 0
The Hon'ble Babu Bhupendra Nath Basu, Calcutta	25	0 0
V. A. Desai, Esq., Ahmedabad	25	0 0
V. Ramesam, Esq., Madras	20	0 0
R. R. Kale, Esq., Satara	15	0 0
Rao Bahadur V. N. Pathak, Satara	12	0 0
T. D. Sanghvi, Esq., Bombay... ..	10	0 0
Sir Gooroo Dass Banerjee, At, Calcutta	10	0 0
Dewan Bahadur K. Krishnaswami Rao, C.I.E., Madras	10	0 0
"A Bengal Friend"... ..	5	0 0
Dr. Joseph Benjamin, Ahmedadad	5	0 0
Dr. K. G. Deshpande, Satara	5	0 0
N. K. Agashe, Esq., Satara	5	0 0
V. G. Chirmule, Esq., Satara	4	0 0
D. N. Phadnis, Esq., Satara	2	0 0
D. G. Divekar, Esq., Satara	2	0 0
Y. R. Patwardhan, Esq., Satara	2	0 0
G. H. Devi, Esq., Satara	2	0 0
G. K. Devdhar, Esq., Poona	1	0 0
Total...	7,155	12 9

Report submitted by the Assistant Secretary

November and December 1906

I went to *Bombay*, on the 15th November to attend the meeting of representatives of the Provincial Committee which was held there on the 17th and 18th idem, and returned to Amraoti on the 20th idem. The month was mostly occupied in the compilation of last year's Annual Report. I left Amraoti on the 26th November and was at *Calcutta* for the rest of the year, except for a few days spent at *Benare* and *Allahabad*, which centres I visited early in December. I addressed public meetings there on industrial questions. Benares is the birth-place of the Conference and Allahabad the capital of the province, and it was pleasing to notice the keen interest with which the citizens of both places were watching the progress of the movement.

January to November 1907.

2. I was re-appointed Assistant Secretary at the Calcutta Conference, and it was specially enjoined on me by its Resolution that I should regard visits to the several provinces to assist the Provincial Committees as my particular duty. For two reasons, however, I have not been able to carry out the instructions of the Conference. No Additional Assistant Secretary has been appointed to work at the Central Office and I have accordingly been required to spend most of my time at Amraoti. Secondly, I was obliged by ill-health to take leave of absence for four months in the year, and have not been able to do even as much touring as I did last year. I have, therefore, an uneasy consciousness that it is with no record of good work done that I face the next session of the Conference. I can only trust to the generosity of the public to be indulgent in judging of it such as it is.

3. I had to remain at *Calcutta* for the first fortnight of the year to assist in winding up the affairs of the last session. From there I proceeded to *Allahabad* to assist in the preliminary arrangements of the Provincial Industrial

Conference. I returned to *Amraoti* on the 23rd January. I visited *Akola* and *Nagpur* early in February.

4. I left for *Vizagapatam* on the 14th February in connection with the arrangements of the Industrial Conference and Exhibition which were to be held at that place in the month of June. I delivered a public address there on the Swadeshi movement. I visited *Vizianagram*, too, and at a special meeting of the local Industrial Committee held to confer with me the steps that were to be taken by it for collecting information about the industries of the district were discussed.

5. I again went to *Allahabad* and *Benares* in March for the First United Provinces Industrial Conference which was held at the former place on the 1st April under the presidency of Rai Bahadur Lala Baij Nath. Before returning from the United Provinces I paid a brief visit to *Cawnpore*, the industrial and commercial capital of the provinces.

6. I came back to *Amraoti* on the 24th April, but had immediately to take leave on account of illness and proceed home. The South Indian Industrial Conference and Exhibition were held at *Vizagapatam* when I was there on leave, and I did what I could under the circumstances to help in the holding of a successful session of the Conference. Before returning to *Amraoti*, I visited *Rajam*, where a new Weaving Company has been doing useful work since last year, and *Bunhiapatam*, where there is a new Pencil Factory at work.

7. I came back to *Amraoti* on the 18th September. Before doing so, however, I went to *Calcutta* for a few days and tried to expedite the publication of the Report of the last Conference and to interest a few of the prominent men of the city in the local Committee of the Conference.

8. The only place I have visited on Conference business since my return from leave is *Bombay*, where I

went to attend a meeting of representatives of the Provincial Committees which was held there on the 10th November. I think I shall be required to spend the month of December at *Surat*, where the next session of the Conference will be held.

9. I humbly express again my sense of keen regret that I have not been able to do good work during the current year.

AMRAOTI,)
24th November 1907. }

C. Y. CHINTAMANI,
Assistant Secretary,
Indian Industrial Conference.

PART II.

A Brief Account of Industrial Activity in India in the Thirteen Months November 1906 to November 1907.

SECTION A.

The Governments of British India and Indian States, and Industrial Development.

As was done last year we shall attempt to give in this section an indication of the attitude of the Governments of British India and the Indian States towards the industrial movement and a brief account of the measures adopted by them in furtherance thereof.

British India.

2. *General.*—The Government of Bengal actively helped the Committee of the Indian Industrial and Agricultural Exhibition which was held at Calcutta in December last, and His Excellency the Viceroy was pleased to preside at its opening ceremony as a mark of his sympathy with the movement for the development of indigenous industries by Indians.

3. A Committee was appointed early in the year to investigate the question of factory labour. Its report, which was submitted towards the middle of the year, satisfied the Secretary of State of the need of a more thorough inquiry upon which to base legislation to regulate the conditions of labour in factories, and this Commission is now pursuing its inquiries.

4. With reference to Resolution II passed at the Calcutta Industrial Conference, the Hon'ble Mr. G. M. Chitnavis moved the Government of India for the publication of the report of the Indian Stores Committee before the final orders of the Government thereon were passed, but

the Report has not yet been published nor is it known what action the Government propose to take on it or even at what stage the consideration of the subject has arrived.

5. In the matter of Industrial Survey, too, it was evidently left to the discretion of Provincial Governments to determine what action they should take, and only two of these have actually taken practical steps in this direction ; although the Member for Commerce and Industry in the Supreme Legislative Council and later on, the Right Honourable the Secretary of State himself publicly declared themselves in favour of such a survey.

6. The Indian Institute of Science, which India owes to the thoughtful munificence of the late Mr. J. N. Tata, is gradually taking shape, and for this we cannot but be thankful. But this year no new grants were made by the Government of India for the spread of technical education.

7. *The United Provinces*—Among Provincial Governments the Government of the United Provinces under Sir John Hewett have been honourably distinguished for their attitude of friendliness towards the industrial movement as demonstrated by their activity during the year. Sir John Hewett on his assumption of the Government of the United Provinces lost no time in appointing an officer to carry out an Industrial Survey of the Provinces for which he had so powerfully pleaded last year in the Supreme Legislative Council. And we are justified in looking forward to substantial good resulting from the investigations of Mr. A. C. Chatterjee, I.C.S., the officer selected to carry out the survey.

8. Sir John Hewett summoned in August last a representative Conference to consider the question of the means of industrial development in general and technical education in particular. The Conference sat from the 19th to the 31st August, and made definite recommendations for being given effect to at once. They are confidential still, but are understood to be reasonably liberal and

comprehensive. They are awaiting the sanction of the Secretary of State. We trust that it will be readily forthcoming and that the first solid step in the matter of the promotion of technical education will have been taken ere long in the United Provinces under the auspices of Sir John Hewett.

9. Speaking of the Naini Tal Industrial Conference it is impossible not to notice, with pleasure, the magnificent speech with which Sir John Hewett opened its proceedings. 'It is impossible for any one interested in the industrial development of this country' said Sir John, 'to study the annual trade returns without lamenting that so much valuable raw produce which might be made up locally should leave our ports annually to be conveyed to other countries there to be converted into manufactured articles and often to be re-imported into India in that form.' In regard to the help that Government might render to industrial enterprise Sir John Hewett said :—

'The means by which it is suggested that Government might encourage industrial enterprise are many and varied. It is suggested that Government should itself start pioneer industries and dispose of them to private individuals when the profit-bearing stage is reached—that it should import expert supervisors and skilled workmen for particular industries—that it should build and equip a factory to test the suitability of improved looms and other appliances, and to conduct investigations into improvements in the reeling, winding, warping, and sizing processes of different yarns—that it should start small weaving schools—that it should encourage and assist the adoption and extension of the co-operative principle in every available way, and particularly the extension of co-operative credit so as to relieve the handicraftsmen of the incubus of the Mahajan—that it should provide advances for the purchase of improved appliances and new tools to be paid for by instalments—that it should arrange for the circulation of information as to markets—that it should assist the improvement of designs so as to prevent what was well described recently as "the reckless multiple reproduction of stock patterns tending to the ultimate neglect of the markets supplied"—that it should train engine drivers, carpenters, smiths, and fitters—that it should make provision for the dyeing of yarns and other materials in large quantities and their distribution from

central establishments—that it should erect factories to demonstrate Mr. Hadi's new process for the manufacture of sugar—that it should start small tanning demonstration schools—that it should purchase locally manufactured goods, and that it should do many other things to which I need not refer. *Among the suggestions that I have enumerated there are undoubtedly many ways in which Government can and in my opinion should give encouragement to industrial enterprise and so far as lies in my power I shall do my utmost to give effect to any well considered proposal that this Conference may endorse to this end* (The italics are ours)

Sir John Hewett began his discussion of the question of technical education with the significant remark that 'there is probably no subject on which more has been written or said while less has been accomplished.' 'Our educational system' according to him 'is distinctly backward and requires to be brought up to date.' We think it profitable to draw attention to some noteworthy passages in this remarkable address and make no apology for quoting them.

'It must be admitted that though [the discussions on the subject] have travelled far and wide and been extended over nearly a quarter of a century, they have produced little tangible result in this province. As I have already shown the general direction of our system of education is certainly not less purely literary than when the discussions began. It is equally certain that, if it is to meet the requirements of the present day, it must be amended so as to give that variety of study declared by the Government of India more than twenty years ago to be essential in order to attract young men to commercial and industrial pursuits'

'It does seem to me to be an axiom that there is a very close connection between education and the progress of industries and trade. Undoubtedly this truth has not been sufficiently recognised in India, and to my mind its backwardness in industries and trade is largely due to the failure to recognise the importance of organising on a proper basis its system of education'

'Unless we do arrange that our industrial schools shall be co-ordinated with a central institution of the nature of a technological institute, we may make up our minds at once that our labours will be in vain'

'Not only is a technological institute required for the control of any system of industrial schools that can be devised, but it is also

necessary for the purpose of commercial research. It is essential that investigations should be continuously directed towards increasing our knowledge as to the use of our vegetable and mineral products.'

'We want, I think, some local authority, or authorities, who will themselves conduct research and supervise the investigations of these matters in different parts of the province. The institute, in which these authorities would be located, should be in close communication with the great factories of the province, so as to ensure that mutual aid shall be given by the work in the institute and those employed in the management of the factories, Cawnpore naturally suggests itself as the best locality for a technological institute.'

'For the training of workmen in local industries many suggestions are made in Mr. Chatterjee's report. These include cotton and silk weaving schools, schools of design for weavers in cotton and silk, schools for dyeing, tanning, glass blowing, carpentry, and general design, and for drawing and design for metal work. I do not propose as the present stage to express any opinion as to the individual proposals made by Mr. Chatterjee, but my general impression is that schools such as he suggests must be beneficial to the industries referred to, and are in fact, essential if the industries are to reach or maintain a substantial level of success.'

'Gentlemen, when I began my address, I said that the problem before us was no light one. It is equally certain that it is of the utmost importance to this country that every effort should be made to solve it without delay. In no country that I know of have the conditions now existing in India ever presented themselves before. We have a large and expanding railway system; we have four or five great centres of industry which would compare favourably with many of the industrial centres of Europe; we have the richest possible collection of mineral and vegetable products; we have a foreign trade of nearly 212 millions sterling, much of which consists in the export of our valuable raw products in return for manufactured articles made in the United Kingdom and foreign countries. In certain of our parts you might imagine yourself in one of the bustling cities of Europe. 'Take a few miles' journey into the interior of the country, and you will see hardly any signs of industrial enterprise, and will at once recognize that you are in a country the inhabitants of which are far too much dependent on a single industry, viz., agriculture. For such a condition of things we can find no precedent, and it is vain to look for precedent in our efforts to remedy it. Two problems set themselves palpably before us. First, we must educate people so as to divert their energies to industrial pursuits other than

agricultural. We must educate skilled labour for all our industries. We must develop among our workmen an interest in their work to replace the feeling that the day's work is only done for the day's wage, and we must bring up educated foremen, supervisors, and managers. We must encourage research into the potential value of our raw produce. Secondly, we must endeavour to overcome the shyness of capital, and success in this respect cannot be achieved unless the leaders of the people throw themselves enthusiastically into the work.

'For my part I consider that the object to be gained is worth a heavy sacrifice. I confess that my imagination is powerfully affected by the opportunities of the present occasion. We cannot regulate the sunshine and the shower, the seed time and the harvest that is beyond the power of man. But we can control, to some extent we can control, the disposal of the products of the earth, thereby opening new avenues to employment and spreading greater prosperity over the land.'

10. The largest area under sugar-cane is in the United Provinces and there are greater facilities there than in any other province for the development of sugar manufacture. It is, therefore, in the fitness of things that considerable attention is given to the subject by the Government of the Provinces. An account of the work done in this connection under the immediate supervision of Khan Bahadur Saiyid Muhammad Hadi, Assistant Director of Agriculture, is contained in the two paragraphs which are quoted below from the last report on the Administration of the Department of Agriculture :—

'Early in November he (Mr Hadi) was placed on special duty for five months in connection with the Calcutta Industrial Exhibition and with sugar demonstrations in these provinces. During this period he equipped a model factory and demonstrated his processes of sugar-making from the middle of December to the middle of January.

On his return from Calcutta he attended the agricultural show at Sultanpur and started a school there for giving practical instruction in sugar-making to the students that came to the department from almost all parts of India for special training. The school worked at Sultanpur and trials of newly imported sugar machinery continued there up to the middle of February.

During the latter half of February he attended the meetings of the Board of Agriculture at Cawnpore and demonstrated his process of sugar-making there.

Early in March the sugar school and model factory were transferred to Amethi where an elaborate demonstration was given at the request of the Raja of Amethi who very kindly provided the necessary raw material and labour.

Early in April the Assistant Director attended the Industrial Conference in Allahabad where he read a paper on the revival of the Sugar Industry of the United Provinces.

In the last week of June he went to Rampur and stayed there till the end of the month to advise the state authorities about the sugar factory which they propose to work in the ensuing sugar season.

It was decided that the processes of sugar-making associated with the name of the Assistant Director should be shown at the Calcutta Exhibition in order to obtain outside criticism; it was recognized that this course would seriously hamper demonstrations in the provinces, and this proved to be the case. The Calcutta demonstrations were useful and interesting, * * *. Later in the year small-scale demonstrations were given at Meerut, Bahraich and a few places outside the provinces, and the processes were also exhibited at the meeting of the Board of Agriculture; but the chief work of the year was done at Sultanpur and Amethi where a training class was held and enough cane was available for quantitative determinations of yield on a regular working scale. I am particularly indebted to the Raja of Amethi for the facilities which he afforded in this matter. The training class attracted 43 students from all parts of India and it was a striking sight to see young graduates of Madras and Bombay competing eagerly with sons of hereditary sugar-boilers of these provinces in the production of the best and whitest product. A large programme of demonstrations in the provinces is being arranged for the ensuing year, and it has been necessary to refuse the loan of trained staff to give demonstrations in other provinces, as we have barely sufficient for our own needs.

11. The United Provinces Government have granted a scholarship to a local applicant who will learn weaving in England.

12. *Madras*.—The appointment of Mr. Alfred Chatterton for five years as Director of Industrial and Technical Inquiries, which was sanctioned by the Government of India last year, took effect early this year. He has been giving his particular attention to the introduction of improvements in lift

irrigation, handloom weaving and chrome tanning. He will thus take up industry after industry to investigate its commercial value in that part of the country. He has not been charged with the duty of making an industrial survey of the Presidency.

13. Last year the Government of India declined to sanction a scheme of technical education for the Madras Presidency sent up by the Local Government. It was elicited by questions in the Legislative Council that the latter had no intention of founding a college of technology or adopting any other large measures for the furtherance of technical education. They would only strengthen the College of Engineering, and found a well equipped College of Agriculture at Coimbatore. It is a matter of regret that the Madras School of Arts seems to be declining in efficiency and popularity.

14. The Co-operative Credit movement is steadily taking root, and advantage of its provisions is being taken to start several useful concerns in towns. The proposals for starting a State-aided Agricultural Bank, which was recommended by Sir Frederick Nicholson, is understood to be still under consideration.

15. The Government of Madras sanctioned 'the gradual extension of the Government Weaving Factory at Salem with a view to test thoroughly any experimental systems of sizing, warping or weaving which it may be desirable to try on a factory scale'; they sent Mr. G. N. Dewal, Weaving Master in the Coimbatore Jail, with a State Technical Scholarship to Manchester to acquire a sound knowledge of various types of handlooms, and of pattern-weaving; and have granted Rs. 2,500 to the National Fund and Industrial Association for an All-India Weaving Competition which will be held at Madras in February next.

The Salem Weaving Factory 'has attracted a large amount of attention all over the country and numerous hand-

weaving factories have been started on lines almost identical with those initiated at Salem. Moreover, the Salem factory has completely demonstrated the immense superiority of the fly-shuttle loom, which enables a weaver to turn out twice the quantity of cloth that can be turned out on an old type handloom.'

16. The Government of Madras have sanctioned a sum of Rs. 40,000 for the erection of a tannery at Perambur, near Madras, where the chrome process will be employed.

17. The Madras Government are proceeding with the work of placing the local fishing industry on a satisfactory basis, and sanctioned nearly half a lakh of rupees for expenditure during the current official year on special research work—almost five times the amount allotted last year. They have passed orders on certain proposals of Sir Frederick Nicholson, who for some time past has been on special duty in connection with fisheries, approving generally the proposals to establish an experimental fishery station on the West Coast and the establishment of corps and other fresh-water fish-hatcheries in suitable localities. They have sanctioned the leasing of a house in Madras to enable an officer to conduct experiments in fish culture, and they have deputed a man to Japan for the study of fisheries.

18. *Bengal.*—It will be remembered that last year the Government of Bengal expressed their disbelief in the utility of an industrial survey of the province. They seem to have changed their opinion since, for the Chief Secretary said in the Legislative Council that 'the first step would possibly be to place some one on special duty to make a general study of the industrial position and possibilities, to collect information regarding the various industries, and to endeavour to ascertain the causes of their rise or decline, and so pave the way for the establishment of the requisite technical schools.' This declaration has not, however, yet led to any action.

19. It is not known in what stage is the question of

the establishment of a College of Technology by the Government of Bengal in conjunction with the Association for the Advancement of Scientific and Industrial Education of Indians, about which we first heard rather early in 1906. The Government have made a grant of Rs 35,000 to technical education. A class for Industrial Chemistry has been opened at the Sibpur Engineering College at a cost of some Rs. 24,000 and a class for training motor car drivers at a cost of about Rs. 4,000. The Secretary of State has formally sanctioned the establishment of a Central Weaving School at Serampore, and a principal and an assistant for it are to be sent out from Europe.

20. The Committee appointed by the Government of Bengal to consider the subject of the decline of the silk industry in that province sent in their report and the Government have accepted the Committee's recommendations. These will cost substantial though yearly decreasing sums till the fourth year, after which the annual recurring expenditure will be between 12 and 16 thousand rupees. The initial cost will be borne by the Government, and it is probable that the firms interested in the industry will be asked to bear one-fourth of the recurring charges.

21. Mr. K. G. Gupta submitted his first report on the fisheries of Bengal. The final report is expected to be in the hands of the Government by the end of the year.

22. A series of informing papers on the economic condition of several divisions and districts of Bengal written by their respective Commissioners and Collectors appeared in the *Indian Trade Journal* in which testimony was borne to the good effects of the Swadeshi movement. Thus in the Burdwan division :

'The Swadeshi movement has given an impetus to the local manufacture of cloth and thus has improved the condition of the weavers. Industrial and agricultural exhibitions were held during the year in the districts of Birbhum, Bankura, Midnapore, and Hooghly mainly through the efforts of District Officers. There is

some ground for hoping that agriculture and indigenous manufactures will be improved by these exhibitions.'

The Commissioner of the Presidency division says :

'The weaving industry in the Baurhat sub-division of the 24 Parganas is reported to have received an impetus from the Swadeshi movement, but it cannot yet be said to be in a flourishing condition. In Nadia the Swadeshi movement has certainly benefited the weaving industry at Santipur and Kumarkhali. Shops and firms dealing exclusively in indigenous articles have come into existence in all important centres of trade in the district of Jessore. Cloth and sugar are manufactured on a fairly large scale in this district. On a rough computation it appears there are over 5,000 handlooms. Mr. Sen (the Collector) has found on enquiry that the number of local looms has increased and is of opinion that the sale of country-made cloth has increased by about 20 to 25 per cent. in the district. He also reports that most of the looms in use in the district are an adaptation of the fly-shuttle kind, but is not hopeful concerning the local sugar industry which cannot compete against its new rival from Java, and it would seem that foreign sugar has to a considerable extent ousted the Indian product throughout the district. * * * In Ktulna also handloom weaving has received an impetus from the Swadeshi movement, but the Collector does not think that it is likely to lead to any permanent results.'

The Collector of Monghyr writes :—

'The "Swadeshi" movement is reported to have checked the consumption of imported cigarettes, * * * The Sub-divisional Officer of Dumka is of opinion that there is a great opening here for a combined tobacco curing and cigarette factory. The "Swadeshi" movement has given an impetus to the shoe-making industry in this sub-division and the local shoe-makers formed themselves into two confederacies in Dumka town, and are now turning out shoes of home-cured leather said to be quite as good as those to be had in Calcutta. Mr. Thompson thinks that there is every probability of this industry expanding and that a tannery here on modern principles would be a good venture.'

In Chota Nagpur, 'the use of foreign articles has received a very slight check owing to the "Swadeshi" movement'; 'imported cigarettes have, to a very large extent been supplanted by local cigarettes known as their "birris"; since the "Swadeshi" movement the extent of the use of imported sugar has been somewhat checked.'

23. *Eastern Bengal and Assam.*—The Hon'ble Mr. (now Sir Lancelot) Hare spoke as follows at a meeting of the Legislative Council of Eastern Bengal and Assam on the question of industrial development and technical education. It is not known if the pronouncement has been followed by any action :—

'In regard to industrial education I can assure the Honourable members that there is no subject in which I take greater interest, but let me also say there is none which to my mind bristles with greater difficulties. I should very much like to have in this Government a Department of Commerce and Industry, and I hope that I may yet see such a department established. We have, from time to time, reviewed our industries, and have considered a great variety of opinions as to measures we might take to improve and develop them, but I feel that if we are to deal adequately with this subject we require a whole time officer at the head of a department possessing special qualifications and experience to obtain and maintain full information as to existing industries and to carefully watch and promote all new efforts and to assist all promising attempts to start new industries with information and advice. As industries show any prospect of development, and as skilled persons are required to carry on these industries, Government might open out suitable training schools. We cannot all be omniscient, and this is a very special branch of knowledge in which the expert is very much in demand. Without such a department as I suggest, I consider that we are likely to be very much in the position of the blind leading the blind. We are likely also, without a thorough and comprehensive review of our position and without a full grasp and understanding of our advantages and disadvantages, to waste our energies over a large field of effort, and so to accomplish less than if we confined ourselves to a few selected industries.'

24. *The Central Provinces and Berar.*—The correspondence between the Central Provinces Administration and the President of the second Provincial Industrial Conference on the subject of technical education has been referred to, and is printed as an Appendix. A Committee consisting of official and non-official members has been formed to consider and settle the plan of operations in regard to industrial education and the development of industries generally in the Central Provinces and Berar. An agricultural

and industrial Exhibition is proposed to be held in November next and an industrial survey of the province will be commenced immediately. Mr. C. E. Low, I. C. S., of the Department of Agriculture, has been placed on special duty to carry out the industrial survey and organize the Exhibition.

25, The school of crafts, intended especially for blacksmiths and carpenters, has been sanctioned, and funds provided for it, amounting in all, recurring and non-recurring, to some thirty or forty thousand Rupees. Proposals have been made for a rather more expensive equipment than hitherto for introducing the use of the fly-shuttle, and the money has been provided. The rough idea is, to send a weaver and a student, in pairs from each of several selected weaving centres to Baroda, or some equally good school of weaving; bring them back here when fully qualified, and start a Provincial school of weaving. An attempt will at the same time be made to get weavers at selected centres to take up the improved methods. A scheme for training Mining Engineers is under consideration. A course would be given in Mining Engineering, analysis, and prospecting, more or less full according to the class of men who present themselves for it has been thought best at first to take a lower class of learners than they will be able to attract later. The feasibility of giving instruction in Mining Engineering depends on the acceptance of the proposal to appoint an Inspector of Mines, which has been separately made. But in any case, analysis and prospecting can be taught without any serious extra cost. There is reason to believe that the Chief Commissioner views the scheme sympathetically. Promises of scholarships for students, and of employment for passed pupils have been received from several firms. A rough scheme for instruction in certain branches of commercial chemistry, has been worked out and the authorities are ready to admit suitable pupils at any time. At the request of the Local Government, who had been

moved by a private firm of coalminers, Mr. Beckett and Mr. Low are also working out a scheme for training foreman mechanics, probably on the lines adopted in the big railway workshops, a combination of workshop experience and theoretical teaching in the hostel.

26. *Bombay*.—The attention of the Bombay Government was called to the desirability of having an industrial survey of the Presidency carried out, by the Hon'ble Sir P. M. Mehta who put a question at a meeting of the Provincial Legislative Council. Though the answer then given was not encouraging the attitude of that Government has become more favourable since then and the matter is under consideration.

27. The Bombay Government are in addition to their usual grants expending a sum of Rs. 1,67,000 on technical education during the current official year, allotments of the grant having been made to the following institutions :—The Victoria Jubilee Technical Institute and the Sir Jamsetji Jijibhoy School of Art at Bombay; the Ranchorial Chottalal Technical Institute at Ahmedabad; the College of Science Workshops at Poona; the American Mission Weaving School at Ahmednagar; the Industrial Schools at Surat, Nadiad and Ratnagiri; and the Sardar's High School at Belgaum.

28. *Burma*.—In Burma Mr. R. W. Sindall investigated the possibilities of the paper-making industry, and the Government have offered to those desirous of establishing paper mills certain concessions which will last for a period of 21 years. The main terms of the agreements between the Government and the manufacturers are :—

'No royalty will be charged on bamboos cut and unutilised for the manufacture of pulp or paper within a period of 21 years. No royalty on manufactured paper stock will be charged for seven years, and thereafter the royalty charged will be Rs. 1 per ton. Suitable sites for the erection of a factory, if available on Government land, will be granted rent free for 21 years, subject to certain

restrictions, and the free use of all roads to and from such factory guaranteed. On the other hand, the party to the agreement will be bound to a factory within two years from the date of the concession, and to keep the same working at least 120 days in each year ; to produce after the first seven years an annual output of 10,000 tons, and after 14 years an output of 20,000 tons of paper stock per year ; to render monthly statements showing the output of the mill each month and allow a full inspection of all books by the Government. The agreement will be considered null and void if operations are not commenced as provided for in the terms of the concession.'

We have quoted the above as it establishes a precedent in the matter of concessions which may properly be granted by the State to help the development of new and promising industries.

Indian States.

29. *Mysore*.—An important educational reform was carried out in Mysore during the year by the introduction of manual training in the schools of Mysore and Bangalore. This was done on the recommendation of Mr. H. J. Bhabha, Inspector-General of Education, who was convinced of its value by his study of the systems of primary and technical education in Europe and America where he spent his furlough. The cost of the scheme is roughly estimated at Rs. 40,700. Technical and industrial education in the State made fairly good progress during the year. Additional grants for expenditure were sanctioned for the Industrial and the Engineering Schools in Mysore and the six other quasi-Government Industrial and Weaving Schools in the State. New monthly grants were also sanctioned in aid of the private Industrial Schools at Bagepalli and Srinivasapur. A new Commercial School was opened by the Wesleyan Mission at Mysore, and Government sanctioned a lump sum grant of Rs. 900 for apparatus required for the school. The students of the Mysore Engineering School were authorised to be taken out by their teachers occasionally to important Engineering Works in the State with a view to give them

better practical training. Fourteen Technical Scholarships were granted to Mysore students to enable them to undergo training in the Technical and Industrial Institutions of Bombay and Madras. A special grant of Rs. 300 was sanctioned by Government to start a small Demonstration Farm in connection with the Anglo-Vernacular School at Dodballapur to teach practical agriculture to the students. It has been resolved to grant the Damodar Dass Charity Scholarships for advanced Scientific Research and Technical Education. The assistance rendered by the Mysore Government to the Tata Institute is well known.

30. To help to revive the local weaving industry which is fast falling into decay, the Mysore Government passed orders: '(a) Authorising the formation of a Weavers' Co-operative Society confined to the residents of Bangalore City; (b) promising to help the society by advancing money up to Rs. 2,000 free of interest, and also to supply it free of cost with specimens of improved looms and appliances to be tried by individual members, and adopted if found suitable; and (c) requesting the Inspector-General of Education in Mysore to provide suitable facilities for the elementary instruction of weavers' children in day and night schools in Bangalore City.' It will perhaps be interesting to state in this connection that the number of weavers in Bangalore City, which according to the last Census was 10,493 has since been reduced to not more than 3,000 as a consequence of the visitation of plague. An exhaustive memorandum on the condition of the weaving industry in Bangalore prepared by Mr. M. A. Sampath Iyengar, Superintendent of the Hole-Narasipur Weaving Institute, was published in the *Modern Review* of Allahabad and it will be found interesting and suggestive.

31. The means by which the Mysore Government propose to promote the silk industry of the State are explained in the following note :—

'The Mysore Government consider that a better way of utilising Mr. Tata's silk farm in Bangalore to the best advantage would be to get the young men engaged in the silk industry in the Province to go through a regular course under the guidance of Mr. Odzu, the Japanese expert in charge of Mr. Tata's farm, so that, on return to their villages, they may be the means of introducing improved methods in the different centres of the silk industry. One of the assistants to the Agricultural Chemist is to be sent to the farm to study the various methods with a view to bringing them to the notice of the silkworm rearers in the important centres of the silk industry in the districts of Kolar, Mysore, Bangalore and Tumkur. The Agricultural Chemist to Government is to make the necessary arrangements. The notes of Mr. Mukerjee, the Bengal silk industry expert, are to be translated in full into Canarese and Hindustani in the form of leaflets for distribution among the silk rearers in the centres named. The instruments and appliances referred to in Mr. Mukerjee's notes are to be supplied for the Tata Demonstration Farm in Bangalore and for sale to silkworm rearers out in the districts. It is felt that it is not clear that the demonstration of the Bengal system of reeling is still going on in Bangalore, and the Inspector-General of Education is to report whether the services of a reeler from Bengal may not with advantage be engaged for a period of six months.'

32. A company called the Bangalore-Chickballapur Railway Co., Ltd., has been started at Bangalore, with a capital of Rs. 12 lakhs divided into 48,000 shares of Rs. 25 each, with the object (among others) of constructing, equipping, and working a line of Light Railway on 2'6" gauge between Bangalore and Chickballapur, a distance of 40 miles, to begin with, and eventually to extend the line towards Madanapalli *via* Sidlaghatta and Chintamani on one side and towards Hosur *via* Anekal on the other. The most important feature of the Company is the offer by the Government of Mysore of a guarantee of four per cent. interest on the Capital expenditure of the Company. Other concessions given by the Government are the free grant of Government lands and the permission to utilise the existing Government roads, wherever the gradients admit of such roads being used, for the

Railway. Further, the Government have authorised the giving of interest on capital during construction charging the same to Capital Account as is usually done. The Hon'ble Mr. Vithaldas D. Thackersey is *ex-officio* Managing Director of the Company.

33. The Mysore Government held an Industrial and Agricultural Exhibition in Mysore City in October on the occasion of the Dussehra. The primary object of the Committee was to impart to the Exhibition a purely educative character and to bring together articles, machinery and processes, the uses of which might advantageously be brought to the notice of the ryot, the artisan and the manufacturer by actual demonstration. A cattle and sheep show was attached to it. The Exhibition was open to all exhibitors throughout India. It was opened with great ceremony by His Highness the Maharajah. In the course of his speech His Highness said that it was not to be expected that exhibitions of this kind should have immediate or revolutionary influence on the agriculture and industries of the country; but they offered to all classes an opportunity of seeing what their neighbours were producing. To craftsmen they were of special use in indicating the directions in which their skill might be usefully directed, whilst distributors might learn from them of new markets on the one hand and, on the other, of new sources of supply. Lectures on agricultural and industrial subjects by persons specially qualified to handle them were a useful adjunct of the Exhibition. This Exhibition is to be an annual Dussehra fixture.

34. An association by name Sri Krishna Rajah Agricultural and Industrial Association was started at Mysore, on the 3rd November, with a capital of Rs. 50,000, mainly through the exertions of Mr. A. Rangaswami Iyengar, Revenue Commissioner of the State. The Association was registered under the Mysore Co-operative Credit Societies Act and it has been formed into a limited liability company. To ensure responsibility in the workers of the Committee it

was resolved that not less than three-fourths of the General Committee should be shareholders and the rest ordinary members paying yearly subscriptions. Among other resources of the Association will be grants, subsidies, etc., from the Mysore Government. The two main lines on which work is resolved to be done are (1) propagandism and (2) practical demonstration. Under the first, leading papers, journals and the transactions of similar Associations elsewhere will be subscribed for, lectures will be arranged, and pamphlets on useful methods and ways issued ; also the latest and most suitable innovations in agriculture or industry will be sought for and adapted to the requirements of the country. Under the second heading experimental and model farms will be opened in one or two places as also establishments for petty artisan work, all under the supervision of experts, both much travelled and suitably educated. Since the concern is to be worked on a co-operative basis, best seeds, ploughs, handlooms or other machinery will be got for the members whenever required and also indigent members or any member in times of scarcity can obtain needed loans in kind or money to tide over the difficulty. Money invested in the share capital of the Association will not be available to private debtors of members.

35. *Baroda*.—His Highness the Maharajah Gaekwar's earnest and intelligent solicitude for the material development of the country is well-known. His Highness brought down with him last year from America Mr. R. C. Whitenack to advise him on matters relating to industrial development. A separate Department of Commerce and Industry has been created this year and Mr. Whitenack placed in charge of it.

36. In the course of a characteristic speech delivered on the occasion of opening a new Cotton Mill at Baroda, His Highness the Maharajah announced his decision to 'have in the course of a few months an Industrial Survey of the State with a discussion of existing conditions, the

projects of growth and some suggestions as to policies to be pursued.'

37. Education, as well technical as general, has always found an eager friend in His Highness the Gaekwar, and it has been promoted during this year with the same unfailing vigilance as ever. The special attention paid to the improvement of handloom weaving has been similarly continued. In the matter of the silk industry the late Mr. N. G. Mukerjee, who was specially engaged by His Highness to investigate its possibilities in Baroda, drew up a scheme which included the establishment of two schools at Viyara and Songadh where students should be taught the methods of both silk-worm rearing and silk-reeling, the starting of mulberry plantations, the publication in Gujarati of a manual of practical instructions, and ultimately the foundation of a reeling factory on a large scale. There need be little doubt that all steps requisite to the successful building up of the industry will be taken by His Highness's Government. The state contributed Rs. 8,000 to the Gaekwar Umbrella Co., which was started in Baroda during this year.

38. *Patiala*.—The Patiala Durbar sanctioned the formation of the Patiala-Jakhhal Railway Company, Limited, with a capital of 15 lakhs divided into 15,000 shares of Rs. 100 each. The Durbar guaranteed an interest of 4½ per cent, with an option of purchase by the State after 50 years. The State also undertook to take all the unsold shares and to sell them again to applicants of the authorised class, viz., subjects or officials of the State, at a reasonable price. The State has also, by a provision in the Memorandum and Articles of Association, agreed to purchase any necessitous shareholder's stock at the market value. On these conditions the subjects of the State have readily come forward to apply for the shares. Mr. Biddulph, the Accountant-General of Patiala, in his note on the project observes :—

'The terms which are contained in the Prospectus and which have received the ready assent of the Council of Regency meet all

the requirements of the investing public as testified to by a general consensus of agreement. Apart from the mere question of relieving the Government of the State of the necessity for producing or borrowing funds for the Railway, my chief object in promoting the Patiala-Jakhal Railway Company, Limited, has been to encourage the subjects of the State to devote their capital to the development of their own resources ; and to engender a feeling of self-help and self-confidence which should tend to promote a readiness to provide for their own requirements. Looked at from the point of view merely as a financial transaction the Durbar obtains funds for the prosecution of the Railway scheme without the necessity for utilising its working balance which is not more than is reasonably sufficient as an insurance against short crops or famines, or, on the other hand, raising a loan the interest on which would go outside the State.'

39. *Kashmir*—During last cold weather the Maharajah of Kashmir inspected several educational institutions of the Punjab in connection with a scheme His Highness has had in view for improving the educational department of his own State. During this tour, the Maharajah was impressed by his visit to the Mayo School of Art, Lahore, and invited the Principal of the Lahore School, Mr. Percy Brown, to spend a short time in Srinagar in order to discuss the practicability of a scheme for art and technical education being put into effect at an early date in Kashmir. Mr. Percy Brown has submitted 'a very complete and practical scheme which has met with general approval,' and it is anticipated that before long, the State will possess an art and technical institution conducted on the most approved lines.

40. In Kashmir the silk industry is giving employment to some 70,000 persons, and the number of rearers is steadily increasing. During the year 1905, the raw silk produced in the State yielded a profit of £28,132, or 58½ per cent. on invested capital. Last year a record crop of cocoons was produced, and it is anticipated that with better prices, the profits will exceed those of the previous year. Kashmir raw silk is said to meet with a very ready sale in the Lyons market in France.

41. *Gwalior*.—An English company has recently obtained a concession from the Maharajah of Gwalior to build a cotton spinning and weaving mill in the State. The concession is for a period of 14 years, and the capital of the Company is reported to be Rs 40,00,000. This is the first textile mill in Gwalior State, and as 'the concessionaires are men of experience, the venture has every prospect of success.'

42. *Banganapalle*.—A syndicate has been formed to work the concession in the Eanganapalle State, eighteen square miles in extent, granted on favourable terms by the Government of India to Khan Bahadur Wajee Laljee. The property is said to contain valuable deposits of copper, which upon analysis, show 23 per cent. of the metal. The property is also said to be diamondiferous and to contain manganese. Mr. Wetherell, when acting as State Geologist of Mysore, visited the properties, and reported favourably on them.

43. *Morvi*.—His Highness the Thakore Saheb of Morvi has under consideration an important scheme of technical education which may be carried out to at an early date.

PART II
SECTION B.

Industrial Activity of the People.

BOMBAY.

1. The formation of the Tata Iron and Steel Company is the most important recent event of industrial India. It seemed at one time that though the enterprise owed most to the genius of an Indian captain of industry the capital would be mostly English and the Directorate would be in England. But these fears luckily proved groundless, and well-wishers of this country have the satisfaction of feeling that the Iron and Steel Company is entirely a Swadeshi concern. The *Times* remarked in a recent issue, with perfect truth as every one knows, that the capital of Bombay 'has pursued the path of industrial development with admirable concentration.' 'It has long been' the *Times* wrote, 'a vast hive of genuine Swadeshism, possibly without quite knowing it, and apparently not much caring to spread the fact abroad. Its forest of factory chimneys, its great rows of busy mills, were largely built with Indian capital, and are to a great extent controlled by Indian owners.' Then the *Times* paid the following tribute to Mr. Tata :—

'Prominent among these was the late Mr. Jamssetjee Tata, a Parsi of remarkable capacity and singular prescience, who in his day did more than any other man in India to assist industrial development and to encourage technical education. Before he died, he gave the magnificent sum of £ 200,000, to found an Indian Institute of Science, which is now in process of inauguration at Bangalore. He devoted himself for years, and until his death, to a scheme for creating an iron and steel industry in India. His purpose was steadfastly pursued by his sons and is now on the verge of fulfilment. A capital of nearly a million and a half sterling has been subscribed for the purpose of starting iron and steel works at the Sini Junction, on the Bengal-Nagpur Railway. The money was almost entirely found by Indians, and the directorate is exclusively

composed of Indian businessmen resident in Bombay. Simultaneously, a scheme devised by the late Mr. Tata for collecting the heavy rainfall on the Western Ghats, and utilising it for working the Cotton Mills of Bombay, has been carried to an advanced stage.

The capital of the Company is Rs. 2,31,75,000, divided into three classes of shares : (1) 200,000 ordinary shares of Rs. 75 each ; (2) 50,000 preference shares of Rs. 150 each ; (3) 22,500 deferred shares of Rs. 30 each. The preference shares are to carry interest from 1st April 1908. All the ordinary shares and most of the preference shares have been taken up.

The Company is formed for the purpose of erecting in India blast furnaces, open hearth steel furnaces, rolling mills, coke ovens, and other plant necessary for the manufacture of pig iron, steel rails, bars, plates, etc., and for these purposes to acquire mining rights over very valuable and large deposits of iron ore. The plant that is to be erected will yield an output of 120,000 tons of pig iron and the conversion of 85,000 tons thereof into 72,000 tons of finished steel ; there is thus every probability of a ready market on the spot for the whole production.

Plant will be established for the manufacture of sulphuric acid as one of the bye-products. Immediately only so much of the acid will be manufactured as is required by the Company itself for producing sulphate of ammonia. The importance of local manufacture of sulphuric acid cannot be exaggerated, as according to Mr. Holland the loss to India arising from the advantage possessed by England in cheap sulphuric acid is over 10 millions sterling. ' With cheap sulphuric acid, the continued and disastrous export of phosphates in the form of bones from this country, would be checked. A growing demand for the acid will resuscitate on a modern scale the once considerable copper-smelting industry in South India and in Rajputana, make the copper-bearing rock in Kulu, Garhwal, Nepal, Sikkim and Bhutan commercially workable, and reduce the large copper and brass bill, amounting to £813,700 per annum, which the country pays to foreign manufacturers.'

2. The Swadeshi movement has had a very beneficial effect on the progress of the textile industry. The losses accruing from the dulness of the China market, where the Indian mill-owner has to face the competition of the Japanese, have been counterbalanced by the increased demand in India itself and the position is thereby rendered distinctly favourable as admitted by those connected with the mill industry itself. The Swadeshi movement has led, too, to the establishment of more new mills than would have otherwise been the case. These are the Broach Industrial Cotton Spinning and Weaving Co., Broach, capital Rs. 7 lakhs; H. H. the Maharana Shri Ajitsinghji Dharangadra Mills Co., capital Rs. 5 lakhs; Fazulbhoy Mills, Bombay; Srinagar Weaving and Manufacturing Mill, Ahmedabad; Ahmedabad Astodaya Manufacturing Mill, Ahmedabad; Jam Shri Ranjit Singjee Spinning and Weaving Co., Bombay, capital Rs. 8 lakhs; Sri Rasulkhan Mills Co., Bombay, capital Rs. 10 lakhs; Haripur Spinning and Manufacturing Co., Ahmedabad; Ahmedabad Swadeshi Spinning and Manufacturing Co., Ahmedabad; Industrial Mills Co.; Maharana Bhowsingji Mills Co., Bombay, capital Rs. 10 lakhs. The foundation was laid of the Sri Krishna Mills at Ahmedabad in June. The Albion Spinning and Weaving Company is to be started shortly at Bombay with a capital of 15 lakhs, the value of each share being Rs. 1,000. Shares worth Rs. 10 lakhs have been sold. Messrs. Narottam Morarjee Gokuldas and Govardhandas Khatau are among the Directors. Weaving sheds were added to the Bombay Cotton Mill, the Elphinstone Mill, Bombay, and the Ahmedabad Merchants' Mill.

3. Besides the above, we have several other concerns to record in connection with the textile industry. It was resolved in the month of June by several respectable capitalists of Sind that in view of the possibility of producing good coarse cloth from Sind cotton, a Joint Stock Mill Co. be started. The Nadiad Silk, Woollen and Cotton Handloom Weaving Co., Ltd., was started at Nadiad in January with

a capital of Rs. 50,000. The Company have manufactured 30 looms and expect to turn out 20 more within the next six months. The looms are of special pattern, being fly-shuttle looms with dobbie attached to them so that [they] are able to make any kind of cloth whether plain or bordered. Several varieties of cloths are manufactured by the Company. A Weaving Company was started at Poona under the designation of the Poona Swadeshi Weaving Co. The Swadeshi Lala Co., Ahmedabad, capital Rs. 1 lakh, has for its object trading in handlooms. The Swadeshi Calico Printing Co., Ltd., Bombay, was started with a capital of Rs. 3 lakhs, divided into 10,000 shares of Rs. 50 each. The Company claims to be the first of its kind in the whole of India. Its chief objects are (1) to establish a mill for bleaching, dyeing and calico printing of cloths on a commercial basis and to successfully compete with those that are at present supplied by foreign countries, and (2) to establish a workshop and a chemical laboratory for making experiments necessary to attain the up-to-date developments of the business and for training the workmen as well as outsiders wishing to be benefited by it. The Swadeshi Hosiery and Manufacturing Co. was started at Bombay with a capital of Rs. 3 lakhs. Messrs. Desai & Co. started the Swadeshi Dyeing Factory at Bijapur. The Luxmi Narayan Handloom Works at Shurgaon in the Thana District turn out 'fine and durable' cloth of several descriptions. Another handloom factory was started at Raibagh in the Southern Maratha country under the guidance of Mr. Kashinath Pant Dandekar, L. T. M. The Maharajah of Kolhapur promised a donation of Rs. 6,000 to the factory. The promoters of the handloom factory which was started at Dhulia last year intend to convert it into a limited liability company. Two enterprising pleaders of Bijapur (Messrs. Raghavendra Rao and Panduranga Rao Desai) started a Calico Printing factory at Bijapur and it is said that success has attended their efforts. The Belgaum Loom and Industrial Machine Works was started by Messrs. Nilajkar and Khatau, two enterprising

young men of Belgaum who returned from Japan after completing their studies. They prepare handlooms and their accessories and within a period of two months of their starting, 22 looms have been made. They are after the improved Japanese pattern. Pupils are taught weaving free of any charge, but they are required each to purchase one loom. From 20 to 30 yards of cloth is turned out daily. Handloom classes were also opened at Nasik and Ratnagiri. The Bharat Press Co., Bombay, capital Rs. 2½ lakhs, the Nimar Cotton Co., capital Rs. 2 lakhs, the Malwa Cotton Co., capital 1½ lakhs, and the Mahadeva Cotton Press Co., capital Rs. 60,000, and the Jhotana Ginning Co., Ahmedabad, gin and press cotton.

4. The Indian Mercantile Insurance Co., Ltd., was started at Bombay with a capital of Rs. 50,00,000 divided into 50,000 shares of Rs. 100 each. This company was formed for the purpose of carrying on the business of Fire Insurance in all its branches in India. Power is reserved to carry on with the sanction of the general body of shareholders, business in Marine Insurance.

5. The Swadeshi Bank was started at Dharwar with a capital of Rs. 1 lakh, the chief object being to encourage manufacturers and artisans. The Pioneer Co-operative Credit Society, Ltd. (Urban), was started at Bombay with a capital of Rs. 1 lakh divided into 1,000 shares of Rs. 100 each. The society was established on the co-operative basis, to enable the members of it to obtain from its funds loans on easy terms and thus to assist them in starting small trades, in entering into useful professions, and in carrying out other practical objects. Messrs. A. V. Jayakar Co. are the secretaries and managing agents.

6. The Oriental Mining Co., Ltd., was started at Bombay with a capital of Rs. 5 lakhs divided into shares of Rs. 100 each. One of the Directors is Mr. Maniklal Ghelabhai, who owns some 24 manganese mines in the Goa territory.

7. Among other new enterprises the following may be

noticed. The Deccan Match Factory was started at Karad in the Satara District by Messrs. Shiralkar and Bahulikar. The capital of the Company is Rs. 1 lakh divided into 1,000 shares of Rs. 100 each. The Belgaum Match Manufacturing Co., was started by Messrs. Nalajkar and Khatau with a capital of Rs. 25,000 for making matches, suitable wood for which is available in the district. The Shampa Bhavan Match Factory at Sholapur was started for the manufacture of grass matches. The machine for cutting the grass is prepared by Kirloskar Brothers of Belgaum and the other machine for dipping the matches in phosphorus is prepared by a maistry in the factory. The Deccan Grass Match Factory is at Poona.

Mr. Kamble opened a small Umbrella Factory at Poona in the month of January. All the parts of the umbrella are locally manufactured with the exception of iron wire required for the frame work which is imported from England. The workshop turns out by hand power about 50 umbrellas per day.

The Soap and Candle Factory at Baramati (Poona District) was started by Seth Tilokchand Hirachand Jain and Co. The products of the factory have been pronounced to be fairly satisfactory. A soap factory was started at Hubli by Laxmi Narayan and Co. The Indian Soap and Candle Factory, Bombay, capital Rs. 1 lakh, manufacture soap, candles and perfumery.

The Gujarat Pencil Factory at Zadeshwar, district Broach ; the Pencil Factory at Hubli started by Tabib Brothers ; Shri Rajaram Pencil Factory, Fanaswadi, Bombay, started by Narayan Vinayak Athalye ; the Pencil Factory at Islam-pore started by Mr. Dalvi, Pleader, are the pencil factories started during the period under review in the Bombay Presidency. Of these the factory at Fanaswadi, Bombay, turns out 1,000 pencils daily, and is expected very soon to turn out 6,000 daily. Almost the whole machinery was manufactured locally.

The Cigarette Factory at Ahmednagar ; the India,

Condensed Milk Co. at Chaklasi (Gujarat)*; the Oil Mill at Karad (Satara District) started by Ramakrishna Naik Kale ; the Indian Cement Syndicate, Bombay, capital Rs. 30,000, which manufactures and sells cement ; the Bombay Milk Supply Co , Ahmedabad, capital Rs. 20,000, which trades in milk, butter, etc , are other manufacturing concerns started during this period.

Mr. Bhaskar Vasudev Sathe, Pleader at Dhulia, has started a Flour and Oil Mill.

8. Shops for storing and selling indigenous goods continue to be started at different localities, thanks to the progress of the Swadeshi movement. Among these are the People's Swadeshi Stores Co., Hyderabad (Sind), capital Rs. 20,000 ; the United Swadeshi Trading Co., Bombay, capital Rs. 50,000 ; the Borsad Swadeshi Sahayak Mandal of Borsad Bazaar, Bombay, capital Rs. 5,000 ; the Indian Stores, Karachi, capital Rs. 25,000 ; the Swadeshi Padartha Sangraha, Dharwar, capital Rs. 20,000 ; the Satara Swadeshi Commercial Co., Satara, capital Rs. 20,000 ; the Deshi Stores Co , Shikarpur, Bombay, capital Rs. 10,000. The Bombay Swadeshi Co-operative Stores Co., which was registered as a limited liability company last year with large capital and an influential directorate, is thriving well and doing very useful work.

9. Very valuable educational work has been done during the year in the Victoria Jubilee Technical Institute at Bombay. The courses of instruction which have been enjoyed by students included mechanical engineering, textile manufacture, electrical engineering, sheet metal working and technical chemistry, and in all of these branches of technical education, the student is thoroughly grounded in the subject he takes up from the practical point of view. The number of candidates seeking admission

* The condensed milk prepared by this Company was examined by the Government Chemical Analyser and certified to be superior to the article imported from Switzerland. The factory is supervised by Professor Gajjar of Bombay.

continues to be considerably in excess of available vacancies, in spite of the higher preliminary education now demanded. The higher standard for admission to the classes has resulted in an appreciable improvement in the quality of the students entering the Institute, as also in reducing to a minimum the number of those who fail to go through the complete course of instruction. The number of students on the rolls on the 31st March 1907 was 387 as compared with 340 last year and 315 the year previous. In order to meet the demand for trained technical teachers, which the growth of small technical schools in the country had created, and which was expected steadily to increase, the Board instituted a small number of Fellowships of the value of Rs. 50 per month. Six of these have been awarded in the year under review and the Fellows assist the teacher in their class work and, at the same time, carry on an additional course of study. One of the chief items of interest during the past session was the opening of the Central Electric Power Station in connection with the electrical engineering branch of the Institute. The station was opened by H. E. the Governor of Bombay, Lord Lamington, in February last.

10. Some gentlemen of Kurundwad in the Southern Maratha Country have hit upon the expedient of an "Industrial Lottery" with the object of obtaining funds for erecting a Sugar Manufacturing Factory. The result will no doubt be awaited with curiosity.

11. The Swadeshi Vastu Pracharini Sabha of Bombay has been working these two years for the promotion of Swadeshism in the country. Under its auspices was held on All-India Swadeshi Conference at Calcutta about the time of the Congress under the presidency of the Hon'ble Nawab Saiyid Muhammad Sahib Bahadur of Madras. A Provincial Swadeshi Sammelan was held at Surat at the time of the last Provincial Conference. The Sabha took advantage of the fair at Pandharpur in October last to popularise the Swadeshi movement by means of lectures and preachings.

BENGAL.

12. The Hindustan Co-operative Insurance Society, Ltd., was started at Calcutta with a capital of Rs. 1 crore divided into shares of Rs. 100 each. It has made a speciality of small insurances and it is said that it affords facilities even for the poorest of ryots and wage earners to make a suitable provision for their families in the event of death or their own comfort in old age. Two other Insurance Companies are the National Indian Life Assurance Co., Ltd., Calcutta, under the auspices of such exalted personages as the Maharajahs of Baroda and Cooch-Bihar, and the National Insurance Co., Ltd., Calcutta. The capital of both the Companies is Rs. 10 lakhs each. The latter Company has done very satisfactory work since its start. It was floated in March last and in these eight or nine months policies to the value of Rs. 15 lakhs have been recorded.

13. The Bengal National Bank, Ltd., was started under influential auspices with a capital of Rs. 50 lakhs.

An Association was started at Bankura under the name of the Bankura Central Co-operative Society, with the following objects.—(a) To create funds to lend out to its members or to be invested for the benefit of its members in accordance with the Co-operative Credit Societies Act. Such investment may take the form of loans to rural credit societies and also, with the permission of the Local Government to urban credit societies; (b) to encourage thrift, self-help and mutual trust among its members who belong to the industrial class, and with this object, (1) to obtain for such members raw materials at wholesale rates; (2) to make advances of cash and material at reasonable rates of interest; (3) to improve the standard of manufacture, and (4) to sell the finished product on behalf of members, charging a fair commission on sales; (d) to act as an organization society for the introduction of Co-operative Societies among the agriculturists and artisans of the district. The capital of the society has been fixed at Rs. 10,000

for the present, to be raised by 1,000 shares of Rs. 10 each. The society is registered under the Co-operative Credit Societies Act. The capital would be gradually increased with the expansion of the sphere of action which would be limited to the district itself.

The Gaya Bank and Trades Association, capital Rs. 50,000; the Ananda Bhandar, Rangpur, capital Rs. 20,000, and the Sonamarg Lakshmi Bhandar of Sylhet, capital Rs. 20,000 are other concerns which do banking business.

14. The several steamer services started by Indians furnish additional proof that Bengal is forging ahead in business affairs, as it is already advanced in matters intellectual. The East Bengal River Steam Service was started with a capital of Rs. 6 lakhs. Raja Sreenath Roy, Babu Janaki Nath Roy and the Hon'ble Rai Sitanath Roy Bahadur are the Managing Agents. Babu Brojola Roy started the Bhagyakul Steam Service with a capital of Rs. 1,24,000. Babu Muralidhar Roy is the Managing Agent. Besides these the Bikrampur Flotilla Service was started by Babu Benodilal Roy and Brothers, and the Lakshminarayan Steam Service by Babu Harendra Lal Roy. The East Bengal River Steam Service Co. also started a workshop under the name and style of the East Bengal Engineering Works at Cossipore to repair their vessels and also to do outside work. All these concerns are due to the enterprise of the Bhaggakul Roy family in the district of Dacca.

15. The Indian Cotton Cultivation Co., Ltd., was formed for growing cotton. It acquired a plot of 250 bighas in the district of Birbhum, about 10 miles to the west of Rampore hat, where cotton is being cultivated. The capital of the Company is Rs. 10,000 divided into 2,000 shares of Rs. 5 each.

16. The determination with which Bengalis have taken to the Swadeshi movement has in no other field produced more gratifying results than in the industry of weaving. The impetus it has given to handloom weaving is remarkable. We have cited official testimony to this fact in the foregoing

Section of this Report. The necessity for starting power-loom mills has not totally escaped attention either. The successful working of the Bengal Luxmi Cotton Mill may be mentioned as an instance in point. The Desi Cotton Mills, Ltd., of Calcutta, were, it is true, promoted by Messrs. Andrew Yule & Co., but the bulk of the shareholders are understood to be Bengalis. A plant of 450 looms has been laid down in this mill and 250 looms are working now. It is intended gradually to lay down a plant of a thousand looms. The factory of the Calcutta Weaving Company was opened at Howrah. Arrangements have been made for the accommodation of 80 looms. Fifty looms are at work at present. The National Spinning and Weaving Co. of Bengal was started with a capital of Rs. 20,000. The Surma Valley Weaving and Trading Co., Sylhet, was started with a capital of Rs. 20,000. The business of trading in indigenous goods is combined with weaving. A company under the name and title of the Bengal Hosiery Co. was formed at Calcutta with a capital of Rs. 2 lakhs. The Madanganj Pressing Co., Bengal, capital Rs. 1,50,000, is for pressing cotton, also jute and hides.

17. The Bengal Agricultural and Dairy Farm, Ltd., capital Rs. 5 lakhs divided into 5,000 shares of Rs. 100 each, was started 'with the object of providing an honourable means of livelihood by farming, to the young men of this country.' It was proposed to partly purchase and partly to lease out 1,000 bighas of land at Kanchrapara and Saptagram (80 miles from Calcutta) and start cultivation and dairy farms. The Company would further arrange to give a practical training to those young men who would serve as apprentices to the farm. The expert members of the Board will make periodical visits to inspect the working of the farm and to give training to the apprentices for farming. It is stated that the Company intends to start such farms in every district with a view to making them popular. 'Rai Saheb Gopal Chandra Chattopadhyaya, retired Executive Engineer, is the Managing Director.

18. The Bengal Pottery Works at Baranagar were started with a capital of Rs. 21,000 ; the Chairman of the Board of Directors being Rajah Peary Mohan Mukerji. The Manorama Candle Factory was started by Babu Nagendra Nath Mazumdar, who learnt the arts of candle-making and pencil manufacture in Japan. Its notable feature is that Mrs. Mazumdar is in charge of the business, all the details of which are worked by herself and a number of other women. The Barisal National Oil Mills were started at Nalchitti with a capital of Rs. 75,000. A large comb factory was built at Cuttack under the direction of Mr. Howard Lucy. The factory is said to be fitted with the latest machinery and an expert in comb-making has been secured from a well-known Scottish firm ' This factory is the first of its kind in India, and is expected to be in full swing by the beginning of the new year.' The 'Bande Mataram Factory' for the manufacture of matches was started at Calcutta by the Hon'ble Dr. Rash Behary Ghose and it is under the management of Messrs. P. C. Roy and A. C. Ghose who had been sent to Japan by the Association for the Advancement of Scientific and Industrial Education, to learn match-making. The 'Small Industries Development Company' was started by this Association with a capital of Rs. 4 lakhs for manufacturing pencils, buttons and other industries which do not require large capital. It is hoped that several of the students sent abroad by the Association will be employed in this concern. The Rangpur Tobacco Company, capital Rs. 1 lakh, is for manufacturing cigars, cigarettes, snuffs and other products of tobacco. Then we have the Jalpaiguri Silpa Samity, with a capital of Rs. 50,000 and the Dacca Silpa Samity with a capital of Rs. 20,000. There are besides, the Kansat Trading Co., Malda, capital Rs. 20,000 ; the Nowgong Trading Co., Nowgong, capital Rs. 20,000 ; the Kamrup Industrial and Trading Co., Gauhati, capital Rs. 50,000 ; the Durbhanga Trading Co., Durbhanga, capital Rs. 20,000, and the Tripurajatiya Bhandar Co., Comilla, capital Rs. 30,000.

19. We pass on to the work done in Bengal in further-

ance of scientific, industrial and commercial education. Foremost of the institutions devoted to this object is the Bengal Technical Institute. Particulars of the instruction imparted here were given in last year's report. Here it is only necessary to say that the institution is making healthy progress. Donations to the Institute amount to Rs. 76,300 and monthly subscriptions to Rs. 3,487. Mr. Dadabhai Naoroji and His Highness the Gaekwar visited the Institute and expressed themselves pleased with what they saw.

It is pleasing to note the attention bestowed on scientific education and manual and technical training at the Bengal National College and School. There are 17 lecturers in the Technical (including Scientific and Commercial) Department, the budgeted grant for the current year for the instruction staff being a little over Rs. 1,900 per month. Rs. 25,000 were budgeted for the current year for the workshops attached to the Technical Department and the Laboratories. Besides this, a special subscription of Rs. 1,000 and upwards was started for the expansion of the Laboratories and Workshops, and Rs. 12,000 were subscribed for the purpose even early in the year. Particulars of the courses of instruction adopted in the Technical Department of the Bengal National College are given in Appendix VII.

The Association for the Advancement of Scientific and Industrial Education of Indians has, as usual, done exceedingly good work during the year. Several students sent by it to foreign countries returned after completion of their studies and are usefully employed. Forty-eight of them were still abroad pursuing their studies at the beginning of this year. And so many as 96 were sent afresh this year. This is splendid work, on which the Hon'ble Babu Jogendra Chandra Ghose, the Secretary, and his fellow-workers, deserve to be congratulated. The financial position of the Association is satisfactory.

Of the young men who returned to India after completion of their education, Mr. Satya Sundar Deb successfully started the pottery works and is getting Rs. 150 a month. Messrs. P. C Roy

and A. C. Ghose started a match factory on a salary of a Rs. 100 a month each and commission of 30 per cent. on the profits. Mr. Amarendra Narayan has been engaged at Bimalpatam pencil factory on a salary of Rs. 100 and a share in the profits. Mr. I. B. De has been appointed Agricultural Officer in the Cooch Behar State on Rs. 500 a month with allowances and Mr. K. E. Nandy has been appointed District Engineer on a salary of nearly Rs. 500 a month with allowances.

The Indian Association for the Advancement of Science, Calcutta, which was founded by the late Dr. Mahendra Lal Sircar, has done a year's good educational work. During the year, the workshop of the Association has turned out several new instruments such as a set of three systems of pulleys, one wheel and axle, a lever with several divisions and weight to illustrate the result of parallel forces and the leverage also and an eye-piece tube for $3/2$ inch telescope to carry Brown-ing's spectroscope. Several tools and implements were also prepared for lathe itself without purchasing them from the market.

The Calcutta Commercial Institute was started at Calcutta this year and Shorthand, Type-writing, Book-keeping, etc., are taught there. Mr. N. K. Mitter, M.A., is the Principal and is assisted by a staff of educated and efficient teachers.

A society, under the title of Silpa Samity, was registered under the Indian Companies Act, with the object of promoting industrial education among the women of Bengal. The society has taken over several technical schools for girls from private management to be worked on an extensive scale. It was under contemplation to start a free day school, where technical and industrial instruction would be given to girls.

The Convent Lace School at Ranchi, Chota Nagpur, is doing useful work in the way of giving the women and girls of the flock a practical education with a view to affording them a more lucrative occupation than that usually adopted by the women of the district, and one which would not interfere with their domestic duties. The Ranchi

Convent already possessed a member who had studied and worked in a Belgian school of lace, and in 1905 the first local institution was founded with three pupils and a little later, a man trained in the lace industry came out from Belgium to take charge of it. Since that date the school has been growing in usefulness and popularity, so that now it may be regarded as a firmly established concern with a future before it. All that it needs to ensure its prosperity is a grant-in-aid from the Education Department.

20. Industrial and Agricultural Exhibitions were held during the year at Balasore, Kendrapara and Angul in Orissa, at Hooghly, at Jhenida and some other places mentioned in Section A. At the Kendrapara Exhibition a Silver Medal and cash prize were awarded to one of the muslin fabric weavers of Gulnazar in the Cuttack District as an encouragement for his first adopting the fly-shuttle to the country loom.

21. Babu Purnendu Narayan Sinha, Secretary, Bihar Exhibition Committee, has kindly sent us the following account of exhibitions and fairs in Bihar :—' In Bihar there are several ancient fairs, some of which give great stimulus to Indian industries. The chief of these fairs is the Sonepir Fair held every year on and about the Full Moon day of Kartic. No attempt is, however, made to offer prizes and medals to the exhibitors of the best industries nor are the industries catalogued in any year. The other important fairs, such as those held at Megh Mordah (Purnea), Bihta (Patna) and Kat Bahrapur (Arrah) are essentially Cattle Fairs. But with some effort they may be converted partly into exhibitions of agricultural and general industries. The Bihar Industrial and Agricultural Exhibition was held in February 1907, at Bankipur. The chief exhibits were cotton, mixed and silk fabrics of Bihar, Fatwa of Dinapur, of Patna, of Bhagalpur, Gaya and Arrah, glass-made articles of Patna, steel trunks of Patna, iron ware from Dinapur and the Bihar School of Engineering, potteries of Sewan and Sasseram, painting from Arrah,

carpenters' work from Dinapur, the famous Kokti cloth from Durbhanga, basket ware and sirki work, carpets both cotton and woollen, Kevor, chiefly from jails, aloe fibre and plantain fibre, cutlery and other articles. The exhibits all came from Bihar.

MADRAS.

22. The failure of Arbuthnot & Co. and the misery into which many families were plunged thereby gave an impetus to the organisation of capital by Indian agency, and the Indian Bank, Ltd., Madras, was the result. Its authorised capital is Rs. 20 lakhs. Business was commenced in the middle of the year. Other joint stock banks started during the year are the Agricultural and Commercial Bank, Tinnevely, capital Rs. 2 lakhs ; the Trichinopoly National Bank, capital Rs. 1 lakh ; the Worriar Alliance Bank, Trichinopoly, capital Rs. 1,49,995. There was besides, the Madras Central Urban Bank, registered under the Co-operative Credit Societies Act. Its main object is to collect funds for financing Co-operative Credit Societies established in the mofussil. The capital of the bank is Rs. 25,000, made up of 50 shares of Rs. 500 each. Four-fifths of the members shall always be non-agriculturists. Every member joining the bank must take at least one share, but no member can at any time hold more than five shares. No member shall be permitted to transfer any share held by him, unless he had held such share for a period of at least one year.

23. Reference was made in last year's Report to the Conjeevaram Weavers' Urban Union. Dewan Bahadur P. Rajagopalachariar, who was till lately Registrar of Co-operative Credit Societies in Madras, some months ago sent an interesting report to the Government of Madras comparing its working with that of the Benares Silk Weavers' Co-operative Association, the principal features of which were also pointed out in last year's Report. The societies are 'essentially of a similar nature,' but they 'differ considerably' in organization. Mr. Rajagopalachariar writes to the following effect :—

'While the Benares Association is registered on the basis of

limited liability with a paid up share capital, the Conjeeveram Union is registered on the basis of unlimited liability, and has no paid-up share capital. Both Societies purchase their raw material wholesale, and then retail them to their constituents at prices more favourable than those given them by middlemen generally. The Societies then receive the finished products from the weavers and sell them to the best advantage. The question of distributing the finished product, however, is not so easy as that of production. The difficulty of getting rid of the finished product is not so great at Conjeeveram as it is at Benares, as the Conjeeveram Society turns out articles of cotton, and on such a small scale as to meet a steady local demand for them; whereas the high-priced silk goods turned out at Benares have to go considerable distance to find a market.'

24. Handloom weaving has received considerable attention. The Hanuman Weaving Factory was started at Madras by Messrs. S. Ranganatham Chetty & Co. It turns out handkerchiefs and *dhotis* with silk borders. The Kistna Textile Manufacturing Co., Ltd., was started at Narsapur in the Kistna district with a capital of Rs 1 lakh divided into 1,000 shares of Rs. 100 each. The object of the Company is to develop the industry of cotton weaving. It was working at first with handlooms of different sorts, indigenous as well as English, but it has since received some power-looms and an engine and a boiler to work them,

'To give a successful start to beginners a machine on the model of the English sizing one with cylinders and size-box has been constructed by P Moorthy Chetty, head jobber of the said company, and it is working satisfactorily. It could give warps also for double powerlooms. The yarn is at first put in the sizing, then rolled on a big drum and afterwards worked on the warping machine of 500 bobbins and finally these four or five warps beams of small breadth are put on the newly constructed sizing machine and are formed into one warp of the required breadth.'

A weaving factory was started at Puthur in the neighbourhood of Negapatam. A *Komati* merchant of Sidhout introduced fly-shuttle looms and is carrying on good business. Two men were sent from Hospet to Calcutta at the public expense to learn weaving on improved handlooms. A number of young men trained at the Government Weaving Factory, Salem, started a private factory with fly-shuttle looms

at the same town. The Nidadavole Weaving Factory in the Godavari district and the Rajam Spinning and Weaving Co., Ltd., in the Vizagapatam district are doing good business. Ellore in the Kistna district is a place noted for carpet-making. The industry is on the decline, however. It is right, therefore, that the Oriental Carpet Manufacturing Co. has been established there. It is working with eight big looms and 52 workmen under the management of an expert of 40 years' experience. The Company has also employed a special designer. Other concerns started during the period under review are the Guntur Hosiery Mills Co., Ltd., Guntur, capital Rs. 50,000; the Kaliswarar Mills Co., Coimbatore, capital Rs. 9 lakhs; the Kamakshi Mills Co., Tanjore, capital Rs. 10 lakhs, and the Sri Todpura Sundari Cotton Press, Bezwada, capital Rs. 85,000.

25. The Vizagapatam Sugar Development Co., Ltd., has just been formed at Anakapalle in the Vizagapatam district with a capital of Rs. 3 lakhs divided into 6,000 shares of Rs. 50 each with the object of erecting 'the First Model Sugar Factory which will be in the nature of a Sugar School in the centre of an extensive sugarcane cultivation. The factory will be managed by Mr. A. E. Jordan, Sugar Expert. The Negapatam Swadeshi Steel Trunk Manufacturing Co. manufactures steel trunks, patent steel brief bags and dispatch boxes of high class quality. A Glass Factory was lately started at Ennur, Madras, under the management of Mr. S. M. Shafi. Sodawater bottles are made at the factory. Mr. S. Ramarao returned from Japan after learning glass manufacture and has been trying to start a glass factory. He has secured a friend who offers Rs. 2,000 as his share and efforts are being made to get a few more persons who will join and form themselves into a limited liability company. The sand of Tiruvottiyur, which has been certified to be suitable for the purpose, will be used for making glass. The Vizagapatam Mills Co., was formed at Vizagapatam with a capital of Rs. 5 lakhs with the object of milling rice. The Sri Laxmi Rice Mills Co. was formed at Gun-

tur with the same object with a capital of Rs. 20,000 ; and the Anakapalle Commercial Syndicate with a capital of Rs. 50,000 has the same object, too. The Cocanada Jute Press Co. was formed at Cocanada with a capital of Rs. 1,50,000. The South Indian Agricultural and Industrial Improvement Co. was formed at Anakapalle with a capital of Rs. 1 lakh. The Coimbatore Industries, Coimbatore, with a capital of Rs. 20,000, will have a chrome tannery. The Kistna Chemical Works was started at Siddhantam in the Kistna district, where also there is the Godavari Soap and Candle Factory. At Pithapur in the Godavari district two factories came into existence for making soaps and candles. It is said that the Rajah of the same place is thinking of starting a Mill for Spinning and Weaving Cotton. The Swadeshi Steam Navigation Co. which was formed last year, is progressing and increasing in popularity.

26. Stores for selling indigenous goods have increased in number since last year. Prominent among these may be mentioned the Triplicane Co-operative Society which has started a distributive Co-operative Stores 'on the historic model set by the Rochdale Pioneers.' The number of members of the society at the end of June was 637, and the share capital amounted to about Rs. 4,950. A branch of the society was opened at Egmore in February. The total distribution of goods to members in the nine months ending June last amounted to Rs. 1,20,530, or an average of nearly Rs. 13,400 a month for all the branches. The Cuddalore Swadeshi Mercantile Co., Ltd., opened an emporium for indigenous goods. It has a capital of Rs. 20,000. Under the name of the Aryan Stores a business was started at Trichinopoly as a limited liability company, the nominal value being Rs. 6,000. 'Deposits are received and $7\frac{1}{2}$ per cent. interest is guaranteed, in addition to bonus at the discretion of the proprietors. The object of the institution is to encourage Indian articles of all kinds.' Two Swadeshi shops were opened at Hospet, one to sell cloths and the other stationery and other articles. The

promoters take moderate profits, reserving the balance of profits to the promotion of industries. The Tanjore National Co-operative Emporium has a capital of Rs. 20,000. The Narasapur Industrial Improvements Co., capital Rs. 50,000, has for its primary object the sale of country-made goods. Similar is the case with the Kallidaikurichi Sudesa Toli Pandasali of Tinnevely, capital Rs. 20,000, and with the Saidapet Industrial Co., Chingleput, capital Rs. 10,000.

It was remarked in last year's Report that almost all these shops are on a comparatively small scale. There are no stores in the presidency which will bear comparison with the Bombay Swadeshi Co-operative Stores Co., Ltd., or the Indian Stores of Calcutta. The attention of the Second South Indian Industrial Conference which met at Vizagapatam was called to the matter, and it passed the following Resolution on it :—

'That this Conference notes with satisfaction the increasing number of shops for storing and selling articles of Indian manufacture which are being started in different parts of Southern India, but regrets that many of them are too small to meet the growing demand for such articles. In the interest of the Swadeshi movement, this Conference earnestly urges educated Indians in every district to organize on a large scale Swadeshi stores on a Co-operative basis.'

27. Several Industrial and Agricultural Exhibitions were held during the year in a few districts. The South Indian Industrial Exhibition of Vizagapatam has been referred to. There were besides, the Narasapur Agricultural and Industrial Exhibition and the Cannanore Agricultural and Industrial Exhibition. The Northern Circars Swadeshi Show will be held at Siddhantam in the Kistna district in January next.

28. The National Fund and Industrial Association of Madras has been doing useful work. To popularise the fly-shuttle looms among the weavers who have evinced a desire to work them, the Association has put six fly-shuttle looms and employed a weaving instructor for the Conjeeveram Urban Weavers' Union. Two students were sent to Japan to receive practical training in making candles, soaps,

pencils, cement and matches. Arrangements have been made to open a class in Madras to train students in soap and wax-making. Attempts are being made towards the formation of a library of industrial and technical subjects, and the nucleus of a library has already been formed. We have already referred to the generous offer of the Hon'ble Mr. V. Krishnaswamy Iyer to start a weaving school at Madras. Another prominent member of the Association, the Hon'ble Mr. P. S. Sivaswamy Iyer, has been paying Rs. 50 a month to enable it to send a student to a foreign country for technical education. The funds of the Association amount to nearly Rs. 10,000.

THE UNITED PROVINCES.

29. The Imperial Bank, Ltd., was started at Meerut with branches at Aligarh and Moradabad with a capital of Rs. 2 lakhs divided into 4,000 shares of Rs. 50 each. The Superior Bank, Muzaffarnagar, was started with a capital of Rs. 20,000. The Co-operative Banking and Trading Society, Ltd., Benares, combines, as its name implies, banking and trading, the latter being limited to Indian goods. The aims and principles of this Society are best explained in the words of the prospectus from which we quote below :—

'The success which has attended the working of Co-operative Credit Societies in other districts has led a number of leading gentlemen in Benares to interest themselves in establishing a Co-operative Banking and Trading concern in Benares. The need of an institution whence loans may be obtained by the ordinary classes of the people at moderate rates of interest, and of a shop for the sale of genuine goods at fixed prices had long been felt here. Institutions started on true co-operative principles thrive and abound in European countries, and it will be the aim of the projected society to work on the same lines and to help local trade by providing cheap capital, and placing a well-furnished store of indigenous goods and useful and necessary articles not made in India at the disposal of the Benares public

'The Society will be registered under the Co-operative Credit Societies Act, No. X. of 1904, and its capital will be raised by the issue of shares tenable by persons residing or carrying on business in Benares. In order that a large number of men of all ranks may join by purchasing shares and thereby avail themselves of the

advantages offered by the Society, the price of each share has been placed at Rs. 5 only, and no person will be allowed more than 200 shares of the value of Rs. 1,000. The total capital at present proposed to be raised in this manner is Rs. 25,000.

'The affairs of the Society will be managed by a Board of Directors elected by the shareholders. Loans will be made only to shareholders of the Society, or to independent Co-operative Credit Societies. No person unconnected with a Co-operative Credit Society will be entitled to deal with this Society. Those who desire to benefit by such dealings should, therefore, at once apply for shares. The Society will work in a field all its own, and will not place itself in opposition to any existing private firm in Benares.'

If the United Provinces are fortunate in having a Lieutenant-Governor, who is in full sympathy with the Industrial Movement, Benares is doubly blessed in having a Collector and District Magistrate so full of genuine Swadeshi spirit as Mr. E. H. Radice, I. C. S. Mr. Radice presided over the meeting at which this Society was formed, and he is also President of the Swadeshi Vastu Pracharini Sabha of Benares; the only instance, we believe, in all India of a District Officer placing himself at the head of such an organisation.

The Unao Town Bank was established in November 1906 for the purpose of financing its members and rural Co-operative Credit Societies. It showed very favourable results for the period ending June 30th, 1907. A dividend of 10 per cent. per annum was declared out of the net profits, after laying by some amount to form a reserve fund. The assets of the Bank were Rs 97,700-2-4, and the total receipts for the period under notice amounted to Rs. 1,69,433-3-9.

30. Among the concerns started during the period under review are the following :—the Bahrala Cotton Ginning Press Co., Bahrala, for manufacturing cotton, wool, etc., capital Rs. 1 lakh; the Jumna Flour Mills Co., Cawnpore for the manufacture of flour, capital Rs. 3 lakhs; the Union Indian Sugar Mills Co., Cawnpore, capital Rs. 4 lakhs; the Hilkarni Co., Agra, for general trading, capital Rs. 20,000; the Harisankar Busdeo Cotton Press and Ginning Mill Co., Debai, for manufacturing jute, cotton, etc., capital Rs. 96,000;

the Agra Boot and Equipment Factory for tanning and manufacturing leather, capital Rs. 5 lakhs ; the Hadi Sugar Manufacture Works, Meerut, capital, Rs. 1 lakh ; the Ganges Sugar Works, Cawnpore, capital Rs. 5 lakhs ; the Friends' Trading Co., Gorakhpur, capital Rs. 20,000 ; the Trading Vaisya Ginning and Cotton Press Mills Co., Agra, capital Rs. 1 lakh ; the Bharat Bhandar, Mirzapur, for encouraging and extending the production and consumption of Indian articles, capital Rs. 25,000.

31. Messrs. Varma Brothers of Aligarh started business in making felt caps which are undoubtedly superior to any of the kind yet made in India. The proprietor and founder of the business is Mr. Mohan Lal, Barrister-at-Law, who utilised his spare time in England while studying for the Bar in learning this important industry at first hand for future introduction in his own country. The Glass Industry Promoters' Association, Dehra Dun, is formed for utilising the knowledge in glass manufacture which was acquired by Babu Saligram Sinha of Benares during a three years' stay in Japan.

32. There is a Weaving School at Bara Banki opened by Mr. Sherring. Candidates are admitted on condition that they each purchase one loom or machine and pay a monthly fee of Re. 1 for the Salvation Army Loom class, Rs. 2 each for the Benares Loom and the Knitting Machine classes. The average period taken by a student on each machine is as follows :—

No.	Name of Machine.	Class of Student	Time taken.
1.	Salvation Army Loom	Artisan ..	2 months
		Non-artisan ...	3 "
2.	Knitting Machine ...	Non-artisan ..	3 "
3.	Banares Loom ...	Artisan ...	6 "
		Non-artisan ...	12 "

The daily output in the case of a weaver when he has learnt his work averages from 8 to 12½ yards according to the count of yarn used.

33. We have referred in a foregoing paragraph to the Swadeshi Vastu Pracharini Sabha of Benares of which Mr. Radice, District Magistrate, is himself the President. The aims and objects of the Sabha are 1) to endeavour to produce and prepare the best arts of the world in India ; (2) to perfect, improve and sell indigenous articles in the country and abroad ; (3) to foster the vernacular languages and Indian industry ; (4) to discourage all such things as are harmful to the cause of Indian progress and to work with the principle of real self-help ; (5) to gather materials for completing the objects in view. A very useful adjunct to the Sabha is to be a factory to train and bring different kinds of artisans and handicrafts. There are also to be opened workshops to give protection to the orphans, to foster the growth of the indigenous arts and to encourage vernacular education.

THE PUNJAB.

34 The following new banks have been started in the Punjab during the year :—the Lyallpur Bank, Lyallpur, capital Rs. 1 lakh ; the Industrial Bank of India, Ludhiana, capital Rs. 5 lakhs ; the Bank of Multan, capital Rs. 2 lakhs ; the Orient Bank of India, Lahore, capital Rs. 5 lakhs ; besides a branch of the People's Bank of Lahore opened at Delhi.

35. Other new concerns are the National Insurance and Banking Co. of Amritsar, with a capital of Rs. 10 lakhs ; Messrs. J. Roy & Co., Multan, capital Rs. 2 lakhs, business general trading ; the Punjab Commercial House, Amritsar, capital Rs. 1 lakh, business general trading ; the Century Flour Mills, Lahore, capital Rs. 5 lakhs, business milling flour ; the Bhagvali Flour and General Mills Co., Ltd., Ambala, capital Rs. 15,000, business wheat and grain milling ; the Swadeshi Weaving Co., Amritsar, capital Rs. 50,000 ; the Indian Stores and Manufacturing Co., Delhi,

capital Rs. 1 lakh, object the promotion of the sale of indigenous goods.

36. At the Vaish Conference held at Ambala in February, Rs. 50,000 were subscribed for the Foreign Education Fund of the community. It is said to be the intention of the members of the Conference to allow this fund to accumulate till it reaches Rs. 5 lakhs. And then it will be devoted principally to enable the young men of the Vaishya community to acquire scientific and industrial education in foreign countries. A Swadeshi Exhibition and Bazaar was held along with the Conference, and it was a great success.

THE CENTRAL PROVINCES AND BERAR.

37. The only two concerns to report are the Karanja Chemical Works Company, Karanja, Berar, started to manufacture scents, oils, etc., under the supervision and guidance of Mr. N. P. Sampat of Messrs. Sampat Brothers; and Messrs. Jogalekar and Co., Akola, capital Rs. 1 lakh, for manufacturing and dealing in Swadeshi articles. As mentioned in last year's Report, weaving sheds have been added to the Akola Native Cotton Ginning, Pressing, Spinning and Weaving Company and to the Akola Oil and Ginning Company.

INDIAN STATES.

38. *Mysore*.—Mr. Vinayak Ganesh Joshi of Poona obtained certain concessions from the Mysore Government such as free timber and free land for opening a match factory in Mysore. The Karnatak Weaving Establishment was started at Bangalore with a capital of Rs. 50,000 for weaving with improved handlooms. The Mysore Fruit Syndicate was started with a capital of Rs. 3 lakhs for fruit cultivation. The Mysore Raj Tobacco Manufacturing Company was started at Bangalore with a capital of Rs. 15,000 for curing and flavouring tobacco and manufacturing cigarettes. The Mysore Chromium Company was started with a capital of

Rs. 8½ lakhs for mining chromite. The directors are Messrs. Hamilton Holmes, James Short and T. B. K. Gandachar.

39. *Baroda*.—A new Cotton Spinning Mill was started at Baroda by Mr. Chimanlal Samal Bechar and others early in the year and His Highness the Gaekwar formally opened it. The Gaekwar Umbrella Factory was started by Mr. Luhar with a capital of Rs. 50,000, divided into 500 shares of Rs. 100 each. It was proposed in this factory to manufacture all the parts of iron, brass and wood, etc., and even the water-proof cloth. The machinery would also prove useful for manufacturing wheels, pinions and other parts of clocks, musical instruments, etc. Another concern started in Baroda is the Shrimant Rajkauza Handloom Weaving and General Trading Co., Ltd., with a capital of Rs. 1,25,000 divided into shares of Rs. 50 each.

40. *Ajmer*.—Two companies were started at Ajmer—the General Assurance Society with a capital of Rs. 1 lakh, and the Purshartha Co. for trading with a capital of Rs. 20,000.

41. *Cochin*.—The Swadeshi Co-operative Stores, Ltd., Cochin, with a capital of Rs. 20,000 divided into 4,000 shares of Rs. 5 each, was started with the object of storing and selling Indian goods.

42. *Kawardha*.—The Bengal-Nagpur Cotton Mills Co. have established a ginning factory in the Kawardha State in the Central Provinces. This will encourage cotton cultivation which has already gained a firm footing in the state.

APPENDIX I.

MEMORIAL ON INDUSTRIAL SURVEY.

From

THE HON'BLE MR. VITHALDAS D. THACKERSEY,
President, Second Indian Industrial Conference,

and

RAO BAHADUR B. N. MUDHOLKAR,
General Secretary, Indian Industrial Conference.

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
DEPARTMENT OF COMMERCE AND INDUSTRY,
CALCUTTA.

AMRAOTI, *dated December, 1907.*

SIR,

We are directed by the Second Indian Industrial Conference, which was held at Calcutta on the 29th and 31st of December 1906, to submit a memorial to Government praying for the carrying out of an Industrial Survey in the different Provinces of India, in view of the importance of such a survey for securing a suitable development of indigenous industries and in regard of the recommendation made by the Committee on Industrial Education to that effect. The Governments of the United Provinces and the Central Provinces have, since the passing of that resolution, deputed special officers to make such a survey within their respective territories. But since the other Local Governments have not yet been pleased to take similar action and since it appears that in some influential quarters there is still a doubt felt as to the utility of such a survey, we beg to submit the following observations to Government in the hope that the facts submitted by us may incline those Local Governments which have not yet taken action to reconsider their views and to adopt the course which has been recommended by high authority.

2 The idea of an industrial survey is not a new one. The suggestion was first made by Dr. Forbes Watson so far back as 1872. He was of opinion that "each kind of produce must be accurately described, the different varieties distinguished, the places and methods of production ascertained, the industrial and commercial value investigated and the question of supply and utilization discussed. And when all this has

been done, provision must be made for rendering such knowledge easily accessible and available for immediate reference not only by Government authorities, but by agriculturists, manufacturers, and men of business generally." The work, according to him, could not be undertaken by any private body but by the Government. "Such a knowledge of the country as is here demanded for India is in Europe the accumulated result of the efforts of many successive generations, the work of legions of pioneers of enterprise who pushing on from experiment to experiment and from failure to failure have revealed to the country by their final success the secret of its resources. The whole of the advanced portion of Europe is in consequence of the development of commerce covered by a net work of private agency, the express purpose of which is to indicate to the consumer the best sources of supply and to offer to the producer the means of realising his products. A similar organization exists, of course, in India also, but only in a rudimentary state and restricted to a few principal towns and to a few of the principal staples, although no doubt it would grow in time by its own efforts. To shorten, however, in India the period of preliminary trials and unavoidable failures, and to hasten the advancement of the country appears to be in the power of the Government which although unable to take the place of private enterprise may promote enquiries which will facilitate the task. Public, as distinguished from private action assumes, therefore, in India much larger proportions than it does here, and this has always been admitted to be the policy of the Government of India. Much has already been accomplished in respect of opening the country by means of information. The trigonometrical, topographical, revenue and geological surveys have been undertaken on a scale of perhaps unprecedented magnitude. It remains to complete the survey which shall take stock of all the various productions of the country, agricultural, forestal, pastoral, and mineral, of manufactures, of the localities of production, of the varieties, qualities and values of the produce, its supply and mode of distribution and consumption."

No action was taken on the suggestion of Dr. Forbes Watson and Sir Louis Mallet, who was at the time Permanent Under Secretary for India, was led to remark: "If there is any one thing which is wanting in any investigation of Indian problems, it is an approach to trustworthy and generally accepted facts. Now I am compelled to say that since I have been connected with the India Office I have found a strong repugnance to the adoption of any adequate measures for the collection of a comprehensive and well digested set of facts. The only occasion on which I had the misfortune of en-

couraging the vehement opposition of some members of the Council was in my advocacy of Dr. Forbes Watson's proposals for an Industrial Survey of India."

3. Sixteen years later the Government of India themselves moved in the matter. In a resolution on Industrial Education and Industrial Survey of India, dated the 18th of June 1888, they said: "But as it is desirable that the step best calculated to promote technical education should form the subject of continuous enquiry and discussion, the Governor-General in Council suggests that Local Governments and administrations should on a convenient, but early opportunity take action in two ways. Impressed with the existing want of information at hand as to the extent, character, and circumstances of important local industries in every province of India, His Excellency in Council would, in the first place, suggest that in each province an industrial survey should be completed" And on the 2nd November of the same year, they addressed all Local Governments "to enquire what action has been taken towards carrying out the suggestion for the completion of an industrial survey." A little later the Government of India addressing the Government of Bengal corrected a misapprehension in regard to the scope of the survey. "In your letter under acknowledgment" wrote the Home Secretary, Mr. A. P. (now the Right Hon. Sir Antony) Mac Donnell, under date the 13th July 1889. "The Government of Bengal appears to propose to limit the enquiry into the industries of Bengal to those industries in which European mechanics and overseers are now employed. The Governor-General in Council thinks it desirable to explain that the Government of India did not contemplate that the industrial survey should be limited in this manner. If the enquiry to be conducted in Bengal is thus restricted, effect will not be given to the intentions of the Government of India, which were to ascertain by local investigation whether any native industries are of sufficient importance and vitality and sufficiently centralised as to be likely to benefit by the establishment of schools of instruction in the theory and better practice of such industries."

4. But no complete industrial survey such as was contemplated by the Government of India was carried out in any province with the exception perhaps, of Lower Burma, as is shown below.

In Bengal an enquiry was in progress as to the reforms possible in the Sibpur College at the time the Government of India's Resolution was issued. The Lieutenant-Governor did not think that the scheme recommended by the Committee appointed to conduct that enquiry was complete,

and desired to make further investigation. "And as such an enquiry would partake of the character of the technical survey proposed by the Government of India," wrote the Secretary to the Government of Bengal, "I am to suggest that the two subjects be dealt with together, an officer being placed on special duty to ascertain what industries in this province offer prospect of remunerative employment to young men educated in the country, and whether students can be properly trained for such employment on the system proposed by the Committee." The Government of Bengal added, "It is not proposed to make any more minute survey, and for the object aimed at a deputation lasting about four months would probably suffice." That the enquiry conducted by Mr. Collin, the officer deputed for the purpose, was far from being comprehensive, becomes evident from the passages quoted below from his report :—

"(a) I have omitted the subject of agriculture and the manufacture of raw products. It would be presumtuons for me in the short period of my deputation to take up this subject. The manufacture of sugar affords a wide field for inquiries, but at this season of the year it would be useless to undertake them. This industry (the cultivation of the silkworm and the manufacture of raw silk), therefore, may be passed over. An industry such as the manufacture of indigo does not fall within the scope of my inquiries. The manufacture of shellac is such a simple process, and has been carried on by both Europeans and Natives for so long that I have omitted it.

"(b) Veterinary science is entirely neglected in Bengal, but a scheme for the establshment of a college has been laid before Government by the Director of the Department of Land Records, and it is not necessary to say anything on the subject. Butter, ghee, cheese-making are industries which also fall within the scope of that Department."

Unduly restricted thus as Mr. Collin's enquiry was, even the industries which were investigated were, we venture to think, superficially treated ; and the information contained in the Report is not, in many cases sufficient or accurate enough for practical action being based upon it.

In Bombay nothing whatever was done. And when a few years later the Industrial Conference and the Industrial Association of Western India represented to the Local Government the need of an industrial survey, the reply was given that it was not necessary.

In reply to the Government of India the Government of Madras stated that no industrial survey had been undertaken in that Presidency but that Mr. E. B. Havell, Superintendent

of the School of Arts, Madras, had submitted reports on the condition of *Industrial Art* in fifteen districts of the Presidency, as the results of tours undertaken by him under their orders, "The general result of those reports is," the Government of Madras wrote, "to show that such a survey as this Government understand to be suggested in paragraph 25 of the Resolution of the Government of India above referred to would be infructuous. Should the Government of India, however, consider further action desirable, His Excellency the Governor in Council would be glad to be informed somewhat more precisely what is the nature of the industrial survey contemplated and by what agency it is proposed to be made as it would be impossible for this Government at present to undertake any measures involving additional expenditure." The Government of India wrote in reply "to say that the enquiry which is being made by Mr. Havell into the arts and industries of the Madras Presidency is such an enquiry as was contemplated by the Government of India with the exception that Mr. Havell looks on industries from a more strictly artistic point of view than the Government of India had contemplated and omits to notice the large manufacturing operations which in the Madras Presidency as in other provinces are doubtless carried on in connection with railways, mills or factories. It might be possible to enlarge the scope of Mr. Havell's enquiries in this direction. The Government of India understands that Mr. Havell will compile an account of the industries and arts of Madras after the completion of this inquiry, and that His Excellency the Governor in Council having supplemented Mr. Havell's inquiry in the direction now indicated, so far as may be necessary, will then be in a position to decide * * *." As a matter of fact, neither did Mr. Havell complete his enquiry nor did the Government of Madras supplement it in the direction indicated by the Government of India.

The Government of the United Provinces decided in the year 1890 that no industrial survey of those provinces was needed.

The reply of the Government of the Punjab to the Government of India was as follows:—"Notes on the *Arts Industries* of the Punjab prepared by Mr. Kipling and expanded from those given in the 'Gazetteers' have been published in the Indian Art Journal, and the summary that accompanies that letter was drawn up for the Revenue and Agricultural Department. Monographs on the principal manufactures are also issued periodically from the Financial Commissioner's Office and published for information. With regard to the small degree to which existing industries are centralised, the simple nature of the handicrafts, and the small capital employed, it does not appear that anything

more than this is required at present in the Punjab, and the preparation of a more elaborate survey with statistics would demand, for adequate treatment, a special agency. Nor would such a survey in the Lieutenant-Governor's opinion bring us, in any material degree, nearer to the desired object in this province " It is clear that the Government of India did not regard Mr. Kipling's note on Art Industries as an adequate substitute for an industrial survey, as they wrote in their Resolution of 7th September 1894, that " an industrial survey was not carried out, as existing industries are little developed."

In Lower Burma we understand that an industrial survey was carried out.

In the Central Provinces the enquiry was entrusted to the Inspector-General of Education and the Commissioner of Settlements and Agriculture. Their joint Report, however, it must be frankly stated, was not of a character sufficiently helpful in the manner desired.

In conformity with the instructions of the Commissioner of Berar, " to institute an enquiry each for his own district, and to report upon the extent, character and circumstances of important local industries," the Deputy Commissioners of Amraoti, Akola, Wun, Basim and Buldana sent replies of a few lines each which can hardly be seriously regarded as partaking of the nature of an industrial survey

The Chief Commissioner and the Director of Land Records and Agriculture of Assam concurred in holding an industrial survey of that province to be unnecessary as " we know already what arts and industries exist and the survey, if undertaken, would teach us little that is new."

The Chief Commissioner of Coorg similarly reported that " nothing would be gained by a further enquiry " after the " very careful investigation " which the industries of Coorg underwent at the hands of " the Local Committee which was appointed to collect exhibits from this province for the Colonial and Indian Exhibition in London in 1886, and over which I presided."

5. Matters rested here till 1902, when the Committee on Industrial Education, composed of Lieutenant-Colonel J. Clibborn, Mr. C. A. Radice, I. C. S., Mr. R. E. Enthoven, I. C. S., and the Rev. F. Westcott, again pointed out the necessity of an industrial survey in paragraph 58 of their Report which is as follows :—" In the absence of a complete survey of Industries, we have found it impossible to make detailed recommendations as to particular industries and the methods of instruction that may with advantage be applied to each. The making of such a survey must necessarily precede the

development of any scheme of Industrial Instruction. A Note on Indian Industries which will, it is hoped, be found useful to officers making a survey will be found at the end of this report. It shows in a striking manner the great importance of some industries which have hitherto received scant attention."

The Note referred to above was prepared by "Mr. Radice, and some passages may usefully be quoted from it as showing the need for an industrial survey.

"I. The census taken in 1891 showed that in India more than 30 million persons depended for a living on occupations which may be classed as industrial. This figure indicates the magnitude of the enquiry which must necessarily precede any systematic attempt to improve the skill of the industrial workers."

"II. In accordance with the orders of the Government of India, the Local Governments have caused surveys to be made of various industries, principally those which are related to the textiles, earthen, China and glassware, copper and brass, the precious metals, ivory. The writers of the monographs, which were prepared in each province, dealt with the history of the industry, the castes engaged therein, the centres where it thrives most, the methods of work and implements adopted, the present state and future prospects of the industry, and the wages earned and profits made, by the worker, but no attempt was made to compare the relative influence of each industry on the general wealth of the country. The choice of the textile industries is fully justified by the vast number of workers it supports, but the choice of the ivory industry, which supports less than two thousand persons, can only find justification in the fact that it develops the artistic talent. Other industries such as those which deal with fish, oil, iron, leather, butter, tobacco, sugar which afford a living to very large numbers of workers have not yet been examined."

"III. Turning from the census tables of 1891 to the trade statistics for 1901, the large export of raw material invites attention to those industries which would provide an occupation in working up such materials for foreign markets. The bare statement, for instance, that India exports $5\frac{1}{2}$ crores worth of untanned hides and tanning materials, suggests the importance of giving instruction in processes for tanning hides. Tanning is an industry which thrives on the misfortunes of the agriculturists and which calls for workers to deal with the hides of the dying cattle at a time when the agriculturist finds it most difficult to earn a living.

"Due enquiry would probably suggest many industrial openings in respect of other raw materials which are being

exported in vast quantities. The following may be mentioned—jute (10 crores of rupees) ; short staple cotton (10½ crores) ; forest lac for varnishes and printer's ink (1 crore) ; coarse wool (126 lakhs).

"IV. The tables for imports are also instructive, but a careful industrial survey may show that much can be done to foster manufactures which will compete successfully with the factories of Europe."

Mr. Radice says of *Drugs* that "examination may indicate a way of greatly increasing exports, and of substituting export of extracts and preparations for that of the raw product." Of Umbrellas he says : " Investigation may discover an Indian cane suitable for umbrella handles ; it may be possible to weave the cloth for cotton umbrellas in India. Even the making up of umbrellas from the imported parts would employ many hands." And of iron : " The smelting of the iron ores of India is manifestly a matter of the greatest importance. The question calls for carefully organised investigation. No action, however, was taken on the recommendation of the Committee on Industrial Education.

6. The next occasion on which official attention was bestowed on the subject was, when the Hon'ble Mr. J. P. (now Sir John) Hewett, then Member for Commerce and Industry, spoke of the importance of an industrial survey, with the concurrence as he has since said, of the Government of India, in his speech in the Supreme Legislative Council on the 28th March 1906. He said :—" Much information bearing on this subject (of indigenous industries) has been collected in Census Reports and in Monographs which have been prepared on the different industries ; but the material is scattered, there is no co-ordination of results, the subject is in general treated from the artistic point of view rather than from a business standpoint, and the information is in many cases neither sufficiently detailed nor sufficiently exact to be of much practical use. We hope that other Local Governments * will now make a survey of the state of indigenous industries within the areas of their jurisdiction, with a view to ascertaining the exact state of the various industries and handicrafts, the amount of the earnings and the present condition of the artisans respectively employed in them, the precise manner in which the different industries have been affected

*Mr Hewett spoke under the impression that the Government of Madras had carried out an industrial survey. This was not so, as what that Government did was to place Mr Alfred Chatterton on special duty to work up particular industries (for instance, aluminium, handloom weaving, chrome tanning) and not to make an investigation into all industries. A complete industrial survey of the Madras Presidency has yet to be carried out.--V.D.T. & R.N.M.

by competition with imported articles, the practicability of creating new markets, or of developing markets which already exist, and the possibility of giving a new lease of life to these industries either by means of special instruction, or by the improvement of the appliances in use. It is not too much to hope that something tangible may be done to improve their efficiency and increase their scope by reorganising them on modern lines."

7. The Right Hon. the Secretary of State, too, made a sympathetic declaration on the subject towards the end of last year when his attention was called to it by a question in the House of Commons by Mr. H. Nuttall, M.P., President of the Manchester Chamber of Commerce. We quote the question and answer:—"Mr. Nuttall asked the Secretary of State for India whether his attention was drawn to the Report of the Indian Industrial Conference held at Benares last Christmas, and to the plea for an industrial survey on the lines pressed on the Government by Dr. Forbes Watson in 1872, and supported by Sir Louis Mallet; and whether, looking to the fact that the need for such a survey for the industrial development of India was recognised by the Government in 1888, by the Committee on Industrial Education, and by the Member for Commerce and Industry in the Viceregal Council last March, he would cause early steps to be taken so that accurate information as to industrial products and means of production might be made readily available to agriculturists, manufacturers, and men of business generally.

"Mr. Morley: I have seen the paper read before the Indian Industrial Conference, in which the need for an Industrial survey of India was urged. As the Hon. member is aware, the proposal has received the general approval of the Government of India, and the Local Governments have been urged to make a survey of the state of indigenous industries within their territories. I trust that this may result in the collection of much valuable information."

8 The above declarations, however, are, it would seem, not regarded by some Provincial Governments as authoritative and binding and they do not seem to consider that they are under an obligation to give effect to the directions laid down. Excepting the Government of the United Provinces and the Administration of the Central Provinces, the other Governments and Administrations have not yet taken steps to have industrial surveys made of their respective provinces. The Government of Bengal were interpellated on the matter in August of last year by the Hon. Syed (now Mr. Justice) Shurfuddin at a meeting of the Provincial Legislative Council, and they said in reply that they did not consider an industrial

survey necessary. They seem to have since changed their opinion, judging from the passage quoted below from the speech of the Hon'ble Mr. Gait at the meeting of the Council held on the 6th of April 1907.—“ The first step would possibly be to place some one on special duty to make a general study of the industrial position and possibilities, to collect information regarding the various industries, and to endeavour to ascertain the causes of their rise or decline, and so pave the way for the establishment of the requisite technical schools.” While it is gratifying that the Government of Bengal have changed their former opinion that no industrial survey was necessary, it is to be regretted that effect has not yet been given to what Mr. Gait acknowledged was the proper course to follow.

In Eastern Bengal and Assam similarly, nothing has been done. Speaking at a meeting of the Legislative Council of Eastern Bengal and Assam held on the 15th April, His Honour the Lieutenant-Governor, the Hon'ble Mr. (now Sir Lancelot) Hare said:—“ In regard to industrial education I can assure the Hon'ble members that there is no subject in which I take greater interest, but let me also say there is none which to my mind bristles with greater difficulties. I should very much like to have in this Government a Department of Commerce and Industry, and I hope that I may yet see such a department established. We have, from time to time, reviewed our industries, and have considered a great variety of opinions as to measures we might take to improve and develop them, but I feel that if we are to deal adequately with this subject we require a whole-time officer at the head of a department possessing special qualifications and experience to obtain and maintain full information as to existing industries and to carefully watch and promote all new efforts and to assist all promising attempts to start new industries with information and advice. As industries show any prospect of development, and as skilled persons are required to carry on these industries, Government might open out suitable training schools. We cannot all be omniscient, and this is a very special branch of knowledge in which the expert is very much in demand. Without such a department as I suggest, I consider that we are likely to be very much in the position of the blind leading the blind. We are likely also, without a thorough and comprehensive review of our position and without a full grasp and understanding of our advantages and disadvantages, to waste our energies over a large field of effort, and so to accomplish less than if we confined ourselves to a few suitable selected industries.” We would respectfully submit that the difficulties in the way of making an exhaustive and accurate industrial survey are not at all so

great as His Honour regards them, and we regret that no action has yet been taken in the matter although the importance of an industrial survey is recognised by the Government of Eastern Bengal and Assam.

The Government of Bombay were sought to be moved in the matter by means of an interpellation in the Legislative Council of that Presidency by the Hon'ble Sir Pheroze Shah Mehta. The reply then given was not of a very satisfactory nature. But we understand that since then the subject has been engaging their attention. No action, however, has yet been taken.

The only provinces in which action has been taken or has been decided to be taken are the United Provinces and the Central Provinces.

9. We have endeavoured to give in what has been submitted above, the history of this question as we believe it would serve to remove the misconceptions which prevail in certain quarters. We think it desirable to emphasise the fact that the idea originated with persons whose knowledge and authority is admitted by all and that the Government of India themselves have on more occasions than one declared their acceptance of the view advanced and policy recommended, because we notice with regret that there is still a disposition among some of those on whom depends the institution of an industrial survey to question its necessity, utility or practicability. The need for such a survey is all the greater now on account of the awakening to the absolute necessity of industrial development which is observable in every part of the country. Enthusiasm without knowledge cannot, however, avail much; and at present there is wide-spread ignorance of even the natural resources of the country. And even among the educated and otherwise well informed classes and persons interested in commerce and trade, there is not sufficient knowledge of its industrial capabilities immediate and potential. No real and solid progress is possible unless and until this ignorance is removed and this knowledge supplied. And this is what an industrial survey aims at. For such a survey to yield the maximum benefit it is capable of, it must be complete and thorough; it must extend all over the country, and it "must be so conducted as to regard nothing as beneath notice." It is obvious that the task is of considerable magnitude and beyond the means of any non-official agency that can be employed for the purpose.

In compliance with a resolution passed at the First Indian Industrial Conference held at Benares in December 1905, the General Secretary of the Conference tried to collect information which might supply the place of a rough industrial

survey. A set of questions were framed the answers to which would, it was hoped, give information sufficient to serve as a basis for an accurate and exhaustive enquiry. These questions were sent to over a thousand persons in different parts of the country but the response was most meagre and unsatisfactory—several persons confessing that they had neither the means nor the agency to collect the necessary facts and that the demands of their profession or business left them no time to make the necessary investigation personally. The difficulty is that in thousands of cases private enterprise, unaided by the State, could not get reliable information, no matter what it expended with the object of doing so. It may be left to private individuals to go into the details of industrial projects and to satisfy themselves that the elements of profit are present in them. But as things stand in India, it is the Government which should take upon themselves the task of collecting the data that will enable the manufacturers to direct their activities to those regions in which there is a *prima facie* case for experiment and trial. This sort of assistance was rendered in the case of the Sugar industry by the publication of several articles in the *Indian Trade Journal* last year. What we respectfully urge the Government to do is to institute detailed enquiries in the different provinces, districts and sub-districts on some such line as that adopted in the questions drawn up by the Conference Office. We beg to enclose herewith a few copies of these questions. We believe that working upon the lines indicated, all the facts necessary to be found out about the past history, the present condition and future possibilities of Indian industries can be sufficiently investigated and accumulated.

10 In making an industrial survey we would respectfully suggest that the procedure followed in the Kolhapur State may usefully be adopted in British Provinces. The industrial survey of the State was sanctioned by the Council of Administration which then ruled over the Kolhapur Territory. The scheme was as follows :—

- (1) " To collect information through the village and district agency, about the existing industries in the territory ;
- (2) To visit the principal industrial centres to check the information collected, and to make local enquiries on the spot about the state of the existing industries and the means of improving and developing them ;
- (3) To visit the localities of mineral resources pointed out by the Geological Survey and to see whether any new industries can be started ;

- (4) To visit the principal parts of the forests and to find out if any of the products can be developed and increased so as to turn them to industrial account and to start any forest industries ;
- (5) To visit those parts where no industries exist and to devise means, if possible, to employ some portion of the population there ; and
- (6) Lastly, to condense the information, to describe the state of the existing industries, to suggest means of improving and developing those that already exist, and the possibility of starting new ones."

Forms and returns with explanatory notes so simple as to be easily intelligible to them, were printed and distributed broadcast to all the villages in the territory through the Mamlatdars and other officers, and the occasion was also utilised to collect information about the indebtedness of the agricultural and industrial classes, by drawing up a set of questions, and distributing them with the other returns. Subsequently, instructions were also issued for making-up the totals for all the villages in a Taluka in a suitable form. With a view to check the information thus supplied by the Kulkarnees, blank forms of the returns were also forwarded through the Deputy Educational Inspector to the schoolmasters. Some of these made independent inquiries and supplied useful information. An officer of the State was placed on special duty to visit the important centres of industrial and commercial activity for checking and supplementing the information collected as aforesaid. He visited large trade centres as well as large weekly markets on market days in order to estimate the consumption of local and foreign industrial products, and to see which of them could be locally manufactured on a larger scale. At important markets arrangements were made for enumerating the number of people that visited the market from outside and for making a rough valuation of the industrial products, cattle and sheep sold. He likewise visited important shops wherever they existed and saw what kind of industrial products were sold, and took care to ascertain the quantities of manufactures that were imported from the neighbouring manufacturing towns on the borders of the territory, and were capable of being locally manufactured. At every industrial centre, the officer visited every industrial house, saw the plant used, the articles turned out, and estimated the cost of the plant and the prices of the raw material required, and of the articles prepared. He marked out such of the workmen as struck him to be possessed of skill and able to do superior work, inquired what difficulties lay in their way and whether they could introduce improvements if assisted. He also tried to point out if a particular

locality possessed special advantages for a particular trade. The result was a report full of instructive information and suggestions.

11. In conclusion we beg to respectfully express the hope that the Government of India will be pleased to favourably consider the suggestions of the Indian Industrial Conference and to again urge upon the Local Governments and Administrations the necessity and importance of instituting and carrying out at an early date industrial surveys within their respective provinces in as thorough, full and accurate a manner as was done in the Kolhapur state.

We have the honour to be,

Sir,

Your most obedient Servants,

VITHALDAS DAMODHER THACKERSEY,

President, Second Indian Industrial Conference.

R. N. MUDHOLKAR,

General Secretary, Indian Industrial Conference.

APPENDIX II.

TECHNICAL EDUCATION IN THE CENTRAL PROVINCES AND BERAR.

The following correspondence was published in the *Central Provinces Gazette* of the 9th November 1907 :—

Dated Matheran, the 21st May 1907.

FROM

Rao Bahadur R. N. MUDHOLKAR, B.A., LL. B.,
*President, Second Central Provinces and Berar Provincial
Industrial Conference.*

TO

THE SECRETARY TO THE HON'BLE THE CHIEF COMMISSIONER,
Central Provinces, Education and Medical Department.

In continuation of my letter dated the 23rd April last and with reference to the Central Provinces Secretariat letter, No. 463—VI.9, dated the 17th idem last, and Mr. Slocock's letter, No. C-384, dated the 3rd June 1906, I have the honour to submit herewith for being laid before the Hon'ble the Chief Commissioner the detailed suggestions which had to be made on the topics included in the first resolution of the Central Provinces and Berar Provincial Industrial Conference held at Jubbulpore on 15th April 1906. I have again to express my regret at the long delay which has taken place in sending these suggestions.

Detailed suggestions for providing Technical Education in the Central Provinces and Berar on the lines laid down in Resolution I passed at the Second Central Provinces and Berar Provincial Industrial Conference held at Jubbulpore on the 15th of April 1906.

Taking into consideration the means and capabilities of the combined territory of the Central Provinces and Berar and the financial resources available, what can be aimed at for the present are :—

1. Provision of secondary and higher instruction in
(a) mechanical engineering ; (b) cotton and silk

- manufacture ; (c) mining, (d) hardware, (e) industrial chemistry, and (f) agriculture.
- II. Crafts schools for (a) carpentry—ordinary and artistic ; (b) smithy ; (c) pottery and china ware ; (d) brass and bell metal manufacture, and (e) handloom weaving.
- III. An institution for experiment and instruction in regard to sericulture as recommended by the Committee on Industrial Education, and provision for carrying out, though on a smaller scale than that proposed in the Report, their suggestions about testing the comparative efficacy and commercial value of improved methods and appliances in (a) textiles and (b) lac, tins and dyes.
- IV. Manual training in High Schools and Anglo-Vernacular Schools ; and drawing in all schools teaching above the fourth Vernacular Standard

I. For higher instruction there is provision made in the existing schemes for agriculture in the Victoria Technical Institute at Nagpur and for mechanical engineering at the Victoria Technical Institute at Amraoti. Provision also deserves to be made for instruction in the preparation of textile fabrics, mining, industrial chemistry and preparation of hardware. A class for secondary instruction in mining might be joined to the Nagpur Institute and teaching of industrial chemistry, especially with reference to oils, paints and varnishes and to dyeing and tanning, should be arranged to be given there. In the Amraoti Institute instruction in spinning and weaving and in hardware can be arranged to be given.

The cost for providing the educational facilities advocated above in regard to manufacture of textile fabrics and mining will depend upon the scale on which the establishments are organised. Considering the resources of the province the provision should be of the same kind as that settled for instruction in mechanical engineering at the Amraoti Institute. The capital expenditure need not exceed Rs. 15,000 and the recurring expenditure Rs. 6,000 a year for the present. The amounts are calculated so low on the assumption that spinning and weaving classes will under the scheme be joined to the Amraoti Institute, where there will be ready provision afforded of suitable lecturing rooms, and the motive power provided for driving the mechanical workshop can be made to subserve the purposes of the spinning and weaving shed. A teacher like Mr. Fernandez in the Bombay Institute, who for years lectured to the two

lower classes, but who after Mr. Monie's death has been taking the third year class also, can, it is believed, be got at a salary ranging from Rs. 200 to 300 a month. With three Jobbers on Rs 50, 40 and 30 respectively, the staff will be found adequate for our present purposes.

Such an institution cannot be called a first class one, but that is all that we can aim at for years to come. It will be something like a second grade college on a small scale.

For industrial chemistry the facilities already existing and contemplated in the Victoria Institute at Nagpur should be fully utilised. An Assistant Professor, who should be a B.A. and B. Sc. or M A. in Science and has further received some practical training, should be supplied. The salary will have to be from Rs. 200 to Rs. 350.

In regard to mining there should be two courses—the Upper course and the Lower course. The aim in the Upper course should be to prepare students for the Mining Engineering diploma of the Sibpur Engineering College. The curriculum should be arranged in consultation with the authorities of that College. The course should extend over a year and a half or two. The terms put in in the Central Provinces Provincial Institute should be recognised by that College provided the examination tests are fulfilled; and those who pass should have the privilege of appearing for the Diploma Examination after they put in in the Sibpur College the rest of the period of attendance and instruction prescribed for that examination.

The Lower course should aim at turning out foremen and chargemen. The instruction should be in vernacular.

The instruction in hardware can conveniently go with that in mechanical engineering.

The branches mentioned above have been selected for the reason that the existing conditions of this territory afford special facilities and, therefore make special demands for their development. The resolution of the Conference makes no reference to either hardware or industrial chemistry. These branches are now included because the expected establishment at no distant date of the Tata Iron and Steel Works would afford a far greater scope to the manufacture of hardware than what exists at present and the provision for a well-equipped Laboratory and a Professor of Chemistry at the Nagpur Victoria Technical Institute makes it easy to undertake instruction in industrial chemistry.

II. The Collegiate Institutions mentioned above in section I would supply facilities for turning out mill and factory managers and assistants, mechanical engineers, spinning, weaving and carding masters, industrial chemists,

directors of large agricultural farms, &c. To meet the case of the large number of men who earn livelihood by means of the different handicrafts it is equally necessary that provision should be made for improving these handicraft industries. The work here is twofold: (1) to teach the men who live by these industries the superior appliances and methods adopted in the advanced countries of the West, and (2) to raise their general intelligence and educational qualifications. For this purpose industrial schools based on the model of the craft schools of the West should be established in each district. The circumstances of the different districts vary and the establishment of schools will have to be decided with reference to such circumstances. The following suggestions are put forward tentatively.

NAGPUR DISTRICT.

Hand-loom Weaving.

The hand-loom weaving industry exists on a considerable scale in the Nagpur District. There should be two schools for hand-loom weaving organised—one at Nagpur and the other at Umrer—the two chief centres of this industry in the District. The most improved patterns of hand-loom with the fly-shuttle attachments should be provided, and practical instruction in them should be given in the vernacular by qualified persons with Indian experience. The instruction will have to be in regard to both weaving and the preparatory processes, *i.e.*, warping, sizing, winding, beaming, &c. Concurrently with the instruction in the industry itself there should be instruction in general elementary education and ordinary drawing.

Carpentry and Smithy.

There should be a school for carpentry—ordinary and artistic—and for smithy. Artistic carpentry would include cabinet-making and carving.

It should be convenient to have these schools located near each other and placed under the same board of management. If possible, the funds should be obtained partly from local subscriptions and partly from Government contributions, and the management should be entrusted to a composite body consisting of representatives of the subscribers and the nominees of the Government taken in due proportion. In case popular subscription is not forthcoming the entire money should be found by Government and the Municipal and District Board funds, and the governing body should be organised accordingly. In addition to these special superior carpentry and smithy schools, there should be schools of

classes for teaching ordinary carpentry and smithy in each tahsil.

Provision should be made in this district for instruction in the manufacture of bell metal and brass also.

The suggestions submitted about general elementary education in industrial schools and about carpentry and smithy schools for each tahsil are intended for application to all districts and tahsils.

JUBBULPORE DISTRICT.

In this district the industries that seem to afford scope for development are (1) pottery and porcelain, (2) stone and marble, (3) shellac and (4) sugar. Schools for giving instruction in these industries will be found very useful. In regard to pottery and porcelain it might be considered whether any satisfactory arrangement might not be made with Messrs. Burn & Co., under a system of grant-in-aid based partly on capitation grant and partly on grant by result.

Pottery in Wardha and Yeolmal Districts.

A school for pottery and porcelain should be opened at Warora, and after it is found how it succeeds another might be opened at Wun, in the vicinity of which also the materials required for superior kinds of earthenware are said to abound.

Carpentry schools in other Districts.

Schools for superior kind of carpentry will do well in the following districts—Chanda, Seoni, Hoshangabad, Mandla, and Raipur—as they have large forest areas with abundance of good timber.

Hand-loom weaving in other Districts.

The hand-loom weaving industry exists more or less in every district. It stands next to agriculture in giving employment to and supporting large numbers. While there should be at Nagpur a hand-loom weaving school equipped with every kind of improved looms and with appliances required for the preparatory processes, there should be one weaving school organised on a humbler scale in each district. At Burhanpur in the Khandwa District the work turned out, especially in lace, is in some respects superior to that of Nagpur. There should be at this town a school as well equipped as the one proposed for the latter city. It should further be one in which gold and silver lace work is taught.

The dyeing industry and the paper industry still exist in this town and the carpets called "Jajams" are also turned

out. The first and the last can conveniently be taken in the proposed school for weaving and preparatory processes. The second will require a separate school by itself.

The manufacture of "Jajams" is also carried on in the Betul District and at Wun in the Yeotmal District (in Berar). In the weaving schools of those districts the preparation of these articles should receive special consideration.

At Akot in the Akola District and at Ellichpur (now in the Amraoti District) the manufacture of strong and thick cotton carpets was a paying industry at one time. At both these places schools for carpet weaving as also for weaving should be established.

Bell metal and brass manufacturing schools seem wanted in the following districts:—Damoh, Mandla, Hoshangabad, Bhandara.

At Buldana a considerable number of various kinds of articles of steel and iron, such as scissors, nut-cutters, knives, &c., used to be prepared and they had a good demand. The smithy school there should be such as would enable the disappearing art of these artisans being preserved and imparted to others.

The weaving school for the Buldana District should be located at Deulgaon Raja.

Sericulture and Tassar Silk Weaving.

Bilaspur is the district where a tassar silk weaving school will not only do well, but is in a manner wanted. The Committee on Industrial Education appointed by the Government of India in 1901 recommended the establishment of an institution for experiment and instruction in sericulture at Sambalpur subsidiary to the chief one proposed to be established in Bengal. As Sambalpur is no longer in this province a school like that proposed by the Committee (*vide* Report, pages 22-23) should be established at Bilaspur or Raipur.

Manufacture of Sugar.

In the Betul and the Chhindwara Districts, where sugarcane plantation exists on a fairly large scale and can be made more profitable than at present if sugar manufacture is established, it would be well if some encouragement for experiments in this direction is given.

Bamboo Work.

Bamboo work should be taught at Chanda, Raipur and Hoshangabad.

Industrial Survey.

The suggestions submitted above are put forward with diffidence as owing to the absence of a properly conducted industrial survey it is extremely difficult to prepare a suitable and comprehensive scheme for technical education. The necessity of such a survey, which was admitted in the Resolution of the Government of India in the Home Department No. 179, dated the 18th June 1888, was emphasised by the Committee presided over by Col. Clibborn (*vide* Report, paragraph 58) and restated authoritatively in the speech delivered in the Supreme Legislative Council on 28th March 1906 by the Hon'ble Mr. J. P. Hewett (now Sir John Hewett), member for Commerce and Industry in the Council of the Governor-General.

Provision for Industrial Experiment.

III. The Committee just referred to point out that before improvements in methods and appliances can be generally introduced, experiment is required :—

- (i) to test the commercial value of discoveries ;
- (ii) to examine the methods and appliances of certain industries with a view to introducing improvements either :—
 - (a) by suitable alterations ;
 - (b) by the introduction of implements and processes used in other countries ;
- (iii) to test the practicability of producing at profitable rates goods now imported into India in large quantities or of working up raw material before export ;
- (iv) to train instructors in the results of the investigations in so far as they lead to the discovery of improved methods and appliances suitable to Indian conditions.

It is not possible to have in this province institutes where work on the lines indicated above can be carried out for all or most of the different industries which exist or can be established here. It is hoped that the utility of an institute for experiment and instruction in sericulture as recommended above will be acknowledged and effect given to the suggestions of the Committee on this matter. But though similar institutes for other industries cannot be provided it is quite feasible to apply in a modified form and on a smaller scale than that contemplated in the Report the very valuable recommendations made therein. For the present action may be confined to two or three departments of industries :—

- (1) hand-loom weaving ;

- (ii) oils and fats and their preparations for commercial purposes ;
- (iii) lac, tans and dyes.

(i) There is a large number of patterns of handlooms provided with the fly-shuttle attachment each claiming superiority over the rest as being constructed on the most improved plans and being most effective and economical. In the case of some of these there is no doubt that some at least of the merits claimed are well founded. But it is becoming obvious that looms suited for one kind of work or one part of the country are not equally efficient for or in others. In the absence of a recognised body, qualified and prepared to give authoritative advice, persons with small means have been sorely disappointed in their expectations or compelled to earn their experience at a great cost. The difficulties are increasing, as in the ardour for industrial development which has manifested itself recently new types and patterns of hand-looms, are put on the market every day. With a view to minimise these difficulties to some extent and to find out the relative merits of the better patterns of handlooms, a prize competition was instituted in December last by the Indian Industrial Conference for both Cottage and Factory looms. Out of the thirty-two looms brought into the Exhibition ground at Calcutta only ten were entered for competition. The reason why the others failed to do so is obvious. And yet the makers of those looms have been able to sell their productions almost as easily as the tested ones.

It is also necessary to test the feasibility and commercial value of the alterations and improvements which are suggested from time to time. And it is equally, if not more, necessary to have an institution where some special thought would be given to discover methods for improving the efficacy and utility of the handlooms.

While some progress has been made in the matter of handloom itself hardly any advance has been made in regard to saving of time or increase of efficiency of the preparatory processes.

It is suggested that there should be one large Central School of handloom weaving where in addition to teaching workers there should be scope for the kind of experiment and instruction as is laid down in paragraphs 31 and 35 of the Industrial Education Committee's Report. This school should be located preferentially at the place where provision is made for instruction in textile manufacture, with power-driven spindles and looms,

The additional expenditure which the carrying out of this object will involve need not be very great. It is not necessary to have a specialist or an expert of the highest kind and of the most varied knowledge and experience. It is quite feasible to have on a salary of two to three hundred rupees a month a person with sufficient qualifications to answer our requirements as set out above.

(ii) and (iii). The oil industry of the province is growing and the preparation and refinement of cotton seed oil, rosza oil, &c., the improvement in the processes employed in expressing oil from linseed, sesamum, gingelly, rapeseed, &c., and the manufacture of paint, varnishes, soaps, candles, &c., are matters which demand urgent consideration. In the Nagpur Institute provision should be made for conducting experiments for testing the commercial value of the industries dealing with these products in the manner in which the Government of Madras made experiments in regard to aluminium under the direction of Mr. Chatterton or are now doing in regard to chrome tanning. Similar action is also very desirable in regard to lac, tans and dyes. If our provincial institution at Nagpur works in co-operation with that of Madras, as it should, there would be great saving of time, energy and money. With a competent Professor of Chemistry who has studied science not only in its general aspects but with special reference to manufacturing industries and one assistant professor under him, all the demands on the chemical side of the institute in regard to the Agricultural College, the Arts Colleges and the proposed industrial department can be fairly met.

Drawing and Manual Training.

IV. These subjects which form clause (4) of the Resolution I of the Conference do not stand in need of elaboration. Their value as a training of the eye and hand, and as cultivating exactness, precision and lightness of touch, is now universally admitted. Their peculiar importance in India lies in the fact of their counteracting the purely literary tendencies of the race and emphasizing the dignity of natural work. Drawing should be compulsory in the Upper Primary, the Secondary and High School courses and manual training while compulsory for those who take the High School course should also be thrown open to such students in the Upper Primary and Secondary Schools as deserve to avail themselves of the same. The text book of Manual Training for Indian Schools of Professors Alexander and Thomson will answer our purposes,

Scholarships

On the matters contained in sub-clauses (a) and (b) of clause (5) of the resolution no special suggestion has to be made beyond submitting that the number of scholarships should be sufficiently large. On sub-clause (c) it has to be submitted that the allotment of the State scholarships only to mining will not meet the purposes for which these scholarships have been instituted. The mere existence of abundance of mineral resources in the province is no reason for expecting an admittedly backward province to supply competitors in a branch of technical knowledge which has made very little progress till now anywhere in India. It was only very recently that the mining course was established in the Sibpur Engineering College. It is no wonder that none of the persons who applied for the scholarship last year was found possessed of the special knowledge which is very properly insisted upon as a necessary qualification. It is suggested that the number of State Scholarships for scientific and technical study outside India should be increased to three and that they may be awardable for any one of the following:—(1) Mining; (2) Mechanical engineering; (3) Electrical engineering; (4) Textile manufacture; (5) Sericulture and (6) Industrial chemistry. Pending this increase in scholarships the rigidity of the existing rules should be relaxed to the extent of removing the restriction of the scholarship to mining and throwing it open to persons wishing to complete their education in one of the branches (1), (2), (4) and (6) mentioned above.

No. 1290—VI-9, dated Nagpur, the 14th October 1907.

From—Major T. C. PLOWDEN, I. A. Third Secretary to the Chief Commissioner, Central Provinces.

To—Rao Bahadur R. N. MUDHOLKAR, B. A., LL. B., Advocate of the Central Provinces and Berar, and President, Central Provinces and Berar Provincial Industrial Conference.

I am directed to acknowledge the receipt of your letter, dated the 21st May 1907, in which you make suggestions for the improvement of industrial education and for industrial development in the Central Provinces and Berar.

2. Before discussing your proposals in detail, I am to convey to you an expression of the Chief Commissioner's great appreciation of the interest which you have taken in the matter and of the labour which you have expended in formulating your schemes. While Mr. Craddock is in thorough sympathy with the object which you have in view; he fears that it will be many years before these provinces can have a complete system of technical education without

relying upon the institutions of other provinces. To begin with, the expense would be prohibitive, and in many respects the provinces are not yet sufficiently advanced to justify the establishment of large independent schools for several industries. In the case of large and new industries, which could be carried out only with considerable capital, Government can do nothing direct: such capital must be found by private enterprise. As you will observe from the following paragraphs, which deal with your suggestions in detail, Government already gives indirect assistance by means of scholarships with a view to enabling promising young Indians to qualify themselves for employment as skilled managers and assistants in existing or projected large industrial concerns, such as cotton mills and mineral enterprises.

3. You suggest that a higher course of instruction in textile fabrics be attached to the Amraoti Technical Institute and you estimate the initial cost at Rs. 15,000 and the annual recurring expenditure at Rs. 6,000. Though this would be only a second grade institution the expenditure proposed would be quite inadequate to start anything really useful in the shape of advanced instruction in the preparation of textile fabrics. The scale on which provision is made for the teaching of this subject at the Yorkshire College at Leeds or the Bombay Victoria Jubilee Technical Institute will show that anything on the scale suggested would be of very little use. Moreover, the Chief Commissioner does not consider that the industrial development of the province has yet reached the stage at which the establishment of an expensive college for an advanced course of instruction in textile industries would be warranted. I am to point out that in the meantime Government has taken advantage of the existence of such institutions elsewhere by encouraging provincial students to attend them with the help of scholarships. One student has already been sent to England with a State scholarship to study this subject; and in order to secure qualified scholars for the State technical scholarships in Europe, the Chief Commissioner has decided to give three scholarships tenable at the Victoria Jubilee Technical Institute at Bombay. Mr. Craddock believes that more good will accrue by thus sending students to good institutions outside than by starting an inferior institution within the provinces.

4. You propose that a course of instruction in industrial chemistry in charge of the Professor of Chemistry, helped by an assistant on a salary of Rs. 200—250, should be added to the syllabus of the Nagpur Victoria Technical

Institute. Undoubtedly there is a considerable demand in India, and some in the Central Provinces, for industrial chemists for employment at mines, sugar factories and other works. The addition to the Nagpur Victoria Technical Institute of the course of instruction suggested by you would mean substantial expenditure in additional laboratories and equipment and extra staff; but the Chief Commissioner is prepared to organize at that Institute post-graduate teaching in mining chemistry and to start a class in industrial chemistry, if managers of existing factories will define the branches of industrial chemistry in which they think they could offer useful and attractive employment to young men so trained. The start would necessarily be on a modest scale.

5. With regard to mining, it is understood that your proposals aim at starting at the Jubbulpore Engineering College (a) a lower course of instruction in the vernacular to train foremen for mines and (b) a higher course in English which would be considered equivalent to the first part of the mining course of the Sibpur College to which students should be admitted to complete their course. Mr. Craddock doubts whether either proposal is feasible. It would be difficult to graft a vernacular course on to the existing college, and the Sibpur College authorities would almost certainly refuse to accept, on the terms proposed, students who had passed half their period of instruction at another institution. You are perhaps not aware that, at the request of this Administration, the Sibpur Engineering College authorities have agreed to admit for the whole mining course such students as are trained up to their entrance standard at the Jubbulpore Engineering School; and enquiries are in progress as to whether such a standard can be arranged for at the Jubbulpore Engineering College. One student was sent to England with a State scholarship to study mining in 1905, and two more have just gone. The Chief Commissioner proposes to give three or more scholarships, tenable at the Sibpur Engineering College by students who will undertake to be trained as mining engineers. For the present Mr. Craddock does not consider that anything more can be done towards the encouragement of mining education.

6. Before leaving that part of the subject which relates to the facilities offered to young men of advanced education to qualify themselves for well-paid employment in large concerns, I am to say that it is proposed to have some more advanced post-graduate teaching in science at the Victoria Technical Institute at Nagpur, while teaching in mechanics will, it is understood, be provided at the Victoria Technical

Institute at Amraoti, as soon as it is completed. The Chief Commissioner does not consider that the Administration would be justified in expanding existing institutions, or raising them at great expense to an equality with more advanced institutions in other provinces, until provincial development has further expanded and the demand for trained men has further increased. The supply in this case must follow the demand, or the advanced and expensive training will only tend to disappointment if those trained cannot find suitable avenues for the practical exercise of the art they have learnt. Such a result would merely cause discontent and defeat the object in view by making technical training unpopular.

7. The second branch of the subject is far more difficult since it relates to a different stratum of society and requires an improvement of handicrafts and cottage industries of which several are in a depressed condition. You propose to open a number of craft schools in certain districts for teaching handicrafts which are peculiar to such districts, particularly where the industry is in a decaying state or has even disappeared. While the Chief Commissioner agrees with you that the object in view should be to revive and improve such industries, he doubts very much whether such handicraft schools as you suggest are the best means for attaining this object. The Indian system under which a son or relative (in most trades even a stranger) is taught his trade by a worker in that trade meets all requirements so far as the teaching of existing methods is concerned. The real requirement for the development of these industries is not a system of teaching *existing* methods but a system of teaching *improved* methods. If an industry is dying out, it will not be revived by teaching the same methods that have failed to keep it alive and flourishing; the causes of decay must be diagnosed, and a treatment prescribed that will eliminate these causes and lead to improvement. In Mr. Craddock's opinion the proper course is to ascertain what industries there are, to select those which seem to be capable of improvement, to find out the methods by which they may be improved, and then to impart those methods to the classes likely to carry on the industries. There are, as may easily be judged, opportunities for failure at every turn and the chances of successful competition with machinery must often be small. The first step should be to collect all the available information on the subject. A fairly large amount has been collected at various times, but much of it is buried away in monographs and special reports, and its extraction, tabulation and classification will be a preliminary step. When this is done it will be necessary to visit and see in working all the industries

which survive; if they are flourishing they may perhaps admit of some extension; if they are depressed they may admit of some improvement; but before any practical step is actually taken the assistance of experts will be necessary. The Chief Commissioner intends to place this work under the direct supervision of the Director of Agriculture and to depute an officer in the ensuing cold weather to make an industrial survey of the province and collect in a handy form as complete information of existing industries as it is possible to obtain. The officer making the survey will require in each district all the assistance that can be given him by gentlemen interested in the development of industries, and it is hoped that the assistance will be real and substantial. He will also receive such help from District Officers as they can reasonably give with due regard to their many duties. If, as is hoped, it is found possible to hold an Industrial Exhibition in Nagpur in November 1908, the officer in question will be able to assist in its organization. By that time much information not now available should be at the disposal of the Administration, which will then be in a position to determine future policy in the matter of the most promising industries. All the information so collected will be submitted to, and discussed by, a specially selected Committee.

8. With regard to your suggestions on the subject of carpentry and smithy work, I am to inform you that for some time past it has been in contemplation to establish an Industrial School in Nagpur as an experiment. The scheme has not been proceeded with because the hope that the public would support it by liberal contributions has not been realized; as you were informed in Mr. Maw's letter No. 367, dated the 26th February 1907, it has not been found possible to enlist any local interest in the scheme. This is partly because the public at large are very busily occupied with their own affairs, and do not feel any special inward calling to devote their money to the improvement of classes who seem to them to be fairly well occupied, and partly because the scheme has been too vague and indefinite to attract interest. But it is also largely due to the fact that the more clamorous sections of the Swadeshi party are more interested in political opposition to the Government, and in the desire to find profitable employment for educated or semi-educated youth, than in the real betterment of the humble weaver or leather worker. They may conceal this even from themselves, but these, and no other, can be the reasons for their refusal to co-operate with the Government in any scheme for the improvement of handicrafts. In these circumstances it is left to the Government to move,

and orders are now issuing for the early construction of the buildings required for the school of handicrafts. The Director of Agriculture (who will informally perform the duties of Director of Industries) has been directed to give effect to the scheme as outlined by Sir Frederic Lely in Mr. Slocock's letter, No. 10291, dated the 5th September 1904, a copy of which was forwarded to you with Mr. Gown's letter, No. 3937, dated the 29th March 1906. The scheme provides for the instruction of boys of the artisan class or any class that like to come forward in smithy, carpentry, wood work, metal work and (as soon as the best form of handloom for local conditions can be determined) in weaving. The institution will comprise a hostel for boys who may come from outside villages, the necessary shed for workshop classes, and quarters for teachers. Later on, when the institution has actually come into being, the Chief Commissioner has no doubt whatever that it will receive much support from those genuinely interested in the subject, and the success which it achieves will be proportionate to the degree of this support. The subsequent management of the institution and the extent to which it can be placed under a Committee containing non-official members must depend on the amount of assistance it receives from the public. If the school is successful it may later on be possible to have similar schools in other districts. At present great difficulty is experienced in securing the services of a suitable staff for even one school, and the estimated expenditure (Rs.12,000 a year) is considerable. One object of the school will be to train suitable craft masters for employment in similar district schools. District industrial schools have been tried in the past and have failed, but with a more carefully prepared foundation and more gradual growth there may be more hope of success.

9. With reference to your remarks on the subject of pottery and porcelain, I am to say that the Chief Commissioner understands that Messrs. Burn and Company will not take Indian apprentices at their Jubbulpore works. The small pottery works at Warora have now been closed. If prospects were good enough private firms would have started long ago to work the clays of Warora and Yeotmal.

10. Mr. Craddock does not consider that a school in sugar manufacture is feasible at present. Although the crop is of comparatively minor importance, the Department of Agriculture is doing its best to investigate both the methods of cultivation and indigenous manufacture. The testing of imported varieties has been started at the Raipur farm, and the improvement of other factors in cultivation is under investigation. Attempts have been made to introduce

Improved handmills, and arrangements have been made to determine the loss of efficiency in the indigenous processes ; but until the cultivation of sugarcane is extended and concentrated in compact areas the Chief Commissioner fears that sugar factories are not likely to prove a success. He hopes that some of the large irrigation works under construction or projected will enable this extension and concentration to be effected.

11. The *Tassar* industry has received a great deal of attention. The result of enquiries has been to show that the defect lies rather in the inadequate supply of raw cocoons than in the processes of manufacture. A special investigation was made by the late Mr. N. G. Mukerjee of Bengal, and an Agricultural Assistant is now undergoing a course of training at the Chaibassa (Bengal) Silk Farm with the object of starting a farm in these provinces if it is found feasible. Attempts have been made without success to introduce the Japanese methods of reeling and the latest enquiry tends to prove that these are not so good as the Indian methods. There is nothing new to teach in a school.

12. In conclusion I am to refer you to Chapter XIII of the Central Provinces Education Manual, which contains a list of scholarships available for different branches of technical education in addition to the scholarships mentioned above. As you will have observed from paragraph 8 of this letter, you are mistaken in thinking that the State scholarships to Europe are confined to mining ; under the orders of the Government of India, engineering is the only subject excluded. This Administration has selected mining and the textile industry as the most suitable for these provinces at present, but this does not exclude other subjects if suitable candidates present themselves. As regards the number of scholarships, it is understood that though one only is attached to the Central Provinces and Berar, others could be secured from the Government of India if suitable candidates come forward. The present difficulty is to secure good candidates, a matter in which the assistance of the Provincial Industrial Association will be cordially welcomed.

APPENDIX III.

THE INDUSTRIAL CONFERENCE HANDLOOM COMPETITION.

Preliminary Report.

To

THE GENERAL SECRETARY,
The Indian Industrial Conference, Calcutta.

Sir,

Out of 82 looms exhibited in the Exhibition, 14 looms were found fit to enter for competition as per the conditions of the Conference, of which nine competed for the prizes, six as factory and three as cottage looms. A tabulated statement of the results of our examination has been appended herewith.

The Factory loom of Salvation Army Industries of Anand, Gujarat, and that of Mr. B. K. Ghosh of Chandernagor have scored 138 and 133 marks respectively out of 200. In the Salvation Army loom taking-up motion requires further improvement and shedding is not automatic. In the other loom, all the motions are automatic and it is a copy of the Japanese handloom, but the working of the loom requires to be made light and easy by using long treadling levers and diminishing the friction in the picking shaft and lever and by providing a seat, at a convenient height, for the weaver to sit and work.

Thus though both the looms have not yet come to the highest standard of efficiency required, yet as an encouragement for further improvement and better work we propose two prizes of Rs. 150 and Rs. 100, respectively, to be given to these looms as 1st and 2nd.

Of the three Cottage Looms, the loom of Messrs. Lascar & Co., scored 134 and Sayaji Poor Man's Loom 124 out of 200 marks.

The price of the loom of Lascar & Co., which is nearly similar to an ordinary Serampore Fly-Shuttle Loom, is Rs. 50, and picking is not automatic, while the price of the other is only Rs. 20 and it has automatic picking, but the parts of the loom require to be made strong. With a view that cheap and effective looms alone can be within the reach of the poor, we after the test was made, came to the conclusion that the maximum price of a cottage loom should

be only Rs. 25 instead of Rs. 50 as was advertised. Judging from this standard, the loom of Lascar & Co., will have to be considered as a factory loom and thus it will get 117 marks. But we cannot do so now contrary to the advertised terms.

Though both the looms have yet to be further improved upon, we propose that two prizes of Rs. 150 and Rs. 100 may be given to Sayaji Poor Man's Loom and Lascar's Loom respectively as first and second among Cottage Looms.

CALCUTTA,
16th January 1907.

} Yours faithfully,
RAOJI BHAI PATEL.
M.A. SAMPATH IYENGAR.
MANMATHA NATH BASAK.
KUNJABEHARI DE.

Full Report.

Report on the Handloom Competition held under the auspices of the Indian Industrial Conference at the Calcutta Exhibition of 1906-07, with remarks on the Handloom Section of the Exhibition.

The harmonious action of the following five principal motions in a loom produces cloth:—

- (1) Shedding (dividing warp threads into layers).
- (2) Picking, or motion of the shuttle,
- (3) Beating up the weft, or motion of the slay for driving in the weft.
- (4) Taking up the cloth woven.
- (5) Letting off the warp.

There is also a sixth necessary motion which does not work, viz., pushing back the slay to make room for the next stroke of the shuttle.

The looms exhibited may be classified with reference to the mechanical contrivances adopted to secure the working of these motions.

CLASS I.—In which all the above movements are actuated by the action of foot-treadles or by a wheel turned by hand, or by the movement of the slay.

The following were the important exhibits under this class:—

- (1) *The loom exhibited by Mr. B. K. Ghose of Chandernagore.*—It is a copy of the Japanese handloom worked by foot-treadles. Its working was satisfactory though the loom was a little too heavy to work. The loom is priced at Rs. 90.

(2) *Shivaji loom exhibited by the Bombay Loom Company.* This is a modification of the Japanese handloom. The weight used to regulate the taking up motion is made to hang down instead of being lifted up and a balance wheel is provided to secure the steady motion of the crank shaft. The loom is priced at Rs. 130.

(3) *The Lame and Blind Automatic Loom.*—This is also a modification of the Japanese handloom; taking up motion is connected with the motion of the slay and the upper shaft is directly turned by a handle connected with it by level wheels. The frame work was not steady. The price of the loom is Rs. 95.

(4) *Krishnabrindavan's Patent Johar Loom.*—This should be considered a power-loom rather than a handloom. This was the only loom in the Exhibition which showed real originality and good workmanship. All the motions of the loom are secured by the revolution of an ecliptic wheel attached to one shaft. As necessity is the mother of invention, the inventor finding it difficult to get a proper crank shaft for this loom, which was meant to be a copy of the power-loom, hit upon this new method of communicating motion. The inventor of this loom should be encouraged to make a handloom of proper size, as one of that kind is likely to work very smoothly and lightly. If it be properly made it may supersede all the existing costly automatic handlooms in the market.

(5) *The loom exhibited by Mr. B. K. Dhur* was a copy of the power-loom meant to be a handloom, but not useful as such.

(6) *Messrs. Hattersley's Domestic Loom.*—This was found to be capable of giving greater production than any other automatic loom and was found somewhat heavy in working. Our weavers accustomed to lazy working of very light wooden looms may not willingly take to it. The price of the loom is Rs. 180.

CLASS II.—Only shedding being actuated by foot-treadles, the rest of the motions being connected with the motion of the slay worked by both the hands.

The following were the important looms under this class :—

(1) *The loom exhibited by Mr. Osborne Maxwell of the Salvation Army Works, Anand, Gujarat* was the best of this kind. The loom seems to be after Mr. Churchill's loom with the picking and taking up arrangements improved. The loom is well constructed and sound in all its parts. The price of the loom is Rs. 80.

(2) *The factory loom exhibited by the Sayaji Loom Works, Baroda, requires greater stability in some of its parts. It has proper arrangements made for adjusting the levels and heights of slay and yarn beams. The price of the loom is Rs. 50.*

CLASS III.—Shedding and picking being joined and actuated by foot-treadles, and the beating up of the weft and the taking up of the woven cloth being done separately by hand as in ordinary handlooms.

The Simplex Loom of Pali Silpasala was the only one of this kind. The price of the loom is Rs. 35. This is simple in construction.

CLASS IV.—Shedding done by foot-treadles, picking connected with the back motion of the slay which is worked by both the hands. The rest of the movements secured directly by hand as in ordinary handlooms.

A loom of the kind was the Sayaji Poor Man's Loom exhibited by the Sayaji Loom Works, Baroda. In this loom the weaver has to work sitting at a pit having his warp stretched on the floor as in ordinary looms. This is simple and cheap. The price of this loom is Rs. 25.

CLASS V.—Looms with fly-shuttle slay attached.—There were three varieties of this kind.

(1) *Fly-shuttle slay adopted to ordinary pit-loom without yarn beam being provided.*

(2) *In addition to slay, yarn beam also provided to the pit-looms.*

(3) *Slay adopted to a moveable frame-work containing yarn and cloth beams.*

In all these looms the movements are caused independently of one another as in ordinary country looms worked directly by hands and feet.

Frame Fly-shuttle looms exhibited by Messrs. B. K. Ghose of Chandernagor and P. N. De of Chinsura, and Laskar & Co. of Raipur (Birbhum). Pit Fly-shuttle looms provided with yarn beams were exhibited by the local weavers, Babus Kiran Chandra Sen, Hari Chandra Das and three others, and Mr. P. N. De of Chinsura.—These were found the cheapest and most convenient forms of fly-shuttle looms to be adopted by weavers that do their work in their own homes. These looms with slight modifications in forms and sizes are the same as the Madras, Bombay, Madura and Mysore fly-shuttle looms, all of which are copies of English fly-shuttle looms.

Two looms were exhibited, one by the Bengal Silk Mills Company and the other by the Sayaji Loom Works, Baroda.

The former, a foreign one, was in good working order and cloth of six feet was woven in three hours 30 minutes. The latter was an attempt to construct such a loom with as many locally made parts as possible but was not in working order on account of breakages in transit.

Messrs. Hattersley & Sons exhibited a *Tape Weaving Loom* priced at Rs. 250, a *Towel Loom* priced at Rs. 180, and a *Silk Weaving Loom* priced at Rs. 235.

There were also *Bcnares Looms for weaving Kinkabs* with skilfully arranged Harnesses for picturesque designs.

The *National Weaving School of Calcutta* exhibited different kinds of looms used in the school, viz., *Hattersley Fly-shuttle Looms, etc.*

Besides the above looms, which were in working order, there were a number of model looms. Some of them were exhibited by students fresh from college and by some Government officials. In these models very ingenious, original mechanical inventions were displayed in crude form. If their school education had offered opportunities for having their hand and eye trained in mechanical work, their ideas would have brought them credit as useful inventions. They were not trained to appreciate form and proportion as the eye had not been exercised in drawing and practical work nor the hand used to the handling of tools and instruments and hence, can do but very crude work.

The Model looms exhibited by Messrs. Bankim Lal Das, Mani Mohan Ghosh and Lalit Mohan Ghosh, Romesh Chandra Dordar and N. M. Mookerji contain original ideas which can be usefully developed with more practical knowledge of the different processes of weaving.

Appliances for Processes preparatory to Weaving.

SPINNING.

There were three exhibits useful for the purpose. One of them from Darjeeling intended for spinning wool, is an ingenious adaptation of the mill spinning spindle for hand work.

The second was from the Weaving Institute of Holenarsipur in Mysore State. In this the spindle is turned by a foot-treadle and both the hands are used for spinning. This is used for spinning wool and any kind of fibre and cotton.

The third was a local exhibit, a simplified form of Chajak.

Winding Machines:—

(1) A useful bobin and pern winder exhibited by the Sayaji Loom Works, Baroda.

(2) There were useful models from the Weaving Institute of Hole-Narsipur, Mysore, and from Mahendralal Banerji of Calcutta.

(3) A bobbin winder with 12 spindles priced at Rs. 152 and a pern winder with 12 spindles priced at Rs. 172 were exhibited by Messrs, Hattersley and Sons.

Warping Mills.—One machine was exhibited by Messrs. Hattersley & Sons. This is suited for making warps more than 100 yards in length but these warps are not useful for sizing after the Indian methods. This serves the same purpose as the old English wooden warping mill used in the Basel Mission Factories. These latter, however, had a greater facility for putting in leases. Hattersley's mill was priced at Rs. 150.

The other warping mill is an original invention exhibited by Sadhu Charan Sarkar, Hari-Narayanpur, Nadia, a poor man not a weaver by caste. This is an improvement upon the native peg warping, and is a real advance from within.

A wheel 4 ft. 9 in. in diameter is divided into three concentric circles and pins arranged round the circumference of these circles receive the yarn as the wheel rotates and preserve the leases formed. The machine, when tested by actual work, was found capable of warping one knob in 30 minutes. The mechanism for turning the wheel is roughly made and does not work smoothly without jerking. This was priced at Rs. 50.

Sizing Machine.—

There was one exhibited by the Sayaji Loom Works, Baroda. This is yet in its experimental stage and is intended for handloom factory works.

The other sizing machine was exhibited by Messrs. Hattersley & Sons and it is intended to saturate the warp with size and to squeeze out the superfluous size, brushing and drying being done on a separate frame. These machines were not exhibited in their working order.

Loom Competition.

The Industrial Conference had announced awards of Rs. 500 to the best Cottage and Factory Handlooms exhibited. A Committee of experts consisting of Rao Bahadur Raoji Bhai Patel, Director of Agriculture and Industries, Baroda, Messrs. Henry H. Ghosh, Bysac, and Kunja Behari De of Calcutta, Mr. B. L. Govilla, Textile Engineer and Chemist, Kurja, United Provinces, and Mr. M. A. Sampath Iyengar, Superintendent, the Weaving Institute, Hole-Narsipur,

Mysore State, was formed. The Committee examined the looms in their capacity and in the construction of their important parts. The looms were kept working for seven hours and the results of their examination have been given below, and a tabulated statement is appended.

For the second time, a loom competition was held on behalf of the Exhibition Committee. In this competition a few local fly-shuttle looms were specially got in to compete for the prize, so that their working capacity might be compared side by side with the new improved looms. In this instance looms were kept working for six hours. The results of this competition also have been given below and a tabulated statement is appended.

The Competition Test.

The looms were tested by the Committee with reference to the following points :—

- (1) Mechanical improvements and construction.
- (2) Adaptability.
- (3) The work done.

Under the head of Mechanical Improvements much importance was attached to the arrangements made to secure the easy and proper working of the shedding, picking and taking up motions, and of the motions of the slay. The looms were also tested to see whether the parts were strong enough to bear the required strain without being unnecessarily bulky. The general workmanship in the manufacture of the machine was also noted.

In regard to adaptability, the Committee took into consideration the following points:—

- (1) Whether the price was within the means of those for whom the machine was intended ?
- (2) Whether the loom was suitable for working with warps prepared according to the country method or necessitated the use of preparatory processes to which our weavers were unaccustomed, or the use of appliances which would be too costly to be possessed by individual weavers ?
- (3) Whether the construction of the loom was simple enough to get damaged parts repaired easily by local artisans ?

The Work done was tested by—

- (1) The highest number of picks per minute attained in fast working for a short time,

(2) The effective number of picks per minute arrived at as follows :—

A. Work was taken for 7 hours 15 minutes, and the total number of picks on the cloth divided by the number of minutes in the whole time.

B. The structure of the cloth produced.

The Results of the Tests.

In the first test the following were found the most successful :—

(1) Salvation Army Loom, Prize Rs. 150.

(2) Mr. B. K. Ghose's Loom of Japanese pattern, Prize Rs. 100

(3) Laskar & Co.'s Loom (ordinary fly-shuttle loom of the English handloom pattern). Prize Rs. 100

(4) Sayaji Poor Man's Loom, with automatic picking which is actuated by the back motion of the slays, Prize Rs. 150.

In the second test, the following were the most successful :—

(1) Mr. B. K. Ghose's Japanese Loom.

(2) Sayaji Poor Man's Loom.

(3) Mr. B. K. Ghose's Ordinary Fly-shuttle Loom.

(4) Babu Kiran Chandra Sen's Pit Fly-shuttle Loom.

General Remarks :—All the looms were worked by expert weavers with more than ordinary speed and at the end of 7 hours all appeared much tired. In the hurry to turn out as much work as possible the structure of cloth was somewhat neglected. In the second test they were more careful. Fly-shuttle looms in different forms have all equally done good work. Automatic looms on account of their high prices are entirely beyond the means of individual weavers to possess them. To take full advantage of the increased speed of the shuttle in these looms, better processes of winding, warping and sizing than the weavers are accustomed to, will have to be introduced with the help of costly new mechanical appliances.

Now the vital question that has to be decided in the development of the handloom industry in India is whether it is possible to develop it along the lines in which it has so far progressed.

One of the great authorities in cotton weaving, Mr. Richard Marsden, has expressed himself as follows :—

"The skill of Eastern races seems to have spent itself in achieving the most perfect results of which manual processes are capable. The products of Indian, Chinese and Japanese arts, especially in textiles,

in excellence of colouring variety, beauty of design and perfection of execution, are something that the mechanical production of the West is a long way from equalling but to which they may with advantage aspire."

Our weaving industry has developed so far as a cottage industry. If it is to continue as such, our mechanical improvements to increase the efficiency of hand labour must be such as will not compel the weavers to become mere flesh and bone parts of some costly machinery having no idea of how and why the machinery performs its rhythmical movement. And our efforts to improve the industry should not become subject to such condemnation as Prince Kropotkin has made: "Skilled artisanship is being swept away as the survival of a past condemned to disappear, for the artist who formerly found æsthetic enjoyment in the work of his hands is substituted the human slave of an iron slave."

Apart from the large portion of weaving work that power mills should do, handlooms have got as much work or even more work to do. Each has its own sphere and although factory work economizes labour, the economic gains to be derived from this domestic industry for a hundred years to come should not be undervalued even in pounds, shillings and pence.

Improvement in the human machinery of the weaver by systematic education and regular work must go hand in hand with the improvement of the appliances for his work. The industry can flourish only under the stimulus of a well organised trade which must be helped by every citizen of India with the responsibility felt and expressed by a prudent economist:

"The trade does not belong to the merchants, capitalists and workpeople of the present generation. But that is a great national property in which they possess only a life-interest. This they are bound by every sentiment of affection for their children and love for their country, to pass on to succeeding generations, not only unimpaired but increased in value. To neglect this duty will be to deprive millions of English people in the future of the means of livelihood and the nation of its most important resources. This would be practically criminal."

RACJI BHAI PATEL,

Director of Agriculture and Industries, Baroda.

M. A. SAMPATH IYENGAR,

Superintendent, Hole-Narsipur Weaving Institute, Mysore.

The Second Indian Industrial Conference Handloom Competition, Calcutta.

FIRST TRIAL.

No.	Kind of Loom.	Name of the Exhibitor.	Time.		Cloth woven.	Width of the cloth	Effective picks.	REMARKS.	
			hrs. m.	ft. in.	ft.	in.			
1	Simple fly-shuttle loom similar to English handloom.	Mr. B K Ghose, Chandernagore.	7	15	21	11	40½	83.6	Clean edges, breakages good many, 40's yarn.
2	Automatic handloom resembling Japanese handloom worked by foot power.	Do.	7	30	24	7	40	34.6	Edges clean, structure good, 40's yarn.
3	Sayaji factory loom	Sayaji Loom Works, Baroda.	7	30	23	4	42	31.2	Cloth damaged, full of breakages, 40's yarn
4	Sayaji pit factory loom	Do.	7	30	15	7	42	20	
5	Sayaji cottage loom	Do	7	30	17	2½	43	30	
6	Factory loom	Mr. Osborne Maxwell of the Salvation Army, Anand, Gujarat.	7	30	25	2	40½	37.3	Structure quite satisfactory, 40 s yarn.
7	Ordinary fly-shuttle loom of English handloom pattern.	Laskar & Co., Raipur (Bibhun)	7	30	23	ft	44	31.9	Structure satisfactory, 40 s yarn.

Calcutta Industrial Exhibition Handloom Competition:

SECOND TRIAL.

No.	Kind of Loom.	Name of the Exhibitor.	Time.		Cloth woven.		Width of the cloth.	Effective picks.	REMARKS.
			hrs.	mi.	ft	in.				in.
1	Simple fly-shuttle loom similar to English handloom.	Mr. B. K. Ghose, Chandernagore.	6	18	25	9	44	83	Edges not clean, breakages not pieced up satisfactorily, structure fine, 40's yarn.
2	Automatic handloom resembling Japanese handloom to be worked by foot power.	Do.	6	15	28	10	43	41	Clean edges, uniform structure, 40 s yarn.
3	Poor man's loom or fly-shuttle slay adopted to ordinary pit loom with automatic picking arrangement.	Sayaji Loom Works, Baroda.	6		25	10	43	46	Edges clean, structure good, 40's yarn.
4	Factory loom picking and take up motion connected with the motion of the slay to be worked by hand shedding by foot treadles.	Do.	5	11	20	1	42	34	Structure somewhat poor.
5	The lame and blind automatic loom worked by hand power.	Mr. Shaik Mahomed Bakur.	6	15	19	8	41	25	Clean edges, uniform structure.
6	Pit fly-shuttle loom	Babu Kiran Chandra Sen.	5	51	16	8	46	43	Warp and weft 80's, well finished cloth.

Calcutta Industrial Exhibition Handloom Competition—*contd.*

SECOND TRIAL—*contd.*

No.	Kind of Loom.	Name of the Exhibitor.	Time.		Cloth woven.	Width of the cloth.	Effective picks.	Remarks.	
			hrs.	mi.	in.	ft.	in.		
7	Pit fly-shuttle loom	Mr. Goluck Behari Rokhir.	6	21	15		45	30	40's warp and 50's weft, clean edges, uniform structure. Warps and weft. 40's double, very close structure, during the whole period two persons worked alternately, uniform structure, well finished cloth.
8	Hattersley's Domestic loom ...	Messrs. Allen Bros.	5	30	63		22	92	
9	Pit fly-shuttle loom	Mr. Harishchandradas.	6		13		44½	30	
10	Pit fly-shuttle loom	Mr. P. N. De ...	6		12		41	20	
11	Frame fly shuttle loom	Do.	6		12½		41	21	
12	Simple loom	Do.	3		4 1		42½	15	
13	Jacquard machine	Bengal Silk Mills Co.	8	30	6				
14	Benares loom for Kinkhab ...	Mr Habibulla ...	8	30	3½				

APPENDIX IV.

INDUSTRIAL SURVEY QUESTIONS AND ANSWERS.

AMRAOTI, 1st October 1907.

DEAR SIR,

The accompanying circular letter, containing a set of questions framed for the purpose of facilitating the collection of information on the present condition and future possibilities of the industries of each district of British India and the Indian States, was issued by me last year and addressed to nearly a thousand educated countrymen of ours in the various parts of India. The response it elicited was, I am sorry to say, most meagre and disappointing; only twenty gentlemen having taken the trouble of replying to it. Their replies were published as an appendix to the Annual Report presented on behalf of this office to the last session of the Industrial Conference held at Calcutta. I send herewith a copy of the set of questions aforesaid, with the request that you will take an earnest interest in the subject and collect the needed information. I need not tell you that it is only by the willing co-operation of gentlemen in your position, keenly interested in the material progress of the country, that the Industrial Conference can satisfactorily perform the duties which it has imposed on itself. The first essential of all work is knowledge. But the information at our command on industrial subjects is lamentably inadequate, and must be supplemented by efforts made in each locality by persons like you. These efforts should comprise (1) the bringing together of the information contained in the available official publications, and (2) local inquiries. I earnestly invite you to set yourself to this important task and send to this office as full information as you can possibly put together. I shall thank you to send your reply before the 10th of November to enable me to include it in the Annual Report which will be presented to the next session of the Conference as was done last year.

I remain,

Yours faithfully,

R. N. MUDHOLKAR,
*General Secretary,
Indian Industrial Conference.*

• • • •

QUESTIONS TO BE ANSWERED.

A.—AGRICULTURE.

1. What is the condition of the agricultural industry in your district ?
2. Has the whole or the greater portion of the culturable area been brought under cultivation ?
3. What is the general quality of the soil ?
4. What is the general condition of the land owning and cultivating classes ?
5. To what extent are the lands held on a proprietary tenure by the cultivators themselves, to what extent by privileged tenants, and to what extent by mere tenants at will ?
6. What steps are being taken in your district for the improvement of agriculture by—
 - (a) Supply of cheap capital,
 - (b) Extension of scientific and practical instruction,
 - (c) Employment of improved appliances ;
 - (d) Resort to recuperative processes like manure, etc.
7. To what extent has advantage been taken of the village co-operative credit system, and what amelioration has it effected in the condition of the peasantry ?

B.—MANUFACTURING INDUSTRIES.

8. Name the existing manufacturing industries in the different towns and villages of your district under the following heads :—
 - (1) Textile fabrics—Cotton, Wool, Silk, and Jute.
 - (2) Vegetable and animal products.
 - (3) Leather, horn and paper.
 - (4) Pottery, porcelain and glass.
 - (5) Metals.
 - (6) Chemical industries.
 - (7) Furniture and decorations.
 - (8) Materials used in construction.
9. What is their present condition ?
10. What was their condition in the past ?
11. What is the approximate number of people employed in and dependent on them severally ?
12. What is the approximate amount of capital employed in them severally ?
13. State how far they have been affected by competition with imported articles.

14. What are the Markets for the products of these industries; *i.e.*, do they supply only a local demand, or are they sent to other markets in noticeable quantities ?

15. What facilities exist to increase their supply if an increased demand arose ?

16. How far, in your opinion, are the existing industries capable of expansion, —

(a) by making advances to the artisans at low rates of interest :

(b) by the improvement of the appliances in use ;

(c) by the imparting of special instruction, and

(d) by the employment of power machinery ?

17. What industries existed in your district formerly but have since decayed ?

18. What are the causes of their decay ?

19. Is it practicable to revive any of them profitably ?

20. If so, suggest measures to bring about their revival.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. Name the mineral and other natural products of your district which are or can be manufactured into finished articles of consumption and use.

22. Which of these are manufactured in your district ?

23. Which, if any, of these are sent to other parts of the country for manufacture ?

24. Which of them are exported to foreign countries in their raw state, and re-imported as finished articles ?

D.—CAPITAL.

25. What banking facilities are there for the support of the industries in your district ?

26. Have any urban industrial banks been started in any town of your district under the provisions of the Co-operative Credit Societies Act ?

27. If so, give particulars in regard to their organization the capital employed, the conditions of lending and borrowing, etc.

E.—TECHNICAL EDUCATION.

28. What facilities are there for training young men in the various industries that exist in your district ?

29. If there are any special schools for the purpose, give particulars in regard to their curricula.

30. Is instruction given both in the practice of, and the principles which underlie, an industry, or, is it theoretical merely or merely empirical?

31. What success has attended these schools?

32. Are industrial and commercial classes attached to any of the schools in your district?

33. If so, give full particulars in regard to them.

34. Have any students been sent abroad from your district to acquire technical, industrial or commercial education?

35. What are their qualifications and were they tested?

36. Who, or what agency, has sent them, and under what conditions, if any?

37. In what countries are they being trained?

38. What arrangements are made to utilise their special technical knowledge by the supply of capital or otherwise, to start or develop the industries in which they receive special training?

39. Are there at present in your district any persons who have received special training in any industry? If so, what are the industries in which they have been trained?

40. How are they employed at present?

41. If their knowledge is not being utilised, what steps can be, or are proposed to be taken, to utilize it?

F.—INDUSTRIAL ASSOCIATIONS.

42. Is there any industrial association in your district? If so, give particulars in regard to its objects, rules, funds, past work and present activity?

ANSWERS TO THE ABOVE.

(1) BABARAV JAIRAM BHISHE, Esq., *Banswara via Rullam.*

1. Banswara is a very poor State with an area of 1,346 square miles and a population of 149,128. Its revenue is Rs. 1,50,000 only. It is indebted to the Government of India to the extent of about two lakhs of rupees.

2. I quote below what was written by the Settlement Officer, Mr. A. T. Home, I. C. S., in the Settlement Report of 1904-06, on the mineral deposits of the State:—

‘The mineral deposits of Banswara have never yet been properly investigated and it is possible that Manganese ore as in the neighbouring State of Jhabvu, or other minerals may some day be discovered. Iron mines were formerly worked at Loyania in the North-West of the State, and tradition is

current that gold was also found there. Stone quarries exist in numerous villages, the best known being at Talwana eight miles west of the capital.'

3. The iron mines of Lovania are not worked for want of knowledge and money. The mine at Khameria is worked by blacksmiths who have their houses there. They were digging *Kachlapathar of Loha* from the iron mines of Udvella, Sadadi, Bamapoda and Yogpura, but from the commencement of this year they have been able to obtain only so much iron as is required for their own work. The reasons for this are given below. The mouth of the Udevella iron mine fell down in last year's rainy season and the poor blacksmiths are not able to open another mouth. They have not also been working the other three mines as more cheap iron than before was imported from Bombay this year. Till this year no or almost little iron had been imported from Bombay, on the other hand iron was being exported from here to the eastern side of Gujarat.

4. About eight miles north from Lovania there are the Parsola iron mines in Udepur State and there are also several iron and copper mines there. In about fifty places in Banswara State you will find iron mines.

5. People say that there was formerly a gold mine, that one Raja filled it up and made a small *mandir* or temple there. Dungree, which is about quarter of a mile south-west of Lovania village, probably has coal.

6. I have seen the Bengal and Warora coal mines, as also the gold mines of Africa. But as I have no scientific knowledge I can say nothing more definite about the mines in these parts.

7. The following information about the places where the mines are situated will be found of use by those who may desire to visit them :—Rutlam is a railway station. Selana is 10 miles from Rutlam and there is a dak bungalow there. Danippla is 10 miles from Selana. It is a police *thana* of the Banswara State and about 40 *Mahajans* reside there. Eighteen miles from Danippla is Banswara, the capital of the State. Eighteen miles from Banswara is Lovania, where there are about 80 *Mahajans*. Parsola, in Tahsil Udepure, is 10 miles from Lovania, and 10 miles off it is Jagpura, where there is a police *thana* of Banswara State. Ilhambra is another 10 miles distant, and there also there is a police *thana*. A traveller can see from here the Udvella, Khameria, Sadadi, Bamanpada and Yogpura mines. Banswara is 18 miles from there, and so the visitor may get back to Rutlam.

8. About 20 miles south of Banswara there are also some mines. Two European companies are trying to get con-

cessions for working them, but any Indian entering the field will have a prior claim

9. It is my belief that in the Banswara and Udepur States there is more mineral wealth than in the Central Provinces where Tata & Sons are going to work.

(2) BABU AMBICA CHARAN MAZUMDAR, *Faridpur*

1. The condition of the agricultural industry in Faridpur is fairly satisfactory. But the craze for jute growing is gradually absorbing the major portion of culturable areas, excepting the *beel* tracts where paddy cultivation still preponderates

2. With the exception of the swamps nearly the whole district is under cultivation.

3. The soil is generally alluvial and therefore quite fertile.

4. The landowning classes are generally middle class *Bhadralokes*. Their condition is generally deteriorating, but the actual cultivating classes are comparatively well off and would be better still if they were economical.

5. Tenant proprietorship does not exist here. Three-fourths of the tenants possess the right of occupancy, only a small fraction being tenants at will.

6. There is an yearly Agricultural Exhibition at Faridpur and seeds and other rewards are given to *bond fide* agriculturists. The institution has been in existence for over 30 years; but beyond the cultivation of potatoes I do not think it has helped agriculture very much. The Faridpur District Association has recently taken up the subject and an account of its working can be given only next year.

7. Two Co-operative Credit Societies have been established quite recently. It would be premature to make any forecasts of their working.

8. A sort of fine *Barley* is being manufactured at Dasaitia in this district which has been properly tested and found to be very wholesome and of excellent quality. It is sold here and may be also found in Calcutta.

Nibs and knives are also manufactured here. The nibs are largely exported to other districts; but the knives are sold only locally.

17-20. Sugar and weaving industries existed here very largely. The latter has revived under the impetus of the Swadeshi movement; but the former is still decaying, sugarcane cultivation having fallen off on account of ravages by

wild animals. The sugar industry furnishes an important as well as a difficult problem. It can only be revived by power machinery without which it cannot stand foreign competition.

21-24. Formerly there was pearl fishery in the river Kumar in this District. It has long died out. An effort might be made to ascertain if pearls exist any more in the shells to be found in this river.

Shell lime is obtained from the shells to be found in abundance in this district. A methodical working of this business may prove a very profitable concern.

25. There is no bank particularly to help industries, although the weaving industry receives some help from the Faridpur Loan Office, Ltd.

26. Two Co-operative Credit Societies have been recently started.

28. There is a small technical school established at Faridpur. It at present deals only in carpentry.

34. Some students have been so sent by the Scientific and Industrial Association, Calcutta; but I cannot give the exact number.

42. The Faridpur District Association recently established proposes to deal with industrial questions also

(3) BAO BAHADUR D. R. SHRIKHANDE, *Damoh (C. P.)*

2. Almost all the available land is under cultivation.

3. Half the district is rice-growing and the other half ragi-growing.

4. Tenants are generally poor. Seven per cent. may be doing well. All malguzars are in debt with few exceptions.

6. (b) One experimental farm is opened.

17. Paper-making in Panchamnagar has decayed owing to competition.

19. It is not practicable to revive any of the decayed industries.

The answer to all other questions is *Nil*.

(4) SETH DAMODARDASA K. RATHI, *Beawar (Rajputana)*.

[My answers should be taken as coming out of local enquiries only. But the information about land has been taken from Government officials as no other authentic source could be found. The answers pertain to the town of Beawar only. — D. K. R.]

A.—AGRICULTURE.

(1) The bulk of the population which is rural, is devoted to Agriculture. The industry as a whole is not so paying as to induce people to pay more attention. Several years in the last two decades being those of low rainfall, the condition of agriculture is going from bad to worse. This year also is feared as one of terrible famine and in the near future thousands of men will be found starving.

2. Area has been sown to the normal extent and not much of culturable land remains waste.

3. Generally poor and very inferior to that of Berars, somewhere hilly and somewhere plain. Not rich even in isolated places.

4. Poor and in a very wretched condition but having no aspiration or any ambition to better their state and shy of entering any other field of earning.

5. Approximately $\frac{1}{2}$ by the ex-proprietory tenures and owners, $\frac{1}{4}$ by mortgagees, $\frac{1}{4}$ by tenants at will.

6 (a), (b), (c). *Nil*.

(d) Ordinary manure is only used and near the town mill and factory refuse and blow dust, &c, of mills used for manure. No scientific method is used to improve the land.

7. *Nil*.

B.—MANUFACTURING INDUSTRIES.

8. (1) three cotton ginning, six pressing houses, one cotton mill working with 13,000 spindles and 623 looms.

One cotton mill under construction, handlooms working in the town and a few in villages.

Hand spinning wheels working all throughout the town and many of the bigger villages.

Wool washing and scouring carried in town by hand preliminary to the same being sent to Europe.

Silk weaving was tried in local mill, but on account of very slack demand was abandoned.

No jute industry exists neither is there found any jute here.

(2) Cotton cleaning done by hand extensively in town press houses. Bones collected all throughout for export at the cost of agriculture, which principle the rude villagers would not acknowledge although explained in every way.

(3) (a) Leather washed, and cleared for shoe-making and export. A large trade carried on in raw and partly cured hide and leather.

(b) No horn trade ever existed.

(c) Paper was formerly manufactured but under competition with machine the industry has become extinct.

(4) Pottery work done generally for local use. No porcelain work nor of glass.

(5) Iron, Brass and Bronze (કાંઠા) work generally done on a good scale in the town. But the industry has declined on account of the keen competition with outside articles and also through these craftsmen getting better livelihood in mills and factories locally as well as at Cawnpur and Ahmedabad, and also in Railway Workshops.

(6) Dyeing done on a good scale. But some dyers joined the mills getting better wages in working the looms. Some emigrated to Ahmedabad on account of bad trade, their customers, the villagers being in bad condition. The town people generally use English dyed and printed goods being decent looking and cheap although less durable.

(7) Nil—except some imitations of ordinary tables, etc.

(8) Slate (stone) and building stone comes in abundance into the town and goes to adjoining places and districts. Ordinary bricks and tiles made for the use of factory buildings only where stone would not do

Almost all wood work required for ordinary dwellings done locally as also metals—excepting screws, hinges, etc., which are now replaced by imported ones on account of their good look although of very little durability.

9. Answered above in reply to query (8).

10. The town is generally prospering owing to the expansion of trade. The town is only about 70 years old. The district was formerly desolate and an abode of robbers and dacoits who would not mind murdering an innocent traveller.

11. (1) Ginning Factories 600 hands in season.

Pressing Factories 500 to 5,000 hands in season.

1 Cotton mill employing 1,500 hands regularly.

1 Cotton mill employing about 800 to 400 hands regularly.

Handlooms employ 300 hands in the town.

Accurate figures for villages unavailable but there may be approximately 200 to 400.

Hand spinning employs 2,000 women in leisure time excepting several months in the year such as Chaitra and Chaturmashya.

Wool washing employs about 200 men in season

(2) Cotton cleaning included in presses No figures available for other professions under this head,

(3) (a) About 600 hands.

(4) 200 hands all throughout including villagers.

(5) 500 blacksmith hands } in town and villages.
50 Brass and Bronze. } Accurate figures not available.

(6) About 500 to 600 hands employed in dyeing and printing according to good or bad time.

(7) About 400 hands employed in carpentry work including villages.

(8) According to demand for stones, slabs and pieces the numbers of hands vary from 50 to 600.

Numbers of men employed in tiles and brick trade vary from Nil to 200.

	Rs.
12. Cotton Ginning	1,25,000
Presses	4,20,000
Mill, one working, about	10,00,000
Mill under construction will cost about ..	5,00,000

Other figures not available.

13. No definite idea formed about this as practically, before British rule, there was no organization of industries on account of the inhabitants being in a primitive condition. It may be said that dyers and printers are losing ground against imported fabrics.

14. (1) Local and other parts of Rajputana for all hand Industries.

(2) Ports for raw materials.

(3) Bengal, Punjab, Madras, United Provinces and local for mill cloth. Engineers from Europe have come for mill yarns.

15 The unskilled labor being cheap, an increasing demand for it will surely benefit the hand industries. The mills will expand with increased demand.

16. (a) By making advances and improving appliances hand weaving can expand.

(b) Hand dyeing and printing can expand with improvement in appliances, imparting of special instruction and by increased demand.

Machinery is badly need for—

(1) Printing and dyeing of fabrics ;

(2) Working wood, and

(3) Crushing oil which is done on a large scale employing about 300 hands.

17. Paper.

18. Cheapness of machine paper.

19. No.

20. Nil.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

21, 22, 23 and 24. Mica is only explored and exported in raw condition to foreign countries other minerals such as asbestos and graphite, etc., found but remain unexplored. No minerals manufactured.

D.—CAPITAL.

25. Practically none on scientific principles. The people borrow from Hindoo and Mahomedan Sowcars.

26. and 27. None.

E.—EDUCATION.

28 Apprentices were taken for many years up to 1906, and paid for learning weaving etc., but since they all leave after learning none are now taken and the weaving in Krishna Mills is now done partly by local and partly by imported labor. In all other industries the people learn merely by practice. Some Engineers have been trained by the Krishna Mills who are now employed in the U. P. and Punjab.

29. Nil.

30, 31. Nil. 32. Nil. 33 Nil.

34. No. But two students are apprenticing themselves in the Krishna Mills for Engineership, one of whom gets a scholarship and the other will get one shortly.

35. Nil. 36. Nil. 37. None. 38. None.

39 Some men have been specially trained at Bombay in dyeing and printing on modern principles and they are prospering.

39, 40 and 41 Some young men are employed in learning the art of managing a Cotton Mill and their services seem to be utilised by the mill in which they work,

Some of the Madras, Sind and Kashmir students returned only last month after receiving training in cotton sizing and weaving. It is not known how their knowledge will be utilised, as the parents of all these are well to do people but not enterprising.

F. INDUSTRIAL ASSOCIATIONS.

42. None.

Remarks.—If capital be forthcoming Beawar can very well maintain a Woollen Mill—also an iron foundry and a wood working concern. Any enterprising gentleman may open a cotton seed oil factory, and soap can also be made. Wool and cotton seeds are great staples in the market and hence this suggestion.

5. P. NATESA IYER, Esq, *Mayavaram* (Tanjore District).

A.—AGRICULTURE.

1. The Agricultural Industry in the District is in a tolerably good condition; and from year to year it is being improved.

2. Almost the whole of the irrigable area has been brought under cultivation; but portions of Pattukottai, Thuruthurai pundi and Tanjore taluks, have to depend upon rain; and in such cases, all have not been brought under cultivation.

3. The general quality of the soil of irrigable area is clay. But rain fed portions consist of either gravel or sand. On the whole the soil requires yearly manuring.

4. Nearly $\frac{3}{4}$ of the land-owning classes are in embarrassed circumstances. The majority of the cultivating classes are very poor.

5. Except in portions of Pattukottai and Tanjore taluks the lands are the absolute property of the Mirasidars themselves; and the cultivators have no proprietary interest in them; and very small portions are either owned by Zemindars, or Inamdars where the Rent Recovery Act is in force; and in such places, the cultivators have a proprietary interest; and almost all the others are merely tenants at will.

6. (a) No steps are being taken for the supply of cheap capital.

(b) No steps have been taken for extension of scientific instruction. As regards practical instruction, no doubt some steps have been taken in a few centres of the District both by Government officials, and private gentlemen. But practically little work seems to be done; and even the little that is done by Government officials is not made as popular as it should be. But in course of time matters might improve.

(c) It may be said that there is almost no employment of improved appliances. The old method of ploughing is continued. Here and there by lectures and by some respectable Mirasidars taking an interest in the matter, some effort is being made to introduce new and improved appliances.

(d) The old method of manuring the fields by dung and certain kinds of leaves, etc., continues.

7. The Village Co-operative Credit system is not known at all in many villages in the District and the Registrar of Co-operative Credit Societies has not done much in this District.

B. — MANUFACTURING INDUSTRIES.

8. (1) In almost all the Taluks of the District weaving goes on of cloth worn by women as of old. Improved methods have not been introduced except to a very slight extent.

As regards wool, silk and jute, it may be said that nothing of the kind exists at all. No doubt silk is purchased by merchants in these places, and these silks are dyed here and used.

(2) Plantains, jack fruits, mangoes, and such like fruits are available on a large scale. As regards animal products—excepting fish in some of the seaport towns, nothing worth mentioning is produced here.

(3) *Leather.*—As an industry it is *nil*. Raw hides are exported to several places.

Horn.—No manufacture.

Paper.—Do.

(4) *Pottery.* No doubt in almost all places in the District pottery work goes on in a large scale, not by any improved and new methods but in the old manner.

Porcelain and glass Nil.

(5) *Metals.*—Copper, brass, bell-metal utensils of various descriptions are prepared in some of the places, and sent to distant places for sale.

(6) *Chemical Industries*—*Nil*.

(7) *Furniture and decorations.*—As regards this in some places, wooden furnitures, such as chairs, tables, mats, etc., are prepared. But these even cannot be said to be made on any grand scale.

(8) Materials used in construction cannot be said to exist on any large scale except what is absolutely necessary for the District.

(9) The present condition is that they have considerably deteriorated. Owing to the introduction of foreign

(by foreign it is not meant outside India—but outside the District) things as a substitute for indigenous ones, and also for want of capital and co-operation the whole thing is going down. Now and then some effort though not of a satisfactory character, is made to revive these industries.

(10) The condition of these industries seems to have been of a very satisfactory character in the past.

(11) In towns the important industries, consist of weaving and metal works. In almost all villages, agriculture is the chief industry and so a very small portion of the population, say 1/10 alone, can be said to depend upon such pursuits.

(12) In weaving, very few have capital of their own. The weavers carry on their profession by borrowing things and repaying in money when possible. But there are few persons who have no doubt some capital to begin their profession, and in course of time, they become either rich or poor according as their business flourishes or not.

(13) Many of the industries have been considerably affected by competition.

For instance Male cloth—Most people do not go in for Swadeshi cloths because they find machine-made cloths are finer and cheaper.

Female cloth.—Foreign female cloth apparently more fanciful and dead cheap.

Metals.—By the introduction of zinc and aluminium, etc., vessels, native vessels have lost much of their fancy and attraction.

Hides.—Similar is the case.

Oil.— Do. do.

(14) Cloths alone are sent to some distant places in the Presidency. Paddy is sent to some distant places

(15) No facilities at all exist to increase their supply.

(16) (a) Agriculture is the chief industry. There are also several artisans. By making advances, at low rate of interest, these cannot be much improved, unless new methods are introduced.

(b) By the improvement of appliances, no doubt much can be done. The people are intelligent and capable of turning out good work.

(c) Special instruction is not imparted at all. There are very many schools for general education. People who are willing to learn special branches find it very difficult,

(d) Some time will have to elapse before power machinery is introduced with any advantage, for the people have to be first taught the rudiments,

(17) Formerly lace embroidery, dyeing industries, and weaving, etc., existed but they have decayed.

(18) The causes are the following :—

(1) Desire for Government employment.

(2) Want of organized capital.

(3) Competition of foreign articles.

(4) Emigration of coolies on a large scale.

(19) Weaving can be revived most profitably.

(20) Measures to bring about the revival—

(1) Joint Stock Companies should be formed.

(2) There must be capital enough.

(3) Improved looms, etc., should be introduced.

(21) Nothing. (22) (23) and (24) *nil*.

D.—CAPITAL.

(25) There are no banking facilities at all.

(26) Nothing.

(27) Do.

E.—TECHNICAL EDUCATION.

(28) There are great facilities. People have a natural liking to learn the industries, but no schools where the necessary instruction is given have been opened.

(29) No special schools.

(30) Do.

(31) Do.

(32) Elementary commercial classes have been attached to some of the schools in the District.

(33) Excepting the fact that boys reading in schools for general education, also take up one of these minor technical subjects, nothing worth mentioning has happened.

(34) No. (35) to (41) No.

F. INDUSTRIAL ASSOCIATION.

(42) No industrial association at all.

6. J. R. SUBBAIYA, Esq., *Coimbatore.*

Five or six miles away from this town is a small village called Savaripalayam. It contains only a few houses and the people are all employed in weaving several varieties of checks and shirting cloths. These are generally called Coimbatore checks. They are of the same pattern as those of the checks of the Basel Mission Weaving Company of Calcut. The Coimbatore checks are very cheap and vary in price from 4 as to 9 as. per yard. But the pity of it is that these weavers are poor and generally live a hand to mouth existence. At the end of every week they sell their products to the local shopkeepers. Thus their goods are not advertised. Considering the durability of these cloths and their cheapness, I am of opinion that if brought to the notice of the public, they will find a ready sale. This is an industry which is well worth encouragement at the hands of all lovers of Swadeshi. There is unfortunately no big shop that deals in these checks of shirting cloths. There is also here a large mill which spins yarns of inferior counts and whose products are sent to several parts of India. In the local Central Jail, weaving is an important industry. Bed covers, dhotis, patties and checks are made.

 7. JOGINDRAVATH SAMADDAR, Esq., *Khulna, BENGAL.*
 A. — AGRICULTURE.

1. The agricultural industry in this district is in a declining state.

2. Nearly the whole of the cultivable area was brought under cultivation but now some 5 lakhs of *Bighas* are lying waste. Moreover, nearly $\frac{1}{3}$ th of the whole district has become unpaying and it is feared that things will take a worse turn. The following paragraph which I cull from "the Telegraph" (Daily) will substantiate to a certain extent my statements. We earnestly beg to draw the kind attention of Mr. A. Ahmed, the popular Magistrate and Collector of Khulna, as well as of the Government to a petition praying for the opening of a canal from the river *Attabanks* through the Village *Gangni* under the jurisdiction of the Police Station *Mollarhat* in Khulna. This proposed canal which would extend to half a mile only will make 30,000 *bighas* of land fertile by enabling the fresh water of the *Attabanks* river to water this land, which now remains almost uncultivated owing to the superabundance of saline water that makes cultivation impossible. In these days of scarcity and malaria, if the cutting of a canal of half a mile only would make 30,000 *bighas* of land fertile, thus providing both food and water to many people, we do not see any objection why Mr. Ahmed who has done and is

doing so much for Khulna, should not take the initiative in recommending to the Government the construction of the canal when as a matter of fact some public-spirited gentlemen are willing to bear all or partial costs for the undertaking." (The *Telegraph* 20th February 1908). The attention of the Government was drawn to it but owing to the opposition of a Zemindar through whose land the canal is to be cut through, the scheme has not progressed at all.

3. Sandy-loam, loam, clay-loam, peaty-loam, and loamy-sand.

4. Precarious excepting big-landowners and tenure-holders who are tolerably well-

5. One tenth of the cultivators' land is held on a proprietary tenure, three-fourths as privileged tenancy, and the remainder as non-occupancy or tenancy-at-will.

6. (a) Practically no steps are being taken. Very rarely by the Government and not at all by private persons.

(b) Very recently and insufficiently by the Government and by the District Agricultural Association.

(c) Practically *nil*.

(d) Practically *nil*.

7. Through the exertions of Mr. A. Ahmad, C. S., one or two Societies have been started. Babu Jadunath Biswas, Zemindar of Bagghat, tried to start two Societies—one of these has been converted into a Grain Bank, and the other is not in a flourishing condition. The rayats are too uncultivated and very slow to take advantage of these schemes. The Zemindars and the intelligent section are apathetic and practically very little is being done now-a-days.

B.—MANUFACTURING INDUSTRIES.

8. (1) Only coarse jute which is sent to Calcutta.

(2) No systematic breeding of animals. Among vegetable products *gur* (treacle) may be mentioned.

(3) No sorting of leather generally. The raw skin and horn taken from carcasses left in the open fields and sold to purchasers.

(4) Inferior pottery for household purposes.

(5) Only malleable iron obtained from foreign countries is wrought into several varieties of implements, and tools. A few of these were exhibited at the Khulna Agricultural and Industrial Association held under the auspices of Mr. A. Ahmad C. S., Magistrate and Collector of Khulna, and these were found to be tolerably well made. Gold and silver are utilised for ornaments but the finish is not of a high order.

(6) Nil.

(8) Bamboos ; wooden materials Ordinary bricks and tiles.

9. Not improving.

10. Was not in a flourishing conditon.

11. One-fiftieth portion only.

12. Practically none.

14. With the exception of jute which is sent off to Calcutta and *gur* which is exported either to Backergunge or to Calcutta, the products supply a local demand.

16. The existing industries are fully capable of expansion. A technical school has been started—the starting of which was due to Mr S C. Mukerji, I C.S., the former Magistrate and Collector of Khulna. An experimental farm has also been started where experiments are being carried on in several branches.

F.—INDUSTRIAL ASSOCIATIONS.

42. Nil

8. RAOJI GOVIND, Esq., Hoshangabad (C. P.)

1. The condition of the agricultural industry is not satisfactory.

Some Malguzars and tenants have now begun to raise bunds (embanking of fields). Others, though anxious, cannot do so for want of funds

Notwithstanding the conciliation courts some tenants have lost their lands owing to indebtedness.

The advantage of conciliation courts was not given to the Malguzars, many of whom are likely to lose their estates on account of heavy indebtedness.

2. The greater portion of the culturable land is brought under cultivation, but the crops (it is feared) will not germinate fully for want of moisture in the soil. In greater portion of the soil cotton seed was sown but owing to the stoppage of rains, some portions of the fields were again ploughed and the rabi crops were sown which for want of moisture, it is apprehended will not fully germinate. Probably Government estimate is 88 per cent. (about the land brought under cultivation).

3. In Harda Tehasil 2 as. out of the whole area is		मोरियार (best soil)
	2	म्राचड
	8	मोरन
(particularly in Cherwa tract	4	हाकड (lead soil).
In Seoni Tehasil—like the Harda Tehasil.		
In Sohagpur Tehasil	8	मोरन
	8	राकड

In Hoshangabad Tehasil—almost like Sohagpur. On the whole—one fourth of the whole area in the district is good and one-fourth is bad, the rest is ordinary.

4. The majority of them are heavily indebted and for want of funds and on account of uncertainty in the fixation of rents and the term of the settlement they do not and cannot make any improvement in their holdings.

5. Proprietary tenures are partly (about half) let out by the plot proprietors and Malguzars to others, for want of seed and sufficient number of bullocks.

The transfer of proprietary rights in *Sir* to creditors has been proceeding rapidly. There has always been a decrease in the area of the *Sir* fields. This is due to their indebtedness and the unsatisfactory character of the season.

6. (a) An urban society was started in Harda last year and four rural banks in other villages of the district. This does not meet the wants and necessities of the agricultural and artisan classes. There is yet time to see their results. The tenants are supplied seeds, &c., by their Malguzars and other creditors and Banias.

(b), (c), (d) A Government model farm was opened at Powarkheda, 3 miles from Hoshangabad where improved appliances are used at a considerable cost, which is beyond the power of ordinary agriculturists to make use of. No practical instruction is given anywhere in the District. A few agriculturists have now begun to make use of cow-dung and other country manures. Some have begun to raise bandhias (embanking) around their fields.

7. It is too early to say anything about it at present. Mostly the tenants borrow seed and other loans from their Malguzars and from Banias.

B.—MANUFACTURING INDUSTRIES

8. (1) There are eleven gin factories, four cotton presses and three hand looms in the District. Jajams, Sutaras (country rough carpets), are prepared in Harda and Sahagpur. Weavers

prepare rough cloth up to 20 counts in many villages of every Tahsil. Rough bangles are prepared in four towns.

2. There are some gardens which produce vegetable and other animal products, sugarcane, &c. No potato cultivation.

3. One leather factory (not by machine) but managed by a European in Harda.

4. One factory of pottery only is started this year like that of Burn & Co., Jubbulpore.

5. In Handia, Hoshangabad and Harda the Kaseras prepare brass pots only.

6. None.

7. One at Rasulia, a mile from Hoshangabad, managed by Missionaries.

8. There are two big markets, one at Tharsi and the other at Rahetgaon, near Harda, for sale of timber brought from jungles in the interior of the district. Ordinary Kumbars prepare in almost all the villages of the district bricks and tiles on old fashion.

9 and 10. Most of the ginning factories will be closed this year for want of sufficient quantity of cotton owing to scanty rains and also for want of sufficient capital to purchase cotton and also due to inefficient and incompetent managers of these factories. When there were only two or three factories and the cotton yield was good and sufficient, they flourished very much and that was the inducement to others to start more such factories, all of which, more or less, receive this year a heavy shock. The pottery work factory is not likely to flourish at present, owing to the tiles, pipes, &c, being inferior to those turned out by Burn & Co., Jubbulpore.

11. On gins about 600 to 700 men are engaged during the working seasons. About 200 men on presses (cotton) and about 2,000 in other industries, such as Kumbars, Kaseras, Weavers, &c.

12. On gins about five lakhs of rupees, on presses (cotton) about two lakhs, on pottery about 20,000; others are worked by individuals with a small capital who scarcely make a decent earning.

13. Brass pots, tiles, bricks and rough cloth are not very much imported in the district except the metal sheets.

14. They supply the demands of the districts only.

15. None for the present, — unless and until the well-to-do class receive technical education and also learn how to combine,

16. By resorting to all the means suggested in (a) to (d) of this question, the industries of the district are bound to flourish.

17. Weaving industry.

18. Foreign competition.

19. Certainly it is practicable to revive many old decayed industries most profitably.

20. If the weavers who now work in the old fashion in many villages of this district are encouraged by supply of capital and by instruction on improved handlooms, they will work wonders. At least one weaving school to impart instruction in improved methods, should be opened here. Some gentlemen here and also in Harda are thinking of raising private subscriptions for this purpose. When one industry like this gets a start and begins to work properly, the other small industries should be taken in hand one by one. Expert supervisors and skilled workmen in each and every branch of the industries are wanting. This want should be met first.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. It is understood that there are certain silver mines in Joga of the Harda Tahsil, but they are not yet properly tried.

There are stone quarries in Hoshangabad and morrum quarries in Harda.

There is a kind of grass in the Hoshangabad Tahsil of which paper can be made, but the experiment is not yet tried by any one.

There is a big jungle in the Harda Tahsil in which there is a kind of timber (probably called salai) which can be used for matches if a match factory were started here. There are coal mines in Bagra in the Hoshangabad Tahsil and the work is, I learn, under experiment by a European firm who commenced the work of experiment five or six months ago.

In Rangpur and Chedka of the Sohagpur Tahsil there are coal mines but the work is not undertaken here as yet.

22 and 23. There are two big markets of timber (sag) which is exported to other districts and provinces, particularly Jalgaon and Khandesh.

Flag stones taken out from Hoshangabad quarries are sent to other districts and provinces. Nothing is exported to foreign countries except cotton and grain (including wheat and til seed). Some kacha stones are found and taken out from Bagda hill in the Sohagpur Tahsil. The earth (matti) taken out of these kacha stones is used for pottery work.

D.—CAPITAL.

25. None for the present. There are many rich bankers in the district but they do not understand the advantages of starting such banks for the support of any such industries.

26. Only one urban bank was started in Harda, under the provisions of the Co-operative Credit Societies Act.

27. It was started in 1906. It is managed by the well-to-do and educated Malguzars. Its capital is Rs 8,000. I had to begin by purchasing 100 shares of Rs. 10 each. Interest charged is 12 as. to 15 as. per cent.

Money is lent to artisans, small shopkeepers and agriculturists on easy terms, and whenever there is no demand the money is lent on hoondies for a very short period. Money is lent on the personal security of two respectable men. Rs. 1,000 have been lent to another rural bank of this district on easy terms and on 8 as. interest.

E.—TECHNICAL EDUCATION.

28. Want of mutual faith and co-operation amongst the people exists and therefore nothing can be done here unless the Government co-operate and give their advice and help. If this is done there are many facilities for training young men.

29. None.

30 to 33. *Nil*.

34. I have sent only one boy at my expense to the Calcutta National Weaving School. None else besides him.

35. He studied up to the 1st English class and was a manual servant of mine. He seemed to me to be very intelligent and willing to learn.

36 to 38. I sent him with a view to teach other weaver boys gratis when he returns.

39. None.

40 and 41. *Nil*.

F.—INDUSTRIAL ASSOCIATIONS.

42. *Nil*.

(0) P. SURYANARAYANA, Esq., *Rajam (Visagapatam)*.

A.—AGRICULTURE.

1. Generally good.

2. Yes.

3. Good.

4. Landlords are prosperous but tenants are poor.

5. About $\frac{1}{10}$ on proprietary tenure ; the rest are tenants-at-will.

6 and 7. None.

B.—MANUFACTURING INDUSTRIES.

8. (1) Rajam, Pondur, Boddam, Kancharam, Mamidipille, Senavaram, Potnuru and Jami are the chief centres of cotton weaving and spinning. Chittivalsa has a jute factory.

2. Nakkapalli and Srungavarapukota are noted for lac and wood works.

3. Vizagapatam ivory and horn works are of world-wide fame.

4. Mining of manganese is carried on by English companies on an extensive scale in Chipurupalli and adjacent taluks.

5. Manufactories relating to leather, pottery, metals, oils, furniture, &c., are carried on in several parts of the district in a primitive style.

N. B.—The following remarks apply only to the textile industry which is the only one carried on on a large scale and upon which about 40,000 people depend for living.

9. The present condition is encouraging owing to the Swadeshi movement.

10. It was gradually decaying.

11. About 40,000.

12. Cannot be estimated.

13. Materially affected by competition with imported articles.

14. Bengal, Orissa, besides local market.

15. Enough of weavers to meet increased demand.

16. (a) Much, but the step is fraught with difficulties. (b) Improvement will be in proportion to the efficacy of the new appliances. (c) Much good can be expected. (d) Much expansion will be the result.

17 to 20. None could be named.

C.—MINERALS, &C.

21. Manganese, iron, graphite and mica.

22 and 23. None.

24. Manganese.

D.—CAPITAL.

25 to 27. None.

E.—TECHNICAL EDUCATION.

32 and 33. A carpentry class is attached to the Mrs. A V N. College, Vizagapatam.

34 to 41. None. Two young gentlemen went of their own accord to Japan to learn the making of pencils, soaps, matches, &c They returned from Japan and left for England for the study of law.

F.—INDUSTRIAL ASSOCIATIONS.

42. There seems to be one at Vizagapatam but only in name.

Note.

The pencil factories at Bimlipatam and Anakapalle, the Vizagapatam Spinning and Weaving Company (Handlooms) at Rajam, the rice mills at Vizianagram and Vizagapatam, perfumes, soaps, matches of B. V. Nath of Vizianagram—all started since the advent of Swadeshism—show that Vizagapatam District has also partaken in the general awakening.

(10) G. V. SHRIKHANDE, Esq., Saugor (C.P.)

A.—AGRICULTURE.

1. The condition of the agricultural industry in Saugor is not satisfactory as the district has been suffering from a series of famine years for the last decade and poor crops have taken the place of valuable crops. Cropped area of the last settlement was 933,864 acres ; at present it is 811,502 acres.

2. No. The district area is 2,561,480 acres. The Malguzari area is thus at present, including a few ryotwari villages, 2,029,844 acres. Of this 140,017 acres is not available for cultivation.

The net available area for cultivation is 1,899,797 acres, while the cultivated area at present is 920,022 acres inclusive of the new fallow ; or, in other words, the margin for extension of cultivation is still 51 per cent. on the total culturable area.

3. The general quality of the culturable soil is fairly good.

The area classified by soils at the last settlement is :—

Mar.	7,259	acs.	Rathia.	54,282	acs.
Mund I.	280,836	"	Patrua.	210,162	"
Do II.	301,082	"	Bhatua.	44,252	"
Baiyan	108,649	"	Kachar	1,141	"
Kabar.	27,026	"			

4. The landowning and cultivating classes are mostly indebted and their general condition cannot be said to be satisfactory.

5. Sir	125,196 ac.	} Absolute occupancy. 158,280 ac. Occupancy. 227,081 " Ordinary. 488,688 "
Khudkast	88,064 "	
Malikmakbuza	37,119 "	

6. (a) No steps whatever.

(b), (c) and (d). Nil.

7. The system has not been introduced yet in this District.

B.—MANUFACTURING INDUSTRIES.

8. (1) Cotton industry is not now important in the Saugor District ; the decrease has been very marked during the last decade ; a little thread is still spun by hand, generally by women in the spare time and used in the manufacture of coarse carpets, bags and cloths.

For weaving, ordinary weaving cloth mill spun thread is now mostly used.

Cloth is woven to some extent in large villages all over the district ; the chief centres are Saugor, Rehli, Deori, Gourjhamar, Garhakota and Bahatgarh. White dhotis with red borders for men and red cloths with black borders for women are principally woven. In 1850 Garhakota was described as a chief cotton mart, the principal articles woven being " addhas " or cloths in red, white and black stripes, which were made into " lahengas " or skirts for women. Very few of these are, however, made now. The weaving castes are principally Kories and Chadais who weave only coarse cloth. There are a few hundred Koshtis in the district and a few houses of Momins or Mohamedan weavers in Saugor. These Koshtis make good " saris " and " dhotijoras " with silk, gold and silver thread. The Momins also turn out good specimens of cloth. A cotton press has been opened recently at Garhakota. Cotton cloths are dyed in Saugor, Rehli, Garhakota and Gourjhamar, but the industry is also decaying. Saugor is said to have been famous for its dyeing industry and to have had a large export trade in former times, but this has now altogether vanished ; many of the weavers now buy coloured thread.

Kusum or safflower, which was formerly extensively used as a dyeing agent, is now scarcely ever employed owing to its cost, and indigo and " al " (*Morinda certifolia*) though not entirely discarded, are being supplanted by aniline dyes. In 1890-91 there were 400 acres under indigo and other dyes, but practically none are grown now in the district.

Wool.—Coarse country blankets are woven from the wool of sheep by the " Gardarias " or shepherd caste, who combine this occupation with sheep-breeding and tending. The local supply is insufficient and blankets are imported from Bundel-

khand and Cawnpore. The local blankets are black, white or chequered in black and white. Blankets of superior quality are made in Khurai Tahsil. The blankets prepared at Khurai are called "ral." Some punjaras in the Saugor City, make "namdas" of unspun wool which are covered with cloth to form native saddles.

Silk is imported in small quantities for making borders of dhotis and saris and for preparing "kad" and "muktas." This is only used by the Koshtis in the town of Saugor.

Jute is neither cultivated here nor used for textile fabrics.

"Sun" (hemp) is grown in the district and is used in making ropes and "tat-pattis."

4 — POTTERY, PORCELAIN AND GLASS.

There are a number of potters in the district; nearly every village has a few Kumbars to supply its requirements for earthenware vessels which are used extensively for cooking and storing water and grain. The vessels are coloured red, white, yellow or black before being baked. The quality of the earthenware is generally superior to that of the Southern Districts, and the pottery of Shahgarh owing to some quality in the clay, has special reputation for strength and durability. The Kumbars also make bricks and tiles.

At the Dewali festival the Kumbars make "cheraghs," a variety of clay figures and ornaments and give them a glittering whitish colour with lime and mica: while the mochis make painted dolls and images of gods and animals.

There is a good industry at Saugor where Allahabad tiles are manufactured.

Porcelain is imported into the district. Glass bangles are made in Saugor, Pithoria, Garhola, Garhakota and Rahatgarh. Balls of rough glass are obtained from Cawnpore. The bangles made locally are now being superseded by those of transparent glass imported from Europe.

Rude glass bottles are made for holding sacred waters, scented oils and medicines.

Lac bangles are also made and are much used by females in the month of Srawan. Beads and necklaces of lac and ornaments for the ears and head are worn by children and women of the lower castes.

2 — VEGETABLE AND ANIMAL PRODUCTS

Wheat and oilseeds, gram, cotton and ghee and "gadi" are the principal articles of export. "Gu" (raw sugar) is manufactured locally. These articles are chiefly exported from Saugor, Khurai, Bina, Bamora, Patharja and Kareli.

Cotton is mainly grown in the south in the Rehli Tehsil. Betel-vine leaves are sent to Northern India as also timber and grass.

Teak is the timber principally used for building and other purposes, while bijesal, saj, and koha are those next in favour.

Wood charcoal is used for smelting and bamboo charcoal for refining. Teak charcoal is generally used only by Lohars and Dhobis. Bamboos are plentiful and are used for building purposes, and basket and mat-making. These are now exported to Cawnpore.

Mahna, achar, and tendu are the chief minor produce of the district jungle ; the flowers of the former and the fruits of the two latter trees are collected in large quantities for food by the poorer classes. From the seeds of the achar tree "chiranj" is extracted. Gum is largely collected from dhaura, khair and saj trees. This is used for food and for export.

Catechu is boiled from the wood of the khair tree. Lac is collected in large quantity though the lac insect is said to have died in the famine years. The other minor products are honey and wax.

Herds of small buffaloes are driven to Chhattisgarh for sale from this district.

3. LEATHER, HORN AND PAPER.

Other exports are hides, horns, bones and skins of cattle. Considerable quantities of sheep skins are also sent away ; these are used for making drums, bookbinding and also for shoes. The skins and horns of the antelope are also exported in small quantities for ornamental purposes.

The export of dried jerked meat has recently become an important and lucrative trade with Burma and Madras.

Big slaughterhouses have been established at Saugor, Khurai and Rahatgarh where about 1,000 heads of cattle are slaughtered daily during the working season.

Formerly paper was made in this district but the industry is now extinct.

Leather industry in Saugor is also most important. It is, however, a village and not organised industry. The Chamars make articles of leather used in agriculture and also shoes. Saugor shoe is noted and is even exported. Better class of shoes have ornamental designs worked with silk, cotton thread and lace ; shoes are mostly made in Saugor and Rahatgarh.

There are good carpenters in towns who turn out high class work and English furniture. Ornamental wood-carving is also

done to order and some of the temples and houses contain very good specimens of this work.

Kanderas or turners make tops, toys, cups, chessmen, "haggas" and other articles, and also do lacquer-work. Bamboo-workers also muster strong in Saugor.

8.—MATERIALS USED IN CONSTRUCTION.

The district of Saugor abounds in good materials for building purposes. It has good clay for bricks and tiles and fine Vindhyan rocks, yielding sandstone, which is well adapted for building purposes and a number of quarries are worked. The best are at Bahatgarh and Maswas near Saugor from which large slabs are obtained. The houses in several villages are built and roofed entirely with sandstone slabs.

Teak and other timber is plentiful

9, 10 and 13 The present condition of all these industries, having come in contact with cheap machine made articles, is quite unsatisfactory, declining and decaying. Before thus their condition was much better.

11 and 12. Statistics are not available.

14 These industries, as has been stated above, supplied mostly local demands and surplus products were exported to surrounding districts.

15. Land and labour is still comparatively cheap at Saugor and will facilitate any increase in the supply, if a demand arose.

16. The existing industries are capable of expansion—

(a) by making advances to artisans at low rates of interest;

(b) by improvement of the appliances in use;

(c) by the imparting of special instruction, and

(d) by the employment of power machinery.

17. Almost all the industries described above still exist but in a decayed form.

18. Cheap foreign articles in the market without any protection or appreciation for the locally made articles.

19 and 20. Cotton goods, dressing and curing of hides and metal works can be much improved with profit by the means noted under head 16. Saugor had formerly a large industry of gold and silver workers, but they are now hard put to it to make a living. There are a few Sonars at Khurai and Itawa and one or two in most large villages. They prepare the ornaments of gold and silver used by the people, besides plates, chains, bells, bones, etc., etc. Souar's son sits all day

with his father watching him work and handling the ornaments ; they also receive some training in freehand drawing at home.

Ornaments are now also largely made of bell-metal by the sub-caste of Andhia sonars. Eating and drinking vessels are also made of this mixed metal, but they cannot stand fire and cannot be used for cooking purposes. Bell-metal industries exist in Saugor, Pijora, Jaisinghangar, Rahatgarh, Isurwara, Deori, Khimlasa and Malthone.

Brass and Copper work.—Water pots and dishes are made of these metals by the hammering process, while drinking and cooking pots, instruments, idols and toys are mainly cast. Copper horns for use as musical instruments are made at Malthone, and sent outside the district. Brass working industries exist at Saugor, Khurai, Itawa, Garhakota, and Rehli.

Iron works.—Most villages have a lohar or blacksmith who makes and mends agricultural implements. Imported iron is now principally used and many articles are imported ready made by Bohras, but cooking utensils made of iron and melted at Hirapuri and Barkhera villages in this district are preferred to the imported articles. Ornamental iron nut-cutters are made at Deori. Some lohars in Saugor can make good and strong locks.

6. CHEMICAL INDUSTRIES.

The local Vaidyas and Hakims prepare their "Matras and medicines." The "attars" produce different "Itras," scents, scented water and 'sharbats.'

7. FURNITURE AND DECORATIONS.

Carpenters are found in most villages who make the wooden implements of agriculture. There are a few good workmen.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. Deposits of iron are found in the north of the district in the villages of Tigora, Heerapur, Baraitha and Amarman-all of the Banda Tahsil.

The mines near the latter village are in Government Forest. This Department lets its mines to a contractor for a small sum and iron workers pay him. In the other mines any one is free to extract ore in payment of a royalty of as. 8 per year on each furnace maintained. The number of furnaces has decreased in recent years. In 1899 there were 78 furnaces ; in 1903 there were only 31.

Sandstone of a superior quality is found in Rahatgarh and Maswasi and in Shahgarh soft stone is obtained which

is made up into cups and vessels. The red clay found in Shahgarh is worked up into earthenware of a good quality and superior strength.

Mica exists at Baraitha, but is not worked.

22. Iron and sand stones are used in the district.
23. None except a little iron which is sent to Cawnpore.
24. Hides, horns and bones.

D.—CAPITAL.

25. None except the local money-lenders.
26. None.
27. *Nil*.

E—TECHNICAL EDUCATION.

28. None whatever. Recently a class has been opened in the High School for the sons of Lohars, Sonars and carpenters where drawing is taught.

11. M. VENKANAH, Esq., Vizianagram.

A.—AGRICULTURE.

1. The district of Vizagapatam is the largest in the Madras Presidency. More than nine-tenths of it consists of Zemindary land, and of the remaining only a fifth comes under *inam*. Hence agricultural statistics are available only for the *ryotwari* and minor *inam* lands in the three Government taluks of the district. The maritime plain and most of the valleys in the Agency Tracts are very fertile. The old tools and implements with which agriculture has been carried on from time immemorial are still in vogue everywhere. The ploughs, the seed drills and other appliances are wholly unsuited to modern requirements and are susceptible of considerable improvement. On the whole the soil is fertile, yielding abundant crops, such as paddy, cambu, ragi, gingelly, gram and cholam. Owing to the high prices which jute has been fetching of late, a large area which has hitherto been under 'wet' cultivation is now brought under jute as being more lucrative. Sugar-cane is extensively cultivated in the Palkonda Taluq and in the valley of the Sarada round Anakapalle. Formerly cotton and indigo were grown over a wide area, but since the discovery of the artificial dye, the latter has been abandoned, with the result that the numerous indigo factories scattered over the district are to be found in a crumbling and dilapidated condition, having been overgrown with cypresses.

2. The district may be divided into two portions, namely, the Agency Tracts and the plains. The former is hilly and is covered with dense and impenetrable forests. The greater part of the cultivable area in the inland parts is brought under cultivation. There is, however, no inconsiderable land in some of the Zemindary tracts which has been left 'uncult' and 'low.

3. The soils of the district as classified in the three Government taluks divide themselves into the two main groups of red ferruginous and black, which may again be subdivided into clays, loams, and sands. The black soil is chiefly found in the alluvial valleys of the streams and rivers, the higher land being usually red.

4. The major part of the population live by agriculture, and in the absence of any industrial activity worth speaking of, they have no alternative avocation to which they can readily take in the event of the failure of the monsoons.

5. The system of tenure in the Zemindary tracts which denies occupancy right in the land does not tend to improvement or careful cultivation of the soil. The Zemindars do not encourage the pauper cultivator and let the land to tenants of substantial means. In most of the estates the ryots do not enjoy a fixity of tenure and the assessments are constantly and aviciously enhanced at the sweet will of the Zemindars. Moreover, most of the *pattas* granted by these Zemindars contain the most rigid and ungenerous stipulations, such as that no trees shall be felled or planted by the tenants without permission and the custom of paying the Zemindar in kind. In these circumstances it is not unnatural to find that the ryots as a class should be wallowing in abject poverty in the Zemindary tracts, while the condition of those in the Government taluks fares no better.

6 (a) There is no supply of cheap capital in the district to finance agricultural or any other industry. The cultivators borrow from the Sowcar at usurious interest with the result that they find themselves unable to refund either in cash or kind, and after undergoing the privations and harassments consequent upon litigation in the Indian civil courts, turn out coolies or labourers or migrate to the more fertile parts such as the Godavari District or Burma in search of livelihood.

(b, c) In 1904 the District Agricultural Society was formed and cattle shows had been held at Vizianagram, Kasimkota and Bobbili. Practical demonstrations in ploughing with new and improved implements were held for the benefit of the agriculturists. But owing to extreme poverty of the ryots, they are unable to avail themselves of these

advantages. From the very outset the Association which has been under official control, does not show much vitality, nor have the public any reason to enthuse over its results so far.

(d) There is hardly any doubt that the soil is gradually becoming infecund, *pace* Dr. Voelcker. Water and manure are the chief wants of the ryots in the district. There are, however, many small rivers, but as they flow mainly through the Zemindary tracts, their contents are not utilised for irrigational purposes on a large scale. The ryots depend mostly on wells, tanks and mountain streams, and in the event of failure of monsoonal rains, they have nothing to fall back upon. Everywhere cow-dung, which is largely burnt as fuel, is used as a manure, but it does not fertilise the soil proportionately to the loss sustained every year. It is only in places adjacent to Municipal towns that night-soil can be procured and utilised as a manurial substance. The out-lying fields of the villages are fertilised with the litter of cattle-sheds and the urine of farm animals. The ryots are ignorant of the use of mineral and artificial manures.

7. It is a pity that the district has not yet taken advantage of the Co-operative Credit System

B — MANUFACTURING INDUSTRIES

8. Next to agriculture cotton weaving is the chief occupation of the people.

(1) Rugs and carpets are made at Jami in the Srungavarapukotu Taluq. They are also woven at Anakapalle and Payakarowpeta in the Sarvasiddhi Taluk. In the east of the district the weaving centres are Rajam, Siripuram, and Ponduru, three neighbouring villages in the Palakonda and Chipurupille Taluks. In the first named coloured cloths are woven which are of a soft and exquisite texture. They are not only sold in the plains, but also sent in large quantities to Ganjam, Orissa and Bengal. Weaving is also carried on in Siripuram and Ponduru where women spin a fine gossamiery yet strong thread which approximates to 150's and weave cloths which are famous for their softness and durability. Other places where cotton weaving forms an important industry are Vizianagram, Duppada, Jonnavalasa, Denkada and Anakapalle.

The local jute is spun and woven into gunny-bags by steam at the mill at Chittivalasa near Bimhpatam. In a few villages near Palakonda, Anakapalle, and Vizianagram jute fibre is woven into long strips of gunny which are cut up and stitched into bags.

(2) The chief centre of jaggery trade is Anakapalle where sugar-cane is now largely grown. Iron mills are used there for pressing the cane. Messrs. Parry & Co. have been encouraging the cultivation of cane by advances of money and improving the quality of the jaggery manufactured by hiring out to the ryots metal vessels for the storage of the juice in place of the earthen pots generally used by them. Jaggery is also manufactured on a large scale at Rayaghada and Palakonda which are situated on the outskirts of the plains. The oils used in the plains are all made in the primitive wooden mills in almost every town and village. Castor oil is prepared in Vizianagram in two mills which are more or less paying.

There are two rice mills in Vizianagram which were started only last year.

There are three tanneries in Vizianagram and one at Jeypore. All of them are owned by Mahomedans. Tanned hides and skins are exported on a large scale from the port of Bimlipatam.

Large quantities of horns are sent from the Agency and are exported to foreign countries.

Vizagapatam is the centre of ivory work in the district. The industry is in a flourishing condition and has won medals at Exhibitions. Fancy articles such as chess-boards, photograph frames, card cases, and trinket boxes are made from tortoise-shells, horns, porcupine quills, and ivory combs of exquisite pattern are also prepared and largely patronised by Europeans.

Lacquer work is done at Anakapalle, Chandanada, Etikoppaka, Lakavarapukota and Srungavarapukota.

Wood of fine quality is turned on the primitive lathe and lac of various colours is then applied to it. The articles made in the places consist of cots, toys of different kinds, chess-boards, small boxes, tumblers and platters.

Glass bangles are made in several villages round about Anakapalle. Yellamanchili, Chipurupalle, Vizianagram, Paidipalem, and Navarangapur.

A pencil factory called the 'Krishna' Pencil Manufacturing Company has been started at Bimlipatam. The plant and machinery are fresh and cost about Rs. 15,000. The daily outturn is encouraging and with efficient and more economical management it will prove a very paying concern. The factory is managed by a Bengalee expert who underwent training in Japan.

(5) Fine work in gold and silver is done at Rajam, Bobbili, Parvatipore and Vizianagram. Cups, rose-water sprinklers, small silver boxes and vessels are neatly executed in these places. Ornamental work in gold and silver is done

in Vizagapatam and Vizianagram. Brass and bell metal work is usually done by the Kancharis in Parvatipore and Anakapalle, Bobbili, Somalingapalem, Ellamanchali, Anantavaram, Lakavarapukota. The work consists in casting vessels and utensils and giving them a fine polish.

(7) Wood work such as cots, chairs and tables is done at Vizagapatam and Tallavalsa.

(8) Materials used in construction are to be had in abundance in the district. Since the major portion of it is hilly, rocks and stones are procurable everywhere. Lime is quarried throughout the district and shell-lime is produced on the littoral tracts. The Agency supplies large quantities of wood for building houses. The inner valleys of the hills in Palakonda are full of iron-wood (*Xyha dolabriformis*), satin wood (*Chloroxylon Swietenia*), and other varieties of timbers. Among the most characteristic trees in the hills are the *nulla madali* (*Terminalia tomentosa*), *Cedrela microcarpa*, *Buchanania Latifolia*, *Pterocarpus marsupium*. Noticeable among the hills are *Shorea robusta*. Bamboos are exported, but teak wood is very scarce.

(9) & (10) It is sad to find that many of the industries, if not all, enumerated above, were once in a flourishing condition, but are now slowly but surely decaying.

(11) According to the last Census Report the population supported by agriculture in the Agency is estimated at 699,069, the percentage of the agricultural population being 82.14; the percentage on agricultural population of actual workers is put down at 44.41, while the dependents are 55.58. The population supported by agriculture in the plains is 1,431,158, the percentage of agricultural population being 68.71; the percentage of agricultural population of actual workers is estimated at 64.05, while the dependents are 35.94.

(13) Of the industries which have been affected by imported articles, weaving of cotton goods may be mentioned first. Fabrics below 40s are not affected by foreign competition, while those above that count have gone down. The lower classes use the former, while the middle and upper classes go in for the latter. The lower classes are, therefore, true but unconscious Swadeshists.

(14) *Vide* remarks on the cotton industry.

16. (a) The establishment of Co operative Credit Societies will go far to advance the existing industries by financing them at low interest.

(b) New and improved tools and implements will the agricultural and other industries.

(c) The opening of Experimental Farms and demonstrations in weaving on handlooms by experts will prove useful in expanding the existing industries.

(d) The Raipur-Vizianagram Railway which is now in course of construction will open up the Agency to trade and commerce. A jute factory wholly manned by natives and located in the centre of the jute-producing tracts will prove a very paying concern.

A sugar factory at Palakonda or Rayaghada, or at Anakapalle, a comb factory and chrome-tannery at Jeypore may prove advantageous to enterprising capitalists.

17 and 18: Indigo-making was a great industry and the whole district is still dotted with deserted indigo-vats and factories.

The trade has dwindled to nothing since the discovery of the German synthetic dye.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

Agency Natural Products.—Paday, ragi, cholam, cambu, gram; gingelly, niger and mustard; saffron, turmeric, garlic, arrow-root; tamarind, soap-nut, ginger, and long pepper; honey and wax, horns, hides and skins; dammer and lac; marking nut, myrabolams and tanning barks

Mineral Products.—Iron is made from the local ores and smelted on a small scale in the Agency.

Plains.—Natural Products.—Paddy, ragi, cho'am, gingelly, and jute

Mineral Products.—Manganese ore.

D.—CAPITAL.

(25 and 27) There are no banking facilities for the support of industries in the district.

E.—TECHNICAL EDUCATION.

There are no facilities for imparting technical education in the district.

F.—INDUSTRIAL ASSOCIATION.

There are two Industrial Associations in the district, one of which is located at Vizagapatam and the other at Vizianagram.

12. G. LAKSHMANNA, ESQ. AND G. RAMACHANDRA RAO, ESQ., *Rajahmundry.*

A.—AGRICULTURE

1. In the Godavari District, the condition of the Agricultural Industry may generally be considered satisfactory

Many kinds of grains and corn, cotton, coconuts jute, tobacco, etc., are grown in abundance. But the chief product is paddy of various sorts and qualities. This year the lands suffered much for want of seasonable rain, which is scanty during the last quarter of the year, the most important period for agriculture. Even in the Delta canals the usual system of supplying water on a free scale has been modified by the introduction of changes by the P. W. Department. So, for want of water, the crops this year present an unhappy condition and foreshadow no good results or harvest.

2. Yes. Almost the whole of the cultivable soil is under cultivation. In the present season the various villages and especially the fields by the side of the canals present a vast ocean of waving green corn extending as far as and even beyond what one can see. This is due for the most part to the canals and the great Godavari anicut, which stores water in the river during the hot months.

3. For the most part the soil is fertile and produces many kinds of grains. In the *Lankas* or islands in the river, excellent tobacco is grown in abundance. In the Amalapur Taluk coconut trees are grown in a healthy way.

4. Not quite satisfactory except in the case of the Zamindars who are few in number. The taxes are heavy and greatly oppress the cultivating classes. Added to this the meagre and unsatisfactory supply of water has created great discontent amongst the cultivators against the Government. The Delta Superintendent and the Revenue Inspector ought to be improved in their pay so that their demands on the cultivators may be few and far between.

(1) Under the first tenure few lands are held.

(a) Neither the Government, nor even individual proprietors on a large scale, supply cheap capital to the ryots. The former is ever ready to "wring from the hard hands of peasants their vile trash," i.e. the taxes regularly and mechanically without any the least mercy even in unfavourable years; while remission of taxation is a thing unknown in this district during even the worst famine years. In certain cases no doubt the Zamindars and proprietors unwillingly supply capital beforehand, though not at a cheap rate, lest their fields become barren and yield no produce on account of the wretched condition and the miserable poverty of the ryot.

(b) No private individuals introduce scientific methods or give practical instruction to the ryot. But the Government, through the beneficent influence of Mr. Alfred Chatterton, opened an experimental farm at Samalkota where sugar-cane and other articles are grown on scientific methods and by resort to good and useful manure. This farm is opened

here so that the cultivators may be benefited by examining and following the not complicated or difficult methods followed by the agriculturist in this new experimental farm.

(c) Generally speaking no improved implements are employed. However, of late the Samalkota Experimental Farm is introducing slightly modified and improved implements which can be easily adopted by the ordinary cultivator

(d) No improved kinds of manure are used ; but the old sorts are still in use everywhere. The farm at Samalkota referred to above is making an innovation in the matter by using scientific manure.

7. No Co-operative Credit Society was started in this district as yet ; but a District Agricultural Association was formed with the District Collector as the President. But even this Society seems to have produced no good results or in any way affected for better the condition of the peasantry or even of the members thereof.

B—MANUFACTURING INDUSTRIES.

8. (1) *Cotton*.—The manufacture of cotton goods is plentiful throughout the district. For the most part this industry is carried on by the weaving classes on their old and unimproved looms. Very fine cloths (dhoties, saris, etc.) are produced at Uppada (near Coringa), Thatipaka (near Nagaram), Bendemurlanka, Mora and various other places even to 200 counts and more. At Zampeta (Rajahmundry), Mandapata, etc., beautiful checks for the use of coats and shirting are made and exported in large quantities to other provinces in the country. A small factory of improved handlooms was recently started at Nidadavole with the modest capital of Rs. 12,000, but it appears not to be in a flourishing condition. Improved looms are also used here at ajahmundry, Mandapata and other places. Cloth is woven at Cocanada out of plantain fibre. A new experimental farm was opened at Rajahmundry by Mr. S. Veeraswamy in which the perennial varieties of long-stapled cotton is grown. From this cotton, yarn used in Dacca muslins can be spun. The trees are growing luxuriantly.

Wool is used in the manufacture of carpets at Ellore and in the Central Jail, Rajahmundry.

Silk—Nil.

Jute.—A Jute Mill was constructed recently at Ellore (now in the Krishna District) with a capital of about 7 lakhs of rupees, the greater portion of which amount was collected by shares. The factory began work a few months back under the supervision of Mr. McIntosh, a Scotch Jute Expert. About 700 labourers are employed in it and the work is going

on satisfactorily. The gunnies manufactured are not exported to any distant places ; but are consumed here only in the Godavari and Kistna Districts ; and yet the mill is unable to supply the demand of even these two districts. This is the only large factory in our district ; and if it were placed under good management and yields good profits or dividends, many more factories will surely arise in the district. For the people here do not require an innovation or a guiding example to follow in the same path, be it good or bad. It is thus that hundreds of mushroom provident companies were started but the infant mortality amongst these companies was almost 100 per cent. Now a large number of rice mills also are arising in a similar scale. Hence, if but this jute factory is made a useful and profitable concern, it will have rendered great benefit in the construction of factories in this district. But if this, the first bold venture fails, it will do incalculable mischief and create great difficulties in undertaking profitable concerns on a similar scale.

Sugarcane, which grows in abundance in the district, is made use of in the big factory at Samalkota belonging to Parry & Co. In this factory, refined sugar and rum are manufactured and this factory supplies the demand of sugar and rum in this district.

Not much of leather or horn industries. There is not a single mill for the manufacture of paper. Hides are exported in large quantities to foreign countries.

(2) *Pottery, porcelain and glass.*—Nil.

(3) *Metals.*—Nil.

(4) *Chemical Industries.*—Nil.

With regard to furniture, the carpenters here supply only the local demand ; but no export trade is practised.

9. The chief industry of the district is handloom weaving. There are fine workmen who can produce beautiful cloth and of a durable texture. For want of patronage and appreciation these looms had fallen out of use during the last two decades or more. But it is refreshing to note that the *Swadesi* and *Boycott* movements have once again revived this once famous industry and the weaver classes and the handlooms are up again and doing excellent work. Without exaggeration it may be said that during these famine days the *Swadeshi* movement saved the weaver classes from poverty, wretchedness and hunger. However, much more remains before us and we hope gradually to improve the present industries and supply cloth of all kinds on a large scale to other parts of the country as we are doing on but a small scale at present.

11. It is difficult to give numbers in answer to this question ; but we may roughly say that there are over 50,000 people employed on the handloom industry in the various towns and taluks throughout the district. In the rice mills themselves, which abound in the district, there are employed about 10,000 coolies. In the jute mill at Ellore some 700 labourers are working, while also a large number are engaged in the weaving of carpets which industry is in a flourishing condition at Ellore and is in need of patronage and appreciation from the country,

12. The capital of the jute mill at Ellore is over 7 lakhs Rs, while rice mills in the district should have cost not less than at least 15 lakhs. In Rajahmundry itself there are about half a dozen of these rice mills.

With regard to the weaving industry, it would not be possible to give even rough figures of the capital employed. The poor and destitute weavers invest what little amount they own, and have to wait, till the cloth produced therewith is disposed of, for again putting more money into the industry. They are sadly lacking in capital : Organised work, recourse to starting handloom factories on the basis of Joint Stock Companies and providing these village weavers with advances would largely increase the present outturn of cloth. The capital of the sugar factory at Samalkota seems to be over 5 lakhs of Rs.

13. I shall under this heading take only cloth which is the most important industry in the district and has a great future before it. With regard to *Dhoties* (cloth for weaving) during the last two decades or more the Manchester *mull* has achieved an importance and sale which cannot be described. Every one and especially the educated classes would wear no other cloth but this foreign *mull*. Just before the *Swadeshi* movement came into importance ; the foreign Mull commanded the markets and reached the climax or zenith of its importance. But the *Swadeshi* and Boycott movements have struck a strong blow at this foreign cloth. Gradually, the use of this Mull began to decrease and our *Swadeshi Dhoties* are once again taking its place. Thus we find that the foreign goods are gradually giving place to *Swadeshi* ones. The same rule about the Manchester Mull applies as well to checks and cloth used for coats and shirting. The one article that the district is sadly lacking in production is woollen cloth. In this direction, the foreign article still commands the local markets,

14. At present the handloom cloth woven by the weavers is not only able to supply the demand in the district ; but is also exported to some extent to other provinces and

cities, especially Calcutta and Madras. Zampeta checks also are exported even in greater quantity to Madras and the neighbouring districts ; while Ellore carpets command a sale throughout the country, but have of late experienced a perceptible fall for want of patronage.

15. If demand increases, there is no doubt that production as well will increase in a proportionate degree. Men of moderate means are ever ready to help production by paying advances to weavers, or by opening looms of their own accord to supply demand. It is only necessary that the few Zamindars of our district should cast off their lethargy and torpor and take advantage of the times by investing large capital in the construction of factories and mills. The very fact that, since the advent of the Swadeshi movement, the old weavers have once again taken to their looms in large numbers and are producing cloth of different qualities and kinds to supply the demand indicates that there will be no drawback in production, if only there is demand.

16. Even now, some expansion is apparent in the industries by advances being made by wholesale dealers and shopkeepers. But the present advances are but meagre and extend only to a few cases. Surely the existing industries (we mean the industry of cloth which is the chief one in the district) is capable of *great* and even *rapid* expansion if only "advances are made to the artisans at low rates of interest." For this purpose an Industrial Bank or something of the sort is required.

By the introduction of improved appliances great progress can be and will be achieved in the Industrial field. Thus at Rajahmundry, Nidadavole, Mandapeta and other places in the district, improved handlooms and fly-shuttle looms are introduced ; and it is gratifying to note that good cloth of a fine and beautiful texture is produced there. It is hoped that the weavers would learn from these improved looms and introduce the same in their own homes thus saving labour, time and money.

The weavers in the District sadly stand in need of special instruction in improved machinery. Some two years back steps were taken to impart instruction to weavers and for this purpose an improved loom and a Bengalee expert were brought here from Calcutta ; but this instruction did not last long as it was given up a few months later. Great progress can be achieved by imparting instruction to the artisans in the district by special experts on improved looms, instruments and machinery.

Power machinery would greatly increase the industries. Thus we find a practical illustration of this in the Ellore Jute

Mill and the various Rice Mills in the district. In a few years, we hope to start some factories, through the wealth and munificence of our Zemindars and with the help of practical knowledge of several of our young men, who had gone to Japan and other foreign countries to learn various industries. Further it is reported that the Raja of Pittapur will shortly construct a factory with a capital of 12 lakhs of Rs. for ginning, spinning and weaving of cotton.

17. The carpet-weaving industry of Ellore used to be in a rather flourishing condition some decades back. The carpets produced there were highly valued and praised in distant places in India and even in foreign countries. The Ellore carpets had a great name throughout the country and were being used by Zamindars and Rajas in their palaces. But during the last two or three decades they have decayed.

18. The decay of Ellore carpets is chiefly due to want of patronage and appreciation from elsewhere. The Government Central Jails at various places in the Presidency are now producing carpets in large numbers and this has to a large extent handicapped the carpet industry of Ellore. Even now there are a few companies of weavers employed in carpet weaving at Ellore.

19. Yes ! It is practicable to revive the once famous carpet industry of Ellore.

20. The carpet industry of Ellore can best be revived by a wide patronage and appreciation of the same by the wealthy classes of the country. The weavers employed in this industry are in a poor condition and require the help and co-operation of rich men. A practical means of infusing life into this industry is by starting a company on a large scale for this industry, wherein these intelligent weavers can be employed on reasonable salaries.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. So far as our knowledge goes no valuable mineral products can be had in the District. But in the Agency Taluks, *mica* is found and now some Europeans are engaged in the digging of this mineral product.

The Agency parts abound in large forests where valuable timber, especially teak, can be had in large quantities. These teak trees are brought to Rajahmundry in large numbers and afford great trade.

22. The mica ore is sent abroad by the Europeans employed there to foreign countries, but is not manufactured in the district.

23. As we have said in answer to the above questions, mica, the only mineral product to be had in the District, is exported abroad.

24. *Nil.*

D.—CAPITAL.

25. There is no special Bank in the district for the support of the industries ; but there is a branch of the Bank of Madras at Cocanada which lends money on mortgages.

26. *Nil.*

27. *Nil.*

E.—TECHNICAL EDUCATION.

28. Amongst the general class of ordinary weavers the training is undergone in their very homes, as there is a special caste which is hereditarily attached to this industry.

Also training on improved looms is imparted in the handloom companies at Nidadavole and Rajahmundry. But there is no special school, where weaving is taught as an art by itself. A few years back a Bengalee expert and an improved loom were brought from Calcutta and a weaving school was opened at Zampeta (a suburb of Rajahmundry) inhabited by a large number of weavers. But unfortunately this weaving school had a premature death and there is not a trace of it left behind.

The National school which the citizens of this district intend opening at Rajahmundry shortly will impart Technical and Industrial instruction in conjunction with liberal Education.

29. There are no special schools, as mentioned in answer to the above question, for imparting instruction or training in the industries of our district.

30. In the generality of the weaver classes, instruction is given only in the practice of industry in a hereditary succession from the very childhood of boys ; but no instruction in the principles which underlie the industry is given.

31. There are no schools at all. The one school opened at Zampeta (near Rajahmundry) some years back, fell a victim to infant mortality after living for two or three months.

32. *No.*

33. There are no such schools at all ; but I hear there is a movement abroad to start rural schools in the various villages by the Government wherein it is intended to impart instruction on agriculture, carpentry, the smaller industries, etc., from the very lowest classes ; and give good practice to the eye and the hand in the earliest stages as is done in Germany, and other countries on the Continent.

34. Yes! The following are the names of the students and the countries they left for.

- | | | |
|------------------------------------|-----|----------|
| (1) Vangala Venkata Narayana, B.A. | ... | Japan. |
| (2) Alapati Gopala Rao | ... | Japan. |
| (3) Goteti Janaki Bamiah | ... | Japan. |
| (4) Mallampalli Narasimham | ... | England. |
| (5) Evena Satya Narayana | ... | England. |

Besides the above students who had gone to foreign countries, about half a dozen young men went to Bombay, Poona, Calcutta, Meerut, etc., to undergo training in the manufacture of candles, soaps, etc., and also to receive instruction in Mechanical Engineering in the Victoria Technical Institute at Bombay.

35. Of the five students that went to foreign lands the first, Mr. Venkata Narayana, is a graduate of the University of Madras, who passed high in Chemical Science. The fourth Mallampalli Narasimham, passed the Matriculation (Entrance) examination and was studying in the Senior F.A. class when he left together with the fifth a few months back for England. The other three young men (Nos. 2, 3, 5) studied as far as the Matriculation class.

36. It may be worthy of note to mention that almost all the above students (excepting the first) left the country without the knowledge of their parents or guardians. The first alone, Mr. Venkata Narayana, left some 2 years back for Japan, having been provided with a scholarship of three thousand rupees by the *Alamur Provident Institution*, whereas with regard to the other four, the second and third, Alapati Gopala Rao and G. Janaki Bamiah, left India some 20 months back for Japan without the knowledge of their parents. The former is the only son of one of the richest merchant princes of Rajahmundry and took with him (providing expenses, etc.) his friend Mr. Janaki Ramiah. They are still in Japan. They underwent training in the manufacture of soaps, candles, biscuits and glass and porcelain; while the fourth and fifth, Messrs. M. Narasimham and E. Satyanarayana, also left for England some 3 months back without the knowledge of their guardians.

37. The reply to this is found in the answer to Q. 34. Two are being trained in Japan and the remaining two in Great Britain.

38. With regard to Messrs. Gopala Rao and Janaki Ramiah, as I mentioned in answer to Q. 33, they shall, I hear, in a few months buy machinery in Japan necessary for the construction of a factory for the manufacture of glass and porcelain ware, for biscuits, and then go back to India together with a Japanese expert, whom (I hear) they engaged

on a monthly salary of Rs. 250 or thereabouts. So they will manage the factory to be started by Mr. Bhaskara Ramayya, while the other two, Narasimham and Satya Narayana, left for England only a few months back and it is not yet clearly known what they are studying there. So we need have no anxiety about their future course so soon. They are in well-to-do circumstances and the latter is owner of a large property (several lakhs) a part of which he will no doubt employ in the enterprise after returning to his native land some two or three years later.

39. Yes. There is at present one young man, Mr. Vangala Venkata Narayana, B.A., who returned from Japan a month back after undergoing full training there—both theoretical and practical—in the following industries:—Dyeing, Calico-printing, manufacture of soaps and candles, etc.

40. At present Mr. Venkata Narayana is doing nothing. He says that the best and most useful industry he had undergone training in is dyeing and calico printing and that a capital outlay of some 5 to 6 lakhs of rupees is required for opening a factory for dyeing and calico-printing. But, so far, no such amount is forthcoming and so his scientific and expert knowledge in these industries may after all prove futile, if no capital is made available.

He says, failing this project, he intends starting a soap and candle factory at Rajahmundry with a capital of Rs. 50,000, which some wealthy citizens of Penumantra seem to have promised to advance.

41. It is not advisable that Mr. Venkata Narayana's great knowledge in the important industries of dyeing and calico-printing should go unutilised. If no single individual—if there is any such, it should no doubt be a Zamindar or a Rajah—is coming forward to advance the whole capital of Rs. 5 to 6 lakhs, then I think it is the incumbent duty of the leaders and wealthy merchants of the district to co-operate at once and collect the required money and in the form of shares for a joint stock company wherewith the factory can be constructed as was done in the case of the Ellore Jute Mills.

42. At present there is no Industrial Association in our district. But over an year back a District Association was started at Rajahmundry with Mr. S. B. Sankaram, B.A., as its Secretary. Under its auspices he delivered some speeches on industrial subjects in the Town Hall and collected money on the Deepavali day two years back from every house at Rajahmundry. This money which amounts to nearly Rs 250 was spent in buying a loom and bringing a Bengalee expert who opened a school and taught handloom weaving to the

local weavers on the improved loom for a few months. But all this activity of the Association died away and it has practically no existence at present.

(13) **BABU PUBNENDU NARAYAN SINHA, Bankipur.**

A — AGRICULTURE.

1. The Bihar cultivators are well known for their intelligence and they are hard-working. They have got a traditional agr cultural lore, rich in useful information.

2. In some districts the whole of the culturable area has been brought under cultivation; in this, the greater portion.

3. The general quality of the soil is clay, clay loam and sand-loam.

4. There are big and small landholders, rich and poor cultivators. They are generally well off, but a large class of cultivators live from hand to mouth and many of these are badly off, specially in the congested district of Arrah, where there is more labour than land.

5. The class of tenant proprietors is increasing gradually. Most of the tenants have occupancy, only a small percentage form tenants-at-will. In Diara lands the tenants are mostly tenants-at-will.

6. (a) *Nil.*

(b) The Divisional Agricultural Association with its District Associations is trying to spread scientific and practical instruction in agriculture. This Association is under Government auspices.

(c) The Association is trying to introduce improved appliances.

(d) The Association is trying to introduce recuperative processes.

7. The system has not yet been introduced in the district nor in Bihar

B.—MANUFACTURING INDUSTRIES OF PATNA DISTRICT.

8. (1) Textile fabrics.

Cotton—Town of Bihar—Dhotis, charkhanas, dupattas, saris, imitation Dacca muslin.

Khasrapur and Dinapur—Table cloth, towels and bed-sheets.

Fatwa—Charkhanas, napkin.

Patna City—Durrries.

Wool—Patna City—Woollen carpets, asris.

Bihar—Woollen wrappers.

Silk and Mixed—Bihar—Dhoti, dupatta.

Jute—*Nil.* Fatwa—Bapta and charkhanas

Embroidery, embroidered cloth of sorts, lace, embroidery threads—Patna City.

(2) Vegetable and animal products—Sugar, gur (molasses), castor-oil, linseed-oil, mustard-oil, castor, linseed and mustard cakes, safflower—dye, flour, pickles, butter, soap.

(3) Boots and leather straps.

(4) Glass made articles. Glass is blown and made into several fantastic shapes, flower stands, teapots, sticks, etc., with the help of simple implements. This is one of the oldest industries of Patna City. Glass-bangles or churis. Glass tickles or forehead drops.

(5) Steel trunks, portmanteaus, despatch boxes in Patna City.

Iron railings, iron gateways, iron benches—Dinapur and Bihar School of Engineering. Cutlery—Dinapur, Brassware, Tinware.

(6) Photography and painting.

Electro-plating.
Ink.

(7) Drawing-room furniture, carriages, wood-carving, house-painting.

(8) Building materials (except iron beams).

9. The industries are in a good condition, except carpet industry, which is decaying.

10. Towel, table cloth and bed sheet industries are of a recent origin; so are steel trunks and iron industry and soaps. Butter industry is largely encouraged by Railway Refreshment Rooms. Of the old industries carpet and wood-carving are decaying and also the dye industry.

11. I cannot give the number for which reference may be made to the Census Report.

12. This requires detailed enquiry for which there is no time. Besides, the capital must vary from year to year.

13. Vegetable dye has suffered from importation of chemical dye,

The prospect of textiles generally is brightening, though they had suffered before.

14. Only the following articles have more than a local demand and are sent to outside markets.

(i)—Table cloth, towel, bed sheet, napkin, imitation Dacca muslin, carpets, both cotton and woollen, asnis, butter, glass-articles, glass-

bangles (churis), tinware, cheap cabinetware of Dinapur.

15. No facilities except what private enterprise would afford.

16. (a) There are local capitalists who make advances. I do not at present see the urgency of further advances.

(b) This is possible with respect to almost every industry.

(c) Special instruction is badly needed.

(d) Difficult to say.

- | | | |
|-----|---|--|
| 17. | } | Carpet industry has decayed. May be revived |
| 18. | | by the supply of capital and introduction of |
| 19. | | new skill from Mirzapur. Vegetable dyeing |
| 20. | | cannot be revived in competition with the cheap chemical dyes. |

C.—MINERALS AND OTHER NATURAL PRODUCTS.

There are no mineral and natural products in the district.

D.—CAPITAL.

25. The manufacturers as distinct from the artisans make advances to the artisans.

26. No.

E.—TECHNICAL EDUCATION.

28. There is the Bihar School of Engineering at Bankipur, which teaches carpenter's and smith's work.

29. It is a Government School that teaches Survey, Engineering and Mechanics. The standard is almost the same as in the Sibpur School of Engineering.

30. Instruction is theoretical and practical.

31. Boys pass in increasing numbers each year, but they have not yet started any shop.

32. No.

34. Yes, by the Scientific and Industrial Association.

35. They have some University qualification tested by the Committee of the Association.

36. Do.

37. Japan and other countries.

38. Nothing as yet.

39 Anbika Charan, B.A., has come out as an Electrical Engineer from Japan.

40 Nil.

41 He has recently come.

42. There is a branch of the Calcutta Industrial Association.

F.—INDUSTRIAL ASSOCIATION.

There is also the Bihar Industrial and Agricultural Exhibition Committee the object of which is to hold an Industrial and Agricultural Exhibition every year at Bankipur, to secure a full and improved representation of all the industries of Bihar. Exhibitions were twice held at Sonapur under the auspices of the Association. In 1907, the Exhibition was held at Bankipur. In February 1908, the Exhibition will be held again at Bankipur. The Agricultural Department of Government contributes Rs. 500 a year to the Exhibition and the Patna District Board Rs. 100. The Committee also subscribe to the Fund. The balance is supplied by the gate money and contributions from other District Boards.

14. RAO SAHEB DEORAO VINAYEK, Akola (Berar).

1, 2, 3. I have not much to add to the information which Government reports and records contain. There are, I believe, all varieties of land in the Akola District, and nearly the whole of the culturable area is under the plough.

4. Barring the landholders, who are besides money-lenders, the condition of other landowning classes is not all that can be desired. They are fairly well off in years of plenty, but one drought throws many of them on the relief works or brings them face to face with starvation.

5, 6. I have no authentic information to supply except on clause (a) of question 6. As for clause (a).—Under the Co-operative Credit Societies Act, Societies have been established at some thirteen villages of this district. Besides these similar Societies were started by me at three other villages, years before the Act was applied to Berar. The object of all these is to raise funds by one method or another from among the members and to render them pecuniary help when it is needed. These Societies are, as it were, the places where, if so desired, the benefits of co-operation and mutual help can be learnt. The principle underlying them is not quite new to India, though the refined and methodical manner laid down by the Act is. It is as yet too early to pass an opinion on its success or otherwise. These Societies will, in all probability, stand in need of considerable pecuniary help from outside their members ;

and to meet this contingency the establishment of a Central Bank at Akola with a moderate capital is under contemplation. This project is in the sympathetic hands of our popular and energetic Officiating Deputy Commissioner Mr. Jather and has fair chances of success. The attempt described above would, however, be a mere drop in the ocean as it were, regard being had to the vast requirements of the district in general. But if the Government keep up its sympathy toward; the movement as at present, and if the people in whose interest the attempt is made freely join the movement, the people will be practically benefited.

8—15. I cannot just now give precise answers to these questions. I may, however, say that there are many ginning and pressing factories in this district. The number of persons employed therein and the dependents on them may be approximately 50,000; but they have this employment only in the cotton season. There are three oil mills and one cotton spinning and weaving mill working all the year round, and the number of persons employed in them and of the dependents on these, may fairly be estimated at 1,000. One more spinning and weaving mill is under construction at Akola and may, when in full swing, find employment for another 1,000, probably throughout the year.

16. There are not big industries in the district except cotton weaving, which, too, is confined to the production of coarse cloth only. This admits of improvement no doubt, but before supplying money, power machinery, or new appliances, general education among the masses and special training besides to the artisan classes is needed urgently. My experience in the Akola Industrial Association, which will be related presently, bears out this view.

17—20 In times gone by there were in existence several private industries such as the manufacture of salt, paper, dyeing colours, opium, ganja, toddy, Sindi and Mhoura wines, cutlery, potteries, thikadi and other oils, bangles, etc. But they have all practically disappeared, some owing to foreign competition, some to Government monopoly, and others for want of funds, of mutual confidence, of a desire to help one another, of perseverance, of honest and efficient management. It is certainly practicable to revive some of them at least under present conditions. Spinning, weaving and oil mills worked by steam power will increase the quantity as well as improve the quality of the articles. Government are also trying to improve agriculture by introducing new methods and by starting a model farm at Akola. There are, besides, good prospects of reviving pottery, tanning, dyeing, bangle-making, Rosal oil and a few

other industries. The difficulties in the way are want of technically trained men, and of education among the masses, their ignorance of the real needs of the country and the means to supply them, apathy of the leaders, want of confidence in them on the part of the people, impatience of success, inexperience of business among those engaged in it and want of honesty and perseverance among managers. These defects are common among those who have lately been interesting themselves in matters industrial, though, of course, there are honourable exceptions. These are not all inherited defects. To this day millions worth of transactions are daily effected among men unknown to one another in the trading castes, and this is only possible by reason of the confidence they have in one another among themselves. Faith in one's neighbour is a necessary factor to ensure harmonious and successful working in joint business. And so is honest and efficient management. Radical changes are called for in the system of public instruction before the state of affairs we are talking of can be brought about. Want of money is not the only or the main obstacle in the way of successful industrial development. There is a great dearth of men who command respect alike for their attainments and their trustworthiness, and unless this can be remedied it is futile to hope for any great success.

21-24. I have no information. I may, however, state that an amount of raw material goes out of the country and comes again in the shape of finished articles. To this extent the country suffers a material loss every year.

25. The Bank of Bombay has a branch here and it supplies funds when sought for by business people.

26 and 27. Yes. One is in contemplation. See my answer to question 6 (a).

28 and 29. When the Berar Education Department introduced age limit rules in respect of students attending Government schools, about the year 1894-95, many good boys were cast adrift, and for their benefit I opened a technical class in the Native Cotton Ginning, Pressing and Spinning Co.'s Factory. The class is still going on. Good many boys have been and are being trained as fitters and turners and they have been earning enough to live respectably. Many were sent up for the Engineer's examination and about 25 passed in the examination of the Bombay Boilers Act. Of these, about 20 have been trained and sent up for the examination since the engagement of Mr. Govind V. Kolhatkar as engineer in my factory in 1907. Of these 25, about seven are second class and the rest third class engineers. Some of these are preparing for higher class certificates also. In addition to the above some

young men are under instruction in my factory in the spinning and weaving departments. There is also an industrial school conducted by Missionaries at Akola. The school is useful to the public and is well spoken of. It admits, I am told, only Missionaries.

30. The instruction given in the above class and school is only in the practice of the industry and principles are only taught so far as are absolutely required for sending out a thoroughly practical man into the world.

31. See answers to questions 28 and 29.

32 and 33. Not that I know of.

34 to 37. Yes. I have sent my cousin to Bombay to learn a branch of commercial education. He is an undergraduate. He is working in a respectable Indian firm dealing in cotton agency business.

38. He thinks of starting a business of his own here or in Bombay as circumstances permit.

39 and 40. There may be several whom I may not know. I know of only one person, Mr. Govind Vishnu Kolhatkar, whom I have engaged as my engineer. He is, besides being first class engineer of the Bombay Victoria Technical Institute, well up in spinning and dyeing, which were his special subjects. He is an all-round man and there are very few subjects as far as engineering, spinning and dyeing are concerned, of which he has not the requisite knowledge. There are good many qualified engineers and almost all of them are well employed.

41. As far as I know there is no necessity for doing anything.

42. Yes, there is one by name 'The Akola Industrial Association' established on the 20th April 1902 on the initiative and with the moral support of Kumar Sri Harbhamji Rawaji, the then Deputy Commissioner of Akola District. Its nominal capital is Rs. 1 lakh and the objects are as under :—(1) In the Akola District, to revive old industries that have decayed owing to want of encouragement. (2) To start and improve new industries. (3) To improve agriculture. (4) To improve the status of agriculturists. (5) To do every thing to promote the above objects. To accomplish the above objects—1. To collect useful information from India and outside. 2. To publish the same information by proper means for the people concerned. 3. To start scholarships and prizes and to give them to those deserving persons who receive instruction in any industry. 4. To find out markets for the products of the industries and agriculture. 5. To advance money to persons engaged in industry or agriculture

on moderate terms. 6. To advance loans on reasonable terms as to interest, and payments to associations or companies started on these lines. The Association was started for the Akola District but it was understood not to confine its effort to this district alone, and so directly it was started the Managing Board called a meeting and resolved, on the 21st April 1902, to use their first efforts towards improving the handloom weaving industry. A fly-shuttle loom of an improved kind and a man to work it were got down from Ahmedabad and it was set up and worked by the Akola Cotton Ginning, Pressing and Spinning Company. Samples of all cloths made in Berar were obtained. Berar weavers from all sides were invited and offered to learn to work the same. Many weavers were employed and taught the work, but only disappointment was in store for the Association. The weavers were in the end found to be so conservative that they would not, under any circumstances and conditions, exchange their old loom for the new. They would rather go on with their small incomes than earn more by substituting the improved for the old country loom. The Association was fortunate in getting any amount of assistance from the Company above named. The latter has erected a shed to accommodate 50 looms of the improved pattern with accessories so as to turn out 50 per cent. more cloth for the same cost and within the same time as the old looms. In fact, everything that this arrangement cost was found by the Company for the Association with the sole object of encouraging the weavers to use the new looms. The Company has thus to spend nearly Rs. 4,000 for the sake of the Association, and at least Rs. 1,500 out of this became a dead loss to it through the sheer indifference of the people for whose benefit it undertook the work. All this was, however, to no purpose, as the weavers refused to attach the fly-shuttle to their old looms, refused to work on the looms started by the Company on the piece-work system, refused all help from the Association in the shape of supply of material at a very small or no profit, of selling their goods which they could *not* sell in the market at *their* price to the Association for cost price, or in the shape of receiving advance of money required by them to go on with their work at a moderate rate of interest, and even refused to allow their boys to learn the fly shuttle working. The Association tried to change the attitude of the weavers through their own men and also through Kumar Shri Harbhamji Rawaji and other sympathetic high officers of Government, but all in vain. The experience of the Association is thus not very encouraging in this respect and it does not hope for better results in the near future. Success in this direction will only be possible when we shall have a new class

of weavers. For this general and technical education is wanted and Government assistance in the matter is indispensable. I am glad to think that it will be forthcoming at the hands of the local Administration. No doubt the experience of the Association is sad, but we should not allow it to dishearten us. I have lately added to my aforesaid Company a weaving shed and when this is in full swing I mean again to try to interest the weavers in shuttle looms. The cost of the preparatory work must be cheaper if ever we are to achieve success in this direction. I had, even when there were no power looms in my Company, prepared a warping machine to make a warp beam of 400 yards length and had made other arrangements also to wind cloth and unwind warps automatically. The preparatory work was thus made reasonably cheap. It can be made cheaper still, and the attempt is well worth making again.

The Memorandum and Articles of Association of the Association were framed and it was to be registered under the Indian Companies Act, but owing to the failure of the effort described above and other causes it had to be deferred. It is, in the meantime, intended to see what other industry the Association can take on hand. I have been inquiring what articles of every day use can be prepared and will command a market *in competition with imported ones*. I am in search of a man who will be able to prepare, among other things, candles, soaps, matches—sulphur and safety—,nibs, umbrellas and pencils. I had tried a Japan returned Indian, who had professed to be able to refine cotton-seed oil which I had a mind to crush and send to market—local or foreign—for sale in its *refined condition*. The trial cost my Oil Mill Company a good deal, but proved unsuccessful owing, among other causes, to the incompetence of the man employed. The seed is in abundance in Berar, and if it can be profitably turned to use in the above manner it would repay the outlay. I have also tried another Japan returned Indian who could prepare matches. A regular Company was started and large sums of money—rather more than Rs. 4,000—were spent in organising the business on a commercial basis, but the effort failed owing to several causes. I have a mind to try and put in practical shape some industry such as tanning, dyeing, or imitation ivory, and I am in search of a man competent to profitably work any of these three. The Association has above Rs 5,000 in hand and can call in more if it can hope usefully and profitably to employ it.

The Indian Industrial Conference has been of late brought into being and the Akola Association has offered to act as its Berar Provincial Committee. The proposal is already before the Secretary, Rao Bahadur Mudholkar. In compliance with the request of the Provincial 'Industrial' Conference of the

Central Provinces and Berar, information in regard to present industries and means to improve them was sought for. About 100 letters were sent to the leaders in the province, of whom about 6 or 7 gentlemen sent answers and gave some information. This, of course, is not full, but as it is it will be placed before the next sitting of the Conference.

At Lonar there is an old lake producing different kinds of salt in abundance. The product is sold by Government for a term of years to private individuals by auction. A well-to-do Mahomedan gentleman from Mehkar, Khan Bahadur Khwaja Abdul Bakikhan, is the present lessee. He has got heaps of salt, amounting to thousands of tons in store. I had a mind to see if the product could be turned to more useful purposes than at present, and I was in communication with the gentleman and also with an English firm in Bombay through whom I got the salts analysed, and was going to find out what better use could be suggested. The attempt seems to have been found by the gentleman not quite hopeful and he does not think it worth his while to proceed further.

At Buldana there are smiths' families. Among them there are several good workmen. They can be utilised very usefully but good advice from me and from many other gentlemen including even Kumar Shri Harbhajji Rawaji and Mr. Kustomji, the present able and energetic Commissioner, was thrown on unwilling ears. They have got their own crooked ideas of their worth and value and would not adapt themselves to the changed conditions of the country. When my attempt to remove them from their old associations to Akola and help them in all possible ways here failed, I, while at Buldana in May last, arranged to start a company *there* at their very door and take them in either as shareholders or even as servants to make some sort of cutlery, but I failed there too.

On inquiry I found that in the province there are some public-spirited gentlemen wishing to do something to improve handloom weaving and I suggested to them to try to open classes to teach fly-shuttle weaving and have also promised to lend my loom and man to teach the work if such thing is practicable at any place.

Since the Association did not succeed in seeing any particular industry started or actually helped, it has now resolved to offer rewards every three months to persons preparing useful articles. For the present India-made umbrellas, pencils, nibs and holders are the articles advertised for rewards.

I had the honour of being introduced to the Hon'ble the Chief Commissioner and during the interview I tried to

explain the present condition of our industries. I requested him to have a thorough industrial survey made of the province and to open craft schools at different centres to teach different branches of industries.

Since the Akola Industrial Association has been established and as the improvement of agriculture is one of its objects, I handed over to it the supervision of the three agricultural societies I had started. They are now to all intents and purposes branches of the Association.

Most of this I have done and am doing on my own responsibility but on behalf of the Association and with a view to lay formally before the Association for action any of my attempts that might be attended with success. I am not yet disappointed but think that we must continue to work patiently and quietly wait for success.

(15) AJODHYA DAS, Esq., *Gorakhpur*.

[The information given below is about the Gorakhpur and Basti Districts]

A.—AGRICULTURE.

1. Agriculture is the principal industry in these districts. It is conducted on old lines and the new scientific improvements have not been adopted as yet. The soil is fertile but it is losing its fertility on account of the increased pressure and the impoverished state of the tenants. Attempts have been made from time to time to introduce new staples, such as hemp, cotton and various kinds of rice but without success. Indigo was started about 1830 by European planters, and a better class of dye is produced here than in any other part of the United Provinces.

2. The average of the area brought under cultivation varies from 71·9 to 75 per cent.

3. The district of Gorakhpur is a submontane tract. Most of its soil is alluvial. The exact figures of the soil of this district are not available at this time.

As to the Basti District, the figures are as follows :—

<i>Nature of soil</i>	<i>Percentage.</i>
Loam or <i>Doras</i>	... 65 per cent.
Clay or <i>matiar</i>	... 27 "
Balna or sand	... 4 "
Kachhar	... the rest.

The above figures may also be taken for the Gorakhpur District with this modification, that there the proportion of Kachhar is greater.

4. The general condition of the landowning and cultivating classes is not at all satisfactory. The successive failure of crops has made them very poor. As a result of this the tenants cannot improve the condition of the soil which has been exhausted by constant tilling. The peasantry is mostly indebted to the Zamindar.

The petty Zamindars are also mostly in debt owing to their love of litigation.

5. In these districts there are no proprietary tenants. In Basti District 46.13 per cent. is held by tenants-at-will and 33.52 per cent. is held by proprietors as their *Sir* or *Khudkast* (i.e., in their own cultivation), 24 per cent. by ex-proprietary tenants, 25 per cent. is rent free and 19.86 per cent. is held by occupancy tenants.

The exact figures for Gorakhpur are not yet available, but, broadly speaking, the proportion is much the same as in the sister district of Basti.

6. (a) Of late Agricultural Banks have been started where loan is given to agriculturists at the rate of 12 per cent which is lower than the usual rate charged by the money-lenders. These Banks being very few in number are not within easy access of most of the tenants who have still to depend upon the money-lenders and pay an exorbitant rate of interest.

(b) There is no school giving any such instruction.

(c) Very little. Chiefly confined to indigo planters who employ improved ploughs for tilling the soil. Tamkohi is a big estate in this district and it is under the Court of Wards. There they use harvesting machines for cutting and gathering crops.

(d) There are no scientific methods in vogue but agriculturists employ ordinary manure before sowing crops. There is considerable export of bones from these districts which tends to reduce the fertility of the manures.

7. This system has been introduced here quite recently and the few societies that have been formed are making progress. It has not been here long enough to produce any change towards the betterment of the tenantry.

B.—MANUFACTURING INDUSTRIES.

8—20. These districts are purely agricultural districts and manufactures in the proper sense of the word are non-existent and thus the manufactures such as they are, are merely designed for local requirements.

- (1) The principal industry is cotton fabrics.
- (2) Vegetable and animal products none.
- (3) Horn and paper, none.

Leather, but only for local requirements.

Sabar or deer skin leather is cured and pillow cases and bed-sheets are made out of them and sold in the market.

- (4) Pottery, etc., calls for no special attention.
- (5) Metal—none of special interest. Metal vessels are made at Bakhira and Mehdawal in the Basti District, but the business is comparatively insignificant.
- (6) Chemical industries—none.
- (7) Furniture and decorations—none worth noting.
- (8) Materials used in construction, ordinary bricks and lime for local consumption.

In Gorakhpur the most considerable industry worth noting is the sugar refining which is carried on mostly on the old local methods prevailing in the district. In 1903 a large sugar refinery worked on European lines has been started. Manufacture of indigo is dwindling but still survives. The factories are owned and managed by Europeans. There is much room for improvement and expansion by using the methods enumerated in question 16. According to the last census in Basti—

56,500 persons were supported by textile industry.
 32,500 by wood, cane and jungle products.
 29,000 by metal work.
 26,800 by earthenware and glass.

Another chief industry is textile fabrics. Here also there is great room for expansion. Want of capital is the cause of the decay of these industries. If advances be made to the Julahas and Koms I think they will be able to produce good fabrics.

For the present all these are only for local consumption with the exception of sugar which is sent to other places in some quantities.

Palanquins are made for local use.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

21—24. In Basti and Gorakhpur *Kankar* of various kinds is to be found which is used as road metal as well as for making lime.

In Gorakhpur the chief mineral product is saltpetre which is extracted from saline efflorescence by *Lunias*.

D.—CAPITAL

25—27. There are two banks here over and above one District Bank started under the Co-operative Credit Societies Act ; but these afford no particular facilities for the support of industries.

E.—TECHNICAL EDUCATION.

28—41. None.

F.—INDUSTRIAL ASSOCIATIONS.

42. There is no Industrial Association.

APPENDIX V.

Report on the Work of the Berar Committee by Rao Saheb Deorao Vinayak, Akola.

Dated Akola, 28th November 1907.

To

THE GENERAL SECRETARY,
Indian Industrial Conference, Amraoti.

SIR,

As desired by Resolution No 2, of the Provincial Industrial Conference of the Central Provinces and Berar, held at Raipur on the 31st March last, I have the honour to submit this report.

2. Directly the Conference was over I, on the 8th of April last, issued a circular letter to the leading men of Berar, including the members of the newly-appointed Berar Committee of the Conference to collect and send me information, among other things, about the old and new industries of the province and to suggest means to improve them. About 70 letters were sent but only six or seven gentlemen replied and gave some information. This, however, is not, as it naturally could not be, full and complete. Besides this, I have collected some more information to supply all of it to you ; but since our Local Government has been pleased to specially appoint a high officer to make a regular and thorough Industrial Survey of the C. P. and Berar, the information so obtained and now in my possession would naturally be of very little use to you. I think, therefore, that I need not give it here. I may, however, state here that Berar does not at the present day boast of any industry worth the name besides handloom weaving. This weaving consists mostly of coarse cloth except at Kolhapur and Anjangaon-Surji and a few other places where silk weaving is also carried on to a small extent. But I do not think there is need of my sending information on handloom weaving which is carried on on antiquated lines At some places fly-shuttle is being used or experimented upon and next year I may be able to say something about it.

3. As I promised in my letter of the 10th instant, I beg to inform you as to what I have done during the year.

(1) On behalf of the Akola Industrial Association I have advertised that I shall give prizes for articles of every-day use which are good. I shall declare the result of my examin-

ation of the articles of workmanship which have been received from Bombay and Poona on the 1st December.

(2) I have been in communication with a gentleman here who manufactures candles. The machinery he uses is all India-made and the article prepared is found as good as the Bombay one. He hopes to sell it in the market at the same prices as the Bombay candles fetch. If he succeeds in doing so the business will be started on a moderate scale.

(3) I have been examining a cotton-seed oil project and one for the manufacture of umbrellas. I have crushed cotton-seed and refined the crude oil. I have been now getting the sediment turned into soap, etc. I am also preparing the required articles except iron framing, to make a complete umbrella. When this is done and the articles are found worth taking to the market, I shall see if a business can be started on commercial lines. This examination is, however, in an experimental stage and I cannot say more at present.

I have the honour to be,

Sir,

Your most obedient servant,

DEORAO VINAYAK,

Secretary,

Berar Committee of the Indian Industrial Conference.

APPENDIX VI.

Communication to the Provincial Committees.

From

RAO BAHADUR R. N. MUDHOLKAR,
General Secretary,
Indian Industrial Conference.

To

- (1) P. BOY CHAUDHURI, Esq.,
*Secretary (in charge), Bengal Provincial Com-
mittee of the Indian Industrial Conference,*
Calcutta.
- (2) LALUBHAI SAMALDAS, Esq.,
*Secretary, Bombay Provincial Committee of the
Indian Industrial Conference, Bombay.*
- (3) THE SECRETARIES,
The National Fund and Industrial Association,
Madras.
- (4) THE SECRETARIES,
The United Provinces Industrial Association,
Allahabad.
- (5) LALA MULKRAJ,
*Secretary, The Punjab Committee of the Indian
Industrial Conference, Lahore.*
- (6) KRISHNA RAO DESHMUKH, Esq.,
*Secretary, The Central Provinces Industrial
Committee, Nagpur.*
- (7) RAO SAREB DEORAO VINAYAK,
Secretary, The Berar Industrial Committee, Akola.

SIR,

The Provincial Committees of the Indian Industrial Conference were established by Resolution VI of the First Conference held at Benares in December 1905, "for giving effect to the recommendations (of the Conference), generally encouraging industries and making an industrial survey in their several provinces, and compiling useful facts and sugges-

tions for submission to the next Industrial Conference in December 1906. In order to carry out these views each Committee is requested to raise suitable funds, appoint trustees, frame rules for the conduct of business and lay its accounts before the next Industrial Conference."

By Resolution V of the Second Indian Industrial Conference, the Committees were "asked, besides taking steps to promote industries in their several provinces, to compile useful facts and suggestions for submission to the next Industrial Conference, and to raise suitable funds for carrying on their work." I am to request you to send a report of the work done by your Committee in the present year in accordance with the foregoing Resolutions.

2. In accordance with Resolution VI of the last Conference, an Additional Assistant Secretary was to be appointed, "so that the Assistant Secretary may be free to visit the different provinces and help the Provincial Committees in all matters in which they may require assistance." And the Conference voted "a sum of Rs. 10,000 for meeting the expenses of the next twelve months and also for issuing a quarterly bulletin of industrial information under suitable management." In point of fact, less than half of this sum has been realised and it has not been possible, for want of adequate funds, either to appoint an Additional Assistant Secretary or to issue the bulletin. It is, however, essential that both of these things should be done. As our first President, Mr. R. C. Dutt, observed in his speech at the last Conference, one Assistant Secretary is required to visit the different provinces and help in the work which devolves on the Provincial Committees and to secure "a greater degree of co-operation between the Central Office and the Provincial Committees." The need of a bulletin, too, is great in the present circumstances of, and with the welcome awakening to the need of industrial development that we witness in the country. How to get the requisite funds is then the question. I hope that your Committee will give their attention to this important matter.

3. This leads me to the question of the future organisation and work of the Conference. I have been asked to communicate, for the opinion of the Provincial Committees, the papers received from Kumar Sri Harbhamji Rawaji of Rajkot and Mr. A. C. Sen of Calcutta on this question, and I send them herewith. It is true that if the Conference is to carry out its object effectually there must be regular, methodical work all through the year based on definite principles and carried on settled lines. At the same time no very elaborate and ambitious scheme stands much chance of success at this time. I have accordingly drawn up what I believe to be a few simple and workable rules which I send herewith. I request

you will be so good as to place all these three papers before your Committee and favour me with their opinion on them.

4. In regard to the carrying out of an industrial survey, I framed last year a set of questions with the object of facilitating the collection of the needed information and sent out nearly a thousand copies, but the response was most meagre and disappointing. I have, therefore, issued them again this year in the hope that some attention would be paid to so important a matter. I send a copy (with four spare copies) of the questions herewith and request you to obtain answers from qualified persons in your province. All replies received before the 30th November will be printed along with the annual report which we shall present to the next session of the Conference, following the precedent of last year.

5. A suggestion that has been repeatedly made is that translations should be made of the most important papers laid before the Conference and the vernacular renderings distributed largely. This is a means of disseminating valuable information which deserves to be adopted by the Provincial Committees. Regard being had to the number of languages into which translation will have to be made, it is obvious that the work cannot be undertaken by the Central Office. It falls within the sphere of the Provincial Committees and their earnest attention to this matter is solicited.

6. Sir Guilford L. Molesworth, an eminent retired Anglo-Indian who takes an abiding interest in the industrial movement and who contributed able papers to the Benares and Calcutta Conferences, asks the Conference to adopt the proposition quoted below :—

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

Please let me know whether it is the wish of your Committee that the subject of fiscal policy should be taken up by the Conference, and, if so, in what form a proposition should be placed before it.

7. It remains to request you to let me have the benefit of any suggestions your Committee may deem fit to make in regard to the next session of the Conference :—

- (i) Who should be invited to fill the office of President ;
- (ii) On what subjects papers should be called for and from whom ;
- (iii) What propositions should be placed before the Conference and who should be asked to speak to them,

(iv) Whether there should be a handloom competition as there was last year, and if your answer be in the affirmative, what amount your Committee will contribute for awarding prizes ;

(v) Any other suggestions.

▲ request you to convene a meeting of your Committee as soon as possible after receipt of this and communicate their opinions to me not later than the 8th of November.

I have the honour to be,

Sir,

Your most obedient servant,

R. N. MUDHOLKAR,

General Secretary,

Indian Industrial Conference.

APPENDIX VII.

Technical Department of the Bengal National College.

The work of the Technical Department divides itself into two branches, and in both, the Physical and the Chemical Departments act in co-operation with the Technical.

First, from the lowest classes of the school upwards through the Primary and Secondary Courses (excepting only in the case of the Intermediate class students offering the alternative literary course) a graduated course of technical instruction is given to our boys according to a scheme framed by Mr. Ranade, which was adopted by the Council at its last meeting. This technical instruction is given along with elementary instruction in Experimental Chemistry and Physics and also Botany and Physiology. What has already been referred to as the *mixed course* for the primary and secondary classes of the school is this combination of elementary, technical and scientific training with literary instruction. The teaching of *Drawing* is also necessarily compulsory in the mixed course. Up to the Fifth or Matriculation standard of the school the mixed course is compulsory ; and it is only in the Intermediate or the Sixth and Seventh standard course that students are given the option of taking up either the Literary or the Scientific and Technical Course. It is necessary to note, however, that the Literary Course boys (Intermediate) are given also the option of studying any one or more of the Commercial subjects prescribed for the Commercial Department of our Institution.

Besides the mixed course of studies for students of the primary and secondary classes, there are the students of the Technical Department proper. Candidates for admission into that Department are required to produce a certificate of having passed the Fifth Standard Examination of the National Council or any equivalent examination. The Technical Department students will receive in the General Department of the College a general scientific course of education in Physics, Chemistry, Mathematics and Drawing ; and in the Technical Department a special course of instruction in the following subjects :—

Machine Drawing ; Mechanics ; Steam Engines and Boilers ; Hand and Machine Tools ; Pattern-making ; Brass Moulding ; Smithy ; Turning ; and Fitting.

Besides receiving a scientific education in principles our students will be specially trained to apply the principles in practice so as to be able to take up the smaller industries not requiring the investment of large capital. Thus in the workshops attached to the Physical, Chemical and Technical Departments, the students will be taught and required to manufacture, as far as practicable, their own instruments and apparatus. It is proposed for the present to teach our students to manufacture articles under the following heads :—

I. CARD-BOARD AND PAPER-WORK.

- (a) Medicine cases.
- (b) Stationery boxes.
- (c) Other assorted boxes.
- (d) Envelope cases.
- (e) Portfolios.
- (f) Blotting pads.
- (g) Geometrical models.
- (h) Envelopes, letter-paper, postcards, &c., &c.

II. WICKER-WORK.

- (a) Arm chairs.
- (b) Waste-paper baskets.
- (c) Boxes.
- (d) Travelling bags.
- (e) Tea poys, etc., etc.

III. CLAY-MOULDING.

Clay figures.

IV. WOOD-WORK.

- (a) Candle sticks.
- (b) Picture frames.
- (c) Toys.
- (d) Handles, pen-holders and stationery cases.
- (e) Artistic furniture (fret work).
- (f) Wood-carving.
- (g) Instrument boxes.
- (h) Stands, tables, supports, lifts and other fittings and appliances for chemical and physical laboratories.
- (i) Drawing boards.
- (j) Set-squares.
- (k) T-squares.
- (l) Parallel rulers.
- (m) Geometrical drawing models.
- (n) Measuring scales.
- (o) Models of verniers.

(p) Kindergarten materials for children in elementary schools.

(q) Machine and engineering models (wheels, pulleys, inclined planes, screws, toy engines, culverts, bridges, etc., etc.)

V. METAL-WORK.

Scientific instruments and apparatus for physical and chemical laboratories,

VI. METAL-WORK.

Garden tools and agricultural implements,

VII. METAL-WORK.

Cutlery.

VIII. METAL-WORK.

Small hand-presses, pumps, pulley-blocks, screw-vices, etc.

IX. METAL-WORK.

Sheet-metal goods.

- (a) Locks and keys.
- (b) Trunks.
- (c) Candle sticks.
- (d) Water buckets.
- (e) Office boxes.
- (f) Canisters.
- (g) Varnish and oil cans.
- (h) Butter tins, etc., etc., etc.

X. METAL-WORK.

Grinding and polishing.

XI. GLASS-BLOWING.

Glass apparatus used in chemical laboratories.



APPENDIX VIII.

JOINT STOCK COMPANIES.

*Number and Particulars of Joint Stock Companies registered in each Province in British India
in the twelve months ending the 30th September 1907.**

No	Name of Company and Situation of its Registered Office.	Object.	Capital.
I—BANKING AND INSURANCE.			Rs.
(a) BANKING AND LOAN.			
1	Industrial Bank of India, Ludhiana, Punjab ...	Banking and Commission Agency ...	5,00,000
2	Madura Sri Ashta Lakshmi Sahaya Nidhi, Madura, Madras ...	Money-lending (mutual) ...	1,89,000
3	Idigarai Devalaya Paripalata Nidhi, Coimbatore, Madras ...	Do ...	1,00,000
4	Indian Specie Bank, Bombay ...	Banking ...	2,00,00,000
5	Madura Union Ela Chit Co., Madura, Madras ...	Money-lending (mutual) ...	1,50,000
6	Lyallpur Bank, Lyallpur, Punjab ...	Banking ...	1,00,000
7	Woriar Alliance Bank, Trichinopoly, Madras ...	Do ...	1,49,985
8	Agricultural and Commercial Bank, Tinnevely, Madras ...	Do ...	2,00,000
9	Superior Bank, Muzaffarnagar, United Provinces ...	Do ...	20,000
10	Bank of Multan, Multan, Punjab ...	Do ...	2,00,000
11	Indian Bank, Madras ...	Do ...	20,00,000
12	Trichinopoly National Bank, Trichinopoly, Madras ...	Do ...	1,00,000
13	Madura Sarvajana Upakara Sahaya Nidhi, Madura, Madras ...	Money-lending ...	4,20,840
14	Orient Bank of India, Lahore, Punjab ...	Banking Business ...	5,00,000
15	Shanmuga Sahaya Nidhi, Madura, Madras ...	Money-lending ...	3,36,000
16	Gaya Bank and Trades Association, Gaya, Bengal ...	Banking and Loan Business ...	50,000

17	Shri Venkatesh Bank, Hubli, Bombay	Banking Business	29,970
18	Bengal National Bank, Calcutta	Banking and Loan	50,00,000
19	Malvalli Kasaba Sri Lakshminarasingswami Bank, Fort, Malvath, Mysore.	Banking	80,000
Total, Banking ...			8,00,75,795
(b) INSURANCE.			
20	National Indian Life Insurance Co, Calcutta	Busines of Life and other Assurances	10,00,000
21	National Insurance Co, Calcutta	Business of an Insurance Company	10,00,000
22	National Insurance and Banking Co, Amritsar, Punjab	Life Insurance	10,00,000
23	Aswini Government Security Life Assurance Co, Vizaga- patam, Madras.	Lo	1,00,000
24	Hindustan Co-operative Insurance Society, Calcutta	Insurance Business	1,00,00,000
25	General Assurance Society, Ajmer	Insurance	1,00,000
26	Indian Mercantile Insurance Co, Bombay	Fire Insurance	50,00,000
Total, Insurance ...			1,82,00,000
Total, Banking and Insurance .			4,82,75,795
II.—TRADING.			
(a) NAVIGATION.			
27	Swadeshi Steam Navigation Co., Tinnevelly, Madras	Navigation	10,00,000
Total, Navigation ..			10,00,000
(b) OTHERS.			
28	Assam Combination Trading Co., Dibrugarh, Eastern Bengal and Assam.	Trade contract	5,000
29	Sonamganj Lakshmi Bhandar, Sylhet, Eastern Bengal and Assam	Agriculture, Trade and Banking	20,000

* Compiled from the *Indian Trade Journal*.

No.	Name of Company and Situation of its Registered Office.	Object.	Capital.
II —TRADING—(Continued).			
(b) OTHERS—(Continued).			Rs.
30	National Spinning and Weaving Co, Calcutta ...	Spinning and Weaving Industry ..	20,000
31	Friends' Trading Co., Gorakhpur, United Provinces	General Trade	20,000
32	Etawah Fibre Trading Co., Etawah, do. ...	Trade in Fibre	1,50,000
33	Kallidarkurchi Sudesa Toli Pandasalai, Tinnevely, Madras ..	Trading in Swadeshi articles ..	20,000
34	Swadesa Paddartha Sangraha, Dharwar, Bombay...	Trading in country goods ...	20,000
35	Mysore Raj Tobacco Manufacturing Co., Bangalore, Mysore ..	Curing and flavouring tobacco and Manufacturing cigarettes	15,000
36	Indian Stores Company, Karachi, Sind	Trading in Co-operative Stores	25,000
37	Tripura Jatiya Bhandar Co., Comilla, Eastern Bengal and Assam	Trading	30,000
39	Borsad Swadeshi Sahayak Mandal, Borsad Bazaar, Bombay	Trading in country-made goods ..	5,000
39	Agriculturists' and Artisans' Alliance, Madras ...	General Trading	1,00,000
40	All-India National Industrial Co., Ganjam, Madras	General trading	10,000
41	Surma Valley Weaving and Trading Co., Sylhet, Eastern Bengal and Assam.	Trading in Swadeshi Goods	20,000
42	Dacca Silpa Samiti, Dacca, Eastern Bengal and Assam	Trading	20,000
43	Bharat Bhandar, Mirzapur, United Provinces ...	Encouraging and extending production and consumption of Indian articles	25,000
44	Deccan Match Manufacturing Co, Karad, Bombay	Manufacturing Matches	1,00,000
45	United Swadeshi Trading Co, Bombay	General trading	50,000
46	Indian Cement Syndicate, Bombay	Manufacturing and selling cement	30,000
47	Nadiad Silk, Woollen and Cotton Handloom Weaving Co., Nadiad, Bombay.	Trading and manufacturing cloth, yarn, etc.	50,000
48	People's Swadeshi Stores Co., Hyderabad, Sind ...	Trading in Indian articles	20,000
49	Narasapur Industrial Improvement Co, Kistna, Madras	Selling country-made goods	50,000
50	Nowgong Trading Co, Nowgong, Eastern Bengal and Assam.	Trading	20,000

51	Jalpaiguri Silpa Samiti, Jalpaiguri, Eastern Bengal and Assam	Trading	...	...	80,000
52	Darbhanga Trading Co., Darbhanga, Bengal	General Trading and Commission Agency	...	...	20,000
53	Purshartlu Co, Ajmer	General trading	...	...	20,000
54	Jogalekar & Co., Akola, Berar	Manufacturing and dealing in Swadeshi articles	...	...	1,00,000
55	Indian Soap and Candle Factory, Bombay	Manufacturing soap, candles and perfumery	...	...	1,00,000
56	Swadeshi Hosiery and Manufacturing Co, Bombay	General trading	...	...	3,00,000
57	Kamrup Industrial and Trading Co, Gauhati, Eastern Bengal and Assam	Trade and Commerce	...	...	50,000
58	Covelong Salt Co, Chingleput, Madras	Trading in Salt	...	...	30,000
59	Dinajpur Trading and Banking Co., Dinajpur, Eastern Bengal and Assam	Trade and Commerce	...	...	1,00,000
60	Kotechandpur Swadeshi Bhandar Company, Bengal	Trade in Indian manufacture and produce	...	...	10,000
61	Malegaon Swadeshi Co-operative Trading Co, Malegaon, Bombay.	Trade in Indian articles	...	...	20,000
62	Belgaon Match Manufacturing Co, Belgaum, Bombay	Manufacturing matches	...	...	30,000
63	Negapatam Weaving Co, Negapatam, Madras	Weaving Industries	...	...	20,000
64	Tanjore National Co-operative Emporium, Tanjore, Madras	Co-operative Stores	...	...	20,000
65	Small Industries Development Company, Bengal	Small Industries	...	...	4,00,000
66	Deshi Stores Company, Shikarpur, Bombay	Trade in country-made articles	...	...	10,000
67	Combatore Industries, Combatores, Madras	Chrome tanneries	...	...	20,000
68	Kansat Trading Co, Malda, Bengal	Trade and Commerce	...	...	20,000
69	Bengal Hosiery Co, Bengal	Hosiery business	...	...	3,00,000
70	Hit Karm Co, Agra, United Provinces	General trade	...	...	20,000
71	J. Roy Co., Multan, Punjab	Do	...	...	2,00,000
72	Punjab Commercial House, Amritsar, Punjab	Do	...	...	1,00,000
73	Shah Brothers & Co, Bombay	Commission Agency	...	...	4,000
74	Alembic Chemical Works, Bombay	Chemical Works	...	...	5,00,000
75	Agra Boot and Equipment Factory, Agra, United Provinces	Tanning and Manufacturing Leather	...	...	5,00,000
76	Shri Ambica Merchant Co, Ahmedabad, Bombay	General trade	...	...	20,000
77	Satara Swadeshi Commercial Co, Satara, do	Trade in Indian articles	...	...	20,000
78	Cuddalore Swadeshi Mercantile Co, Cuddalore, Madras	General trade	...	...	20,000

No.	Name of Company and Situation of its Registered Office.	Object.	Capital.
II.—TRADING—(Continued).			Rs.
<i>(b) OTHERS—(Continued)</i>			
79	South Indian Agricultural and Industrial Improvement Co., Anakapalle, Madras.	General Trade and Commission Agency ...	1,00,000
80	Rangpur Tobacco Co., Rangpur, Eastern Bengal and Assam ...	Manufacturing cigarettes, cigars, snuffs and other products of tobacco ...	1,00,000
81	Ananda Bhandar, do do	Trading and Banking ...	20,000
82	Property Dealing Co., Lahore, Punjab ...	Dealing in immoveable property ...	1,00,000
83	Swadeshi Lala Co., Ahmedabad, Bombay ...	Trading in handlooms ...	1,00,000
84	Bombay Milk Supply Co., Ahmedabad, Bombay ...	Trading in milk, butter, etc ...	20,000
85	Saidapet Industrial Co., Chingleput, Madras ...	Encouragement of industries and trade ...	10,000
Total, Others ..			41,79,000
Total, Trading ..			51,79,000
III.—MILLS AND PRESSES.			
<i>(a) COTTON MILLS.</i>			
86	Swadeshi Weaving Co., Amritsar, Punjab ..	Working and manufacturing cotton, etc. ...	50,000
87	Kaliswarar Mills Co., Coimbatore Madras ...	Spinning and weaving cotton ..	9,00,000
88	Maharana Bhowsingji Mills Co., Bombay ...	Spinning and weaving cotton, etc. ...	10,00,000
89	Ahmedabad Sri Ramkrishna Mills Co., Ahmedabad, Bombay..	Do ..	3,25,000
90	Swadeshi Industrial Spinning and Weaving Co., Vizagapatam Madras.	Do ..	1,00,000

91	Broach Industrial Cotton Spinning and Weaving Co, Broach, Bombay.	Manufacturing and Spinning cloth	...	7,00,000
92	H. H. The Maharana Shri Ajtsinghjee Dharangadra Mills Co., Bombay.	Do	..	5,00,000
93	Kamakshi Mills Co., Tanjore, Madras	Spinning and weaving	..	10,00,000
94	Jam Shri Ranjit Shinjee Spinning and Weaving Co, Bombay	Spinning and weaving cotton, etc.	..	8,00,000
95	Sir Rasulkhan Mills Co, Bombay	Do	...	10,00,000
96	Guntur Hosiery Mills Co., Guntur, Madras	Do	...	50,000
Total, Cotton Mills...				64,25,000
(b) OTHER MILLS AND PRESSES.				
97	Trading Vaishya Ginning and Cotton Press Mills Co, Agra, United Provinces.	Trade in Ginning Cotton, etc	...	1,00,000
98	Swadeshi Manufacturing Rice and Oil Mills and Trading Co, Ganjam, Madras	Milling rice, etc.	...	5,850
99	Barisal National Oil Mills Co., Nalchitti, Eastern Bengal and Assam	Trading, etc.	..	75,000
100	Nimar Cotton Co., Bombay	Ginning and Pressing Cotton, etc	...	2,00,000
101	Malwa Cotton Co., Bombay	Do	...	1,50,000
102	Mahadeva Cotton Press Co, Bombay	Do	...	60,000
103	Cocanada Jute Press Co., Godavari, Madras	Do	...	1,50,000
104	Bhaguati Flour and General Mills Co, Ambala, Punjab	Wheat and Grain Millers	...	15,000
105	Madanganj Pressing Co, Bengal	Pressing jute, cotton and hides	...	1,50,000
106	United Ginning and Pressing Co, Bengal	Ginning and pressing cotton, etc	...	10,00,000
107	Swadeshi Calico Printing Co, Bombay	Bleaching, dyeing, etc.	...	5,00,000
108	Bahrata Cotton Ginning Press Co, Bahraha, United Provinces	Manufacturing cotton, wool, etc.	...	1,00,000
109	Baria Zveri Ginning and Manufacturing Co., Ahmedabad Bombay.	Ginning and pressing cotton, etc	..	20,000
110	Anakapalle Commercial Syndicate, Anakapalle, Vizagapatam, Madras	Milling rice	..	50,000
111	Karnatic Weaving Establishment, Bangalore	Weaving with improved handlooms	..	50,000

No.	Name of Company and Situation of its Registered Office.	Object.	Capital.
III.—MILLS AND PRESSES—(Continued).			Rs.
(b) OTHER MILLS AND PRESSES—(Continued)			
113	Jumna Flour Mills Co., Cawnpore, United Provinces ...	Flour manufacture ...	3,00,000
113	Hari Shunkar Busdeo Cotton Press and Ginning Mills Co., Debai, United Provinces	Manufacturing jute, cotton, etc. ...	96,000
114	Jhotana Ginning Co., Ahmedabad, Bombay ...	Ginning and pressing ...	36,000
115	Sri Lakshmi Rice Mills Co., Guntur, Madras ...	Milling rice ...	20,000
116	Vizag Mills Co., Vizagapatam, Madras ...	Do ...	5,00,000
117	Century Flour Mills, Lahore, Punjab ..	Milling flour ..	5,00,000
118	Karachi Steam Roller Flour Mills, Karachi, Sind ...	Do ...	4,00,000
119	Bharat Press Co., Bombay ...	Ginning and Pressing cotton, etc. ...	2,50,000
120	Sri Tripura Sundari Cotton Press, Bezwada, Madras ...	Do ...	85,000
121	Zayathree Rice Mills Co., Sagang, Burma ...	Rice-milling ...	50,000
122	National Trading Co., Rangoon, Burma ...	Oil-milling ...	1,00,000
Total, Other Mills and Presses ..			49,62,850
Total, Mills and Presses...			1,13,87,850
IV.—SUGAR MANUFACTURE.			
123	Hadi Sugar Manufacture Works, Meerut, United Provinces ..	Manufacture of sugar ...	1,00,000
124	Union Indian Sugar Mills Co., Cawnpore, United Provinces .	Do ...	4,00,000
Total, Sugar Manufacture ..			5,00,000

V.—PLANTING, MINING AND QUARRYING.

125	Kuardi Coal Co., Bengal	...	...	...	Business of mining and dealing in coal and coke.	3,00,000
126	East Kuardi Coal Co., Bengal	...	...	..	Do	2,00,000
127	Huntodih Coal Co., Bengal	...	...	...	Do	8,00,000
128	Bengal Bhatdee Coal Co., Bengal	...	...	...	Do	4,50,000
129	Trichinopoly Treasure Trove Co., Nilgiris, Madras	...	...	...	Mining, etc.	30,000
130	Hajee Prospecting Syndicate, Mysore	...	...	...	Mining all sorts of minerals	1,00,000
131	Bengal Agricultural and Dairy Farm, Bengal	...	...	...	Cultivation of cotton, jute, rice, etc.	5,00,000
132	Southern India Manganese Company, Madras	...	...	..	Working manganese, etc.	2,00,000
133	Indian Granite Company, Madras	...	...	...	Mining stones	1,00,000
134	Mysore Fruit Syndicate, Bangalore	...	...	...	Fruit cultivation	3,00,000
135	Tata Iron and Steel Co., Bombay	...	...	..	Mining iron ore, etc.	2,31,75,000
136	Banganapalle Minerals Syndicate, Madras	...	...	..	Gold-mining	99,990
Total, Planting, Mining and Quarrying ...						2,57,51,990

VI.—OTHERS.

137	Guntur District Athmakuru Lift Irrigation Co., Guntur, Madras	...	...	...	Construction of irrigation channels for watering fields from the Kistna canal.	12,200
138	Belgaon Company, Chittagong, Eastern Bengal and Assam	...	...	...	Acquisition of Belgaon Estate, etc.	50,000
139	Punjab Building Co., Lahore, Punjab	...	...	..	Buying and selling of lands, building, etc.	2,50,000
Total, Others						3,12,200
Grand Total						9,14,09,835

*Abstract Table of Companies Registered in the Twelve Months ending 30th September 1907.
Compared with the Number Registered in the Nine Months ending 30th September 1906.*

Description.	Numbers.		Capital.	
	Jan—Sep 1906.	Oct 1906— Sep 1907.	Jan—Sept. 1906.	Oct. 1906.— Sep. 1907.
			Rs.	Rs.
Banking Companies	14	19	1,67,00,000	3,00,75,795
Insurance Companies	3	7	55,20,000	1,82,00,000
Navigation Companies	5	1	1,21,00,000	10,00,000
Other Trading Companies	46	58	70,53,200	41,79,000
Cotton Mills	22	11	1,80,52,000	64,25,000
Other Mills and Presses	16	26	47,86,750	40,62,850
Sugar Manufacturing Companies	2	2	5,00,000	5,00,000
Planting, Mining and Quarrying Companies	4	12	1,62,000	2,57,54,990
Other Companies	2	3	5,50,000	3,12,200
Total ...	114	139	6,57,23,250	9,14,09,835

APPENDIX IX.

(Re-printed from the " Indian Trade Journal " of
date June 27, 1907.)

INDIAN JOINT STOCK COMPANIES.

A YEAR'S PROGRESS

The total number of Joint Stock Companies registered in India in the course of 1906-07 under the Indian Companies Act VI of 1882 amounts to 308 with a nominal capital of Rs. 11,80,33,075, compared with 277 companies with Rs. 7,93,51,568 in 1905-06 and 143 companies with Rs. 3,70,31,779 in 1904-05. There has, therefore, been a continuous growth in the number of companies in each successive year and in the average amount of nominal capital per company. This was Rs. 2 59 lakhs in 1904-05, Rs. 2 86 lakhs in 1905-06 and Rs. 3 83 lakhs in 1906-07.

On the other hand, it is necessary to examine the variations in the ratio borne by the paid up to the nominal capital at time of registration. The figures for the last three years as far as reported were :—

CAPITAL—R.

<i>No.</i>	<i>Nominal</i>	<i>Paid-up.</i>	<i>Ratio of Paid-up to Nominal.</i>
1904-05—143	3,70,31,779	86,88,879	10 per cent.
1905-06—277	7,93,51,568	19,28,118	2 4 "
Increase 93·7 p. c.	114 3 p. c.	—47 7 p. c.	
1906-07—308	11,80,33,075	1,96,702	·2 "
Increase 11 2 p. c.	48 7 p. c.	—89 8 p. c.	

The figures of paid up capital which are shown above represent in each case the sums actually paid up at time of registration. They do not necessarily afford any gauge of the prospects of the companies, but it is a fact that the market was inimical to the raising of capital and the contrast (which is a real one) between the respective centesimal ratios of paid-up to nominal capital has a certain interest.

The nominal capital is chiefly distributed under the following classes of industries :

	No.	1905-06.		No.	1906-07.	
		Nominal—Rs.	Paid-up—Rs.		Nominal—Rs.	Paid-up—Rs.
Banking and Loan	45	68,33,748	25,618	55	4,20,69,505	43,766
Insurance	55	6,15,330	...	51	88,71,270	525
Navigation	2	16,00,000	...	5	1,25,00,000	...
Printing	5	4,45,000	6,050	8	15,00,000	...
Trading	77	1,03,79,000	8,30,000	96	1,09,85,700	11,971
Cotton Mills	27	1,58,50,000	2,89,800	18	1,60,07,000	80,160
Jute Mills	3	50,00,000	...	2	41,00,000	...
Cotton and Jute Screws and Presses ...	7	4,35,000	62,500	13	20,40,000	...
Coal Mining	7	18,70,000	60,000	21	94,25,000	...
Land and Building	2	14,00,000	...	6	37,70,000	...
Sugar	8	18,50,000	4,99,650	3	10,00,000	...

Of the new nominal capital Rs. 5,09,40,775 or about 43 per cent. was intended for Banking, Loan and Insurance Companies, 74 per cent of this amount relates to companies registered in Bombay and 118 per cent. in Madras. Trading companies account for 21.6 per cent (Rs. 2,55,35,700,) of which Rs. 1,25,00,000 or nearly half was to be invested in Navigation.

DIVISION OF CAPITAL.

Nearly 20 per cent. (about Rs. 2,35,89,600) of the aggregate capital was to be devoted to mills and presses, chiefly for working and pressing cotton, jute, wool and silk. A number of the mills and presses are registered in Bengal (nine with capital of Rs. 80,55,000), Bombay (fifteen with Rs. 90,70,000), and Madras (seven with Rs. 45,67,850). The new capital proposed in respect of mining and quarrying companies is Rs. 1,10,65,000, of which 85 per cent. was to be invested in coal companies registered in Bengal. The increase has been fourfold compared with the capital invested in coal companies during 1905-06.

About 73 per cent. of the total nominal capital invested in Joint Stock Companies during 1906-07 is concentrated in companies registered in Bengal and Bombay. Bengal had Rs. 4,85,37,500, being 24 per cent and Bombay Rs. 5,81,08,100 or 49 per cent. Thereafter, but a long way behind comes Madras with a projected addition to joint stock capital of Rs. 1,33,80,625 or 11.3 per cent. of the whole.

The average capital of each company is Rs. 3,83,224 against Rs. 2,86,467 in 1905-06, the provincial averages being Rs. 16,76,077 for Bombay, Rs. 3,90,925 for Bengal, Rs. 1,21,644 for Madras. The average for Bombay is considerably higher this year owing to the registration of seven important companies, namely :—

	Rs.
Indian Specie Bank	2,00,00,000
Bank of India	1,00,00,000
Bombay Steam Navigation Co.	60,00,000
All-India Insurance Co.	50,00,000
Shah Steam Navigation Co. of India	30,00,000
Bank of Western India	25,00,000
Finlay Cotton Mills	20,00,000

The average for Madras is as usual lower on account of the extended application of the Companies Act to the business of small money-lenders, for no less than 84 Loan and Insurance Companies with a nominal capital of Rs. 60,40,775 were registered during the year in Madras, out of a total of 106 companies with Rs. 5,09,40,775 for All India.

APPENDIX X.
INDIAN PATENTS.

(Filed in the Twelve Months October 1906—September 1907.) *

APPLICATIONS FILED.

1. J. N. Dey, of Howrah, for a self-adjustable easy chair.
2. Sreemanthula Kuppachary, of Madras, for an improved water-lift.
3. Rai Bahadur B. B. Chakravarti, of Benares, for improved lock-tile called 'Chakravarti' tile.
4. Tulsidos Khemchand Sipahimalani, of Quetta, for a pain balm.
5. Akbar Ali, of Ludhiana, for a loom with a single shaft for shedding, picking and beating up.
6. Surendra Nath Mukerji, of Calcutta, for Mukerji's patent sound doubling adjustment for attachment to sound boxes of disc talking machines.
7. Jawahar Singh, of Jawalapur, for an improvement in wheel and axle.
8. P. S. Mudaliar, of Palamedu, for a water-lifting machine.
9. Rama Dayal Fuller, of Aligarh, for improvements in oil lamps.
10. Chunder Nath Bose, of Bally, for a process of colouring celluloid and the like.
11. Abdul Rajak Abdul Rahim, of Surat, for a musical instrument called the bell instrument.
12. Lalit Chandra, of Gaubäti, for improvements in lamps.
13. Cankala Kristnasawmy Veerasawmy Naidu, of Negapatam, for improvements in brief bags or carriers for legal and other documents and sundry articles.
14. Kandernath Mondul and Hira Lal Mondul, of Howrah, and Calcutta, for hand wheel bomar presses for pressing of loose jute from two maunds up to the weight of four and a half maunds in bales.

* Compiled from the lists published in the numbers of the *Indian Textile Journal* from November 1906 to November 1907.

15. A. K. Mazumdar, of Dhamrai, Dacca, for hironia or the lady spindle.
16. Manockji Gavasji Petit, of Bombay, for an automatic brake for two-wheeled vehicles drawn by a pair of animals.
17. Kiriti B. Mukherji, of Calcutta, for a hand-machine for cotton-spinning or "Charka."
18. Ganga Singh, of Quetta, for recovering lost articles from inaccessible depths, whether in seas, rivers, wells, artesian borings or vertical Mining Shafts.
19. Radha Kissors Sinha, of Indeswar, Assam, for a fan moved by hot air pressure arrangement.
20. Nawab Hozoor Mirza, of Murshedabad, for improvements relating to suspended rope railways or tramways.
21. Prokash Chunder Chatterjee, of Calcutta, for an improved fly-shuttle loom to be called the "Sree Krishna Loom No. 1."
22. Radha Kissors Sinha, of Uttarbhad, P O. Indeswar, for Kerosine gas-store of a syphon arrangement.
23. Rao Bahadur Chever Krishnachar Subba Rao, of Bellary, for a climax tread powder for man or beast for work in general.
24. Mr. Yusaf, of Meerut, for summer relief.
25. K. G. Subba Row, of Tirukolur, for a pair of cook's tongs.
26. D. S. Guanakan, of Bangalore, for improvement in Izal disinfectant called "Ozu."
27. Thakur Dutta Sharma, of Lahore, for a medicinal compound called Amritdhara.
28. P. Lall, of Mauza Narela, Tehsil Delhi, for a new variety or substitute for tea made from herbs, called "Imrat Sar Fiwan."
29. Dorabjee Burjorjee, Engineer, of Bombay, for an economic bamboo and paper roller for the cotton gin.
30. Khursedjee Sorabjee Jussawala, of Bombay, for a contrivance for developing continuous and even motive power both from tide and ebb waters.
31. A. C. Imbert, of Vizianagram, for improved compressing or baling machinery.
32. Harichand Mancharam and Son, of Bombay, for a padlock without any joint.
33. Gajendra Kumar Paul, of Comilla, for improved box harmonium.
34. Ram Lal Das, of Calcutta, for producing musical tones of all pitches and qualities to be called Suralahari.

35. Ebrahim and Shaik Jaffer, both of Sholapur, for improvements in warping machines.
36. Karter Singh, of Rawalpindi, for a disinfectant to be known as "plunas."
37. Motlal C. Mehta, and the Sayajee Loom Works, Ltd., of Baroda, for improvements in take-up motions for looms.
38. Gangadhar R. Mangrulkar, of Sholapur, for improvements in the manufacture of grass matches.
39. Kedarnath Chakravarti of Kalighat, for a spinning machine to be called "The Bijoy charka."
40. Nil Kunth Nundy, of Calcutta, for a new or improved machine for making hookah tubes and the like.
41. Narain Singh, of Amritsar, for Swadeshi leatherless boots, shoes and slippers.
42. Jotendra Nath Bannerjee, of Calcutta, for johor's mechanical smokeless kerosine lamp.
43. L. K. Kirloskar, of Belgaum, for improvement in hand chaff or fodder cutter.
44. Kanhaiya Lal, of Delhi, for making a perpetual calendar of the Christian era.
45. Bawa Budh Singh, of the Public Works Department, Punjab, for a folding camp punkha.
46. Soruj Bali, of Lucknow, for flour mill.
47. Ashutosh Pollay and Wooma Churun Deshi, both of Howrah, for improvements of hand power jute press.
48. Sorabji Cursetji Arsiwalla, for a safety device for live electric cables.
49. Kartar Singh, of Rawalpindi, for a composition of chemical matter for expelling rats from premises forming an anti-rat preparation to be known as "rat scare."
50. Radhika Nath Saha, of Benares City, for improvements in stylographic, fountain and like pens.
51. Dusha Pestonji Framji Ghadiate, of Surat, for preventing accidents to life and property caused by the falling of aerial wires carrying electrical currents of high tension.
52. Ishwar Janeswar Khettry, of Sholapur, for improvements in warping machines.
53. Hara Dhan Mandal, of Howrah, for the efficient jute press.

SPECIFICATIONS FILED.

1. Motilal Chotalal Mehta, and the Savajee Loom Works, Limited, both of Baroda, for improvements in take-up motions for looms.
 2. Donkim Lal Das, of Calcutta, for a cottage or factory loom to be called Bankim's Patent Domestic Loom.
 3. Priva Natha Roy, of Darjeeling, for a semi-automatic spinning wheel, being a rustic machine with common material to be called Sarala Charaka.
 4. Rama Dayal Fuller, of Aligarh, for improvements in oil lamps.
 5. Lalit Chandra, of Assam, for improvements in lamps.
 6. Khetramohon Dass, care of L. Deveria, Alipore, for the "Bengal" self-acting brick and the tile-making machine.
 7. Pestonjee Cursetjee Mehta, of Bombay, for a new fuel briquette.
 8. B. B. Chakravarti, of Benares, for an improved looking roofing tile called "Chakravarti" tile.
 9. Akbar Ali, of Ludhiana, Punjab, for a loom with a single shaft for shedding, picking and beating up.
 10. Rai Bishambar Nath, of Delhi, for a cheap country oil lamp.
 11. Rai Bishambar Nath, of Delhi, for an improved portable stove and bed warmer.
 12. Rai Bishambar Nath, of Delhi, for a cheap water-heater.
 13. Ram Nath, of Delhi, for a new process (to be called the new Rama process) for reproducing copies of drawings.
 14. Y. K. Davda, of Bombay, for improvements in lamp chimneys of mica.
 15. Maneckshaw J. Chanjibhoy Mistry, of Bombay, for a detaching device for vehicles.
 16. Madan Lall Kapoor, of Peshawar, for hand, treadle or power loom weaving machine.
 17. Kander Nath Mondul and Hiralal Mondul, of Howrah, and Calcutta, for hand wheel Bomar Press for pressing of loose jute in one bundle of one and a half maund in weight.
 18. Laljee Madhowjee, of Madeji Road Station, for improvements in clocks.
 19. Lakhiswar Ghatak, of Shahapur, for an alloyed gold.
 20. Chandra Mohan Roy, of Lucknow, for improved brick burning in a trench or over-ground kiln.
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21. Kartar Singh, of Rawalpindi Cantonment, for mushicide or the signal rat exterminator.

DESIGNS REGISTERED.

1. Miss Nistarini Mitter, of Calcutta, for a pictorial flag showing a tiger, crescent, star, sun, moon, and the words "Bande Mataram" in Deb Nagri character.

2. M. S. Das, of Cuttack, for a tantalusor spirit stand of a snake design.

3. Gordhan Dass, Sarraf, of Delhi, for a disc for necklaces bearing specified words on each side.

4. Jugal Kishore, of Delhi, for a disc for necklaces bearing specified words on each side.

5. Shadi Ram, jeweller, of Delhi, for a disc for necklaces bearing specified words on each side.

The

SALEM

WEAVING FACTORY.

BY

ALFRED CHARTERTON.



*Contributed for the Industries Conference held
at Surinam December 1917*

MADRAS

PRINTED BY THE SUPPLEMENTARY GOVERNMENT PRESS.

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THE SALEM WEAVING FACTORY.

In the present paper I propose to give a brief account of the origin and objects of the Hand-loom Weaving Factory which was established early last year in Salem under the orders of the Government of Madras. This Factory has attracted a great deal of attention not only in the Madras Presidency but in all parts of India, unfortunately however its aims and objects have been misunderstood with the result that the work done there has not exercised that influence over the movement in favour of reform in the methods of the hand-weaver which we think it is entitled to and which in the interests of the Indian weavers themselves it should.

As far back as the year 1900 my attention was drawn to fly-shuttle looms as an improvement over native hand-loom by the then Deputy Superintendent of the Chingleput Reformatory and in the following year I set up about half a dozen fly-shuttle looms in a shed in the School of Arts, Madras, with the object of getting experience as to their working capacity and data regarding their possibilities. I was aware of the existence of the large weaving establishments on the West Coast belonging to the Basel Mission where fly-shuttle looms are exclusively used and as Inspector of Technical Schools in Madras I knew a number of mission institutions where weaving with fly-shuttle looms was taught. But in every case the work done on the looms was with comparatively coarse counts and the goods turned out were invariably copies of the Basel Mission work. So far as I was aware no attempt had ever been made to turn out purely indigenous cloths on fly-shuttle looms and it was to achieve this object that I

began the investigations. From enquiries in Madras I found that some attempts had been made by people interested in the piece-goods trade, but that nothing had come of them and a Muhammadan firm Messrs. Hajee Mahomed Badsha Sahib & Co. showed me the results of a very extensive series of experiments they were undertaking in the manufacture of Madras handkerchiefs with the domestic hand-loom manufactured by Messrs. Hattersley & Sons. As their experiments had ended in failure they lent me some of the looms with which to make further experiments and these looms may still be seen in the School of Arts, Madras, among the discarded relics of our various weaving experiments.

At the outset Madras handkerchiefs were taken up and for two or three years we made great efforts to improve the various details of their manufacture in the hope of being able to turn them out at a profit. At first the handkerchiefs fetched poor prices, but latterly we were able to command the highest rates paid for them. Attempts were also made to introduce the manufacture of these handkerchiefs into some of the Industrial Schools, but in every case the experiment ended in failure and at the end of 1905 after carrying on the work for nearly five years it was found impracticable to make the fly-shuttle loom a success on the lines along which we were working. We had, however, definitely ascertained that it was practicable to turn out a much larger percentage of cloth on a fly-shuttle loom than on the native loom, that a cloth of even better texture could be produced and that if the sizing processes could be improved there seemed to be some hope of the fly-shuttle loom coming into general use throughout the country. Our want of success was largely due to trying to do many things at one time and to the difficulty of getting good weavers to work regularly in the weaving shed.

In August and September 1905, I made a tour through Bombay, the United Provinces and Bengal and in passing orders on my report the Government of Madras expressed their willingness to establish a hand-loom weaving factory for experimental work either in Salem or Madura. For a variety of reasons the former town was selected and in February of last year the looms and apparatus with which we were working in Madras were transferred to Salem and a new start was made. Salem was selected, because according to the Census Reports there were over 8,000 hand-weavers in the town who were supposed to be in a more or less chronic state of poverty, because the climate was considered suitable, and finally because it was conveniently situated in regard to access from Madras—a matter of some importance in connection with the supervision of the factory. All the experience gained in running the looms in Madras was made use of in considering the lines upon which the Salem Weaving Factory was to work.

The weaving problem was obviously a much more complicated one than was dreamt of by Mr. Havell who since 1901 has persistently advocated the substitution of the fly-shuttle loom for the native hand-loom, claiming that if that was done all would be well with the weavers, that their output would be doubled, and that they would gradually regain the enormous volume of trade which has been surrendered to the power-loom weaving factories. Optimism is essential if one is to endeavour to raise the status of the hand-industries of India, but it must be based on a practical knowledge of the possibilities of each industry and not the result of ignorance. The dilettantism of the artist is a poor equipment with which to endeavour to solve the economic problems which the Indian manufacturer has to face and the Weaving Factory at Salem was

started with a perfectly open mind as a centre for experimental work in the weaving industry and without the slightest idea of using it to furnish data to support previously formed conclusions.

In a report on the results of the first year's working of the factory which was submitted to the Government of Madras I have explained that it is an experiment to ascertain whether it is possible to improve the condition of the hand-weavers in South-
ern India

- (1) by substituting for the native hand-loom improved hand-loom which will enable the weaver to produce a greater length of cloth in a given time without in any way sacrificing the essential characteristics of native hand-woven goods ;
- (2) by introducing the factory system among the weavers so that they may work under the management of men with commercial and manufacturing experience and so that capital and organisation may be introduced into the industry to render the hand labour more productive ;
- (3) by introducing, if possible, improved preparatory processes to diminish the cost of the preliminary warping and sizing which the yarn undergoes before it is placed in the loom.

From this it will be seen that the Weaving Factory is not a school for imparting technical instruction in the trade, but is simply for solving certain problems which have been definitely formulated and the future action of Government in regard to the weaving industry will largely depend upon the kind of solution which is arrived at. With the first set of problems and the third set

no one, I think, will disagree, but a great deal of opposition has been raised to what is characterised as an attempt to introduce the factory system with all its squalor and ugliness into what has hitherto been an artistic handicraft. If the hand-weaving industry is to be materially improved, a great deal has to be done not merely in connection with the technical details of the weaving processes, but also in connection with the training and education of the weaver himself. In the design of woven fabrics there is immense scope for artistic skill, but the production of these fabrics in the loom is a purely mechanical operation and the hand-weaver is an artisan and not an artistic handicraftsman. The production of solid bordered cloths is still beyond the capabilities of the power-loom and for the very finest work the native hand-loom is still supreme; but for the bulk of the textile fabrics required by the people of India the power-loom represents one method of manufacture and the question which has yet to be answered is whether ultimately it will not represent the only method of manufacture.

Those who study the weaver in his house amid his ordinary everyday surroundings, often short of work and nearly always in the hands of the cloth merchants in the bazaar, see little of the independent artisan who is to be the industrial backbone of this country, but much of the misery and poverty of his lot. With the assistance of his women and children he ekes out a miserable existence and his seeming independence is merely indolence and aversion to regular work. The imagination of the artist casts a glamour over the wretched isolation of the weaver and would have us leave him to fight a losing battle against the products of one of the largest and best organised industries in the world telling him to work with tools which have been discarded in other countries

as inefficient. The purchasing power of money in India is steadily decreasing and in most of the other trades and industries the earning of the workers are increasing. In the weaving trade at best they are stationary and in many places are on the decline. Will the hand-weaver survive the stress of competition or will he be driven as in other countries to seek a livelihood at other work? The answer is doubtful. The fact that he has survived so long is in his favour and there is no doubt the transitional period can be prolonged, but it is still an open question as to whether he can be put in a position which will enable him to command the same wages for the same number of hours of work as the power-loom weaver, or the blacksmith and carpenter, whose industrial existence is not threatened by the prospect that ingenious machinery will be devised to supplant them. On all these questions, I have in respect to the weaving factory endeavoured to preserve an open mind and it has only been called it a factory and organised it on factory lines because it seemed to be the simplest way of testing the efficiency of new methods of working and of training a certain number of weavers to carry on industrial experiments to a definite commercial conclusion. As a Government institution one can hardly hope that it will be a great commercial success. Experimental factories cannot be run on purely commercial lines and there is no chance of establishing any sort of a monopoly which might enable us for a time to obtain unusually profitable work.

So far at Salem we have not had time to tackle any technical problems connected with the hand-weaving industry. All our time has been engaged in getting together a sufficient number of capable hand-weavers to really test the capacity of the various looms which have been brought to our

notice. We have found that the hand-weavers of Salem like the hand-weavers of Madras object to working in the hand-weaving factory, and although their wages are good their attendance is unsatisfactory. This is mainly because the weavers prefer to work in their own homes assisted by their women and children and dislike being subjected to the discipline and regular hours of working which must necessarily prevail in the factory. Although the men can earn considerably more than they do in their own houses and are ensured regular and continuous employment, they much prefer the old system and seem to find steady employment extremely irksome, but few of them are free agents and nearly all are in the hands of the cloth merchants who from time to time make them advances and receive the cloths they manufacture. Naturally these gentlemen view the experiments at the Weaving Factory with suspicion and their influence has all along been against us. So far, therefore, we have had to work mainly with waifs and strays of the weaving community, and the Assistant in charge of the Factory has had a long and tedious task in getting into it even some semblance of order. Private individuals however have watched our efforts, imitated our methods and met with a much greater degree of success and without any special advocacy on our part a considerable number of hand-weaving factories have been started in various parts of the Presidency, but with what degree of success I am not able to state. The interest in hand-weaving is mainly due to the Swadesi movement and most of these factories owe their existence to the enthusiasm engendered at the birth of a new political movement. Whether, in the long run, they will hold their own or not, and whether, in consequence, they will grow in size and multiply in number, remains to be seen.

Comparatively recently there has been a great development in the use of cotton checks for native clothing and it is largely to supply this demand that most of the factories were started. The pioneer work in this direction was done by the Basel Mission weaving establishments and it is not improbable that if the demand continues to grow to any great extent the power-loom weavers will try to cut into the business and possibly with success. In Madras, at any rate, there are two large hand-weaving factories in Tondiarpet, both of which are manufacturing mainly Madras handkerchiefs and in this direction the proprietors assure me that they are doing better than with native hand-loom, but as no accounts are available it is difficult at present to tell whether they have succeeded in placing these factories on a firm commercial basis, or whether they have achieved little or nothing more than has been done in the Government Weaving Factory. One result of our work at Salem during the last 18 months is to furnish fairly reliable data for the opinion that the weaver himself is not likely within any reasonable time to change his methods of working and take to the fly-shuttle loom and it seems almost certain that in this part of India the factory system will have to be introduced if anything is to be done. In the North of India, especially in the United Provinces, from enquiries which I have recently made it would seem that the weavers there are more likely to take to improved looms on their own initiative and it does not seem to be altogether hopeless that there the difficulties connected with the establishment of the hand-weaver in a sound economic position may be solved through the agency of Weavers Guilds or other forms of co-operative enterprise. It is not my intention now to discuss these questions and I have merely mentioned them to indicate that in different parts of India it is quite possible that the

weaving problem will be solved in different ways. A scheme which may be successful up north will prove a complete failure down here and *vice versa*.

I freely invite criticism of our methods of working and of the way we are tackling the weaving problem, but I deprecate all criticism which is based on ignorance of our local conditions. In Conjeeveram, a large weaving centre, at no great distance from Madras, the National Fund and Industrial Association have endeavoured to popularize the fly-shuttle loom and I have assisted their efforts in so far that I have with the consent of the Board of Revenue lent them six fly-shuttle hand-looms, but the experiment has not been productive of any satisfactory result and the National Fund and Industrial Association have failed to popularize the fly-shuttle loom notwithstanding the fact that they fully recognise its merits. Similarly in the town of Madura where the weavers are more enterprising than in most parts of the country numerous experiments have been made with fly-shuttle looms and I have seen the most improved types of European hand-loom such as the domestic loom of Messrs. Hattersley & Sons at work in the bazaar, but none of these looms have caught on and plain weaving to-day is done in Madura much in the same way as it was more than a hundred years ago. It is not the expense which a good fly-shuttle loom entails which stands in the way, for in places where looms have been lent there has been no eagerness on the part of the weavers to avail themselves of the loan. Finally our experience in Salem itself is dead against any idea that the fly-shuttle loom can be popularised among the weavers themselves. They are ignorant and conservative and in their eyes the doubtful merits of the fly-shuttle loom are insufficient to make them change their ways of working. As the result therefore of our work at Salem and of the observations which I have been

able to make whilst touring through other parts of the Madras Presidency, I am of opinion that the only hope of progress in this part of the country is that outsiders will put their money into the trade and that through their intelligence and energy it will be placed upon a new footing.

In connection with weaving in fly-shuttle looms the opinion has hitherto generally prevailed that fine cloths cannot be woven on looms fitted with the fly-shuttle attachment, because owing to the greater strain only comparatively coarse yarn which will not readily snap can be used for the warp. This opinion has absolutely no foundation in fact, as where the fly-shuttle looms are designed for working in fine counts no difficulty has been experienced. The great bulk of the work done in the Salem Weaving Factory is in counts between 60's and 100's and I should not have the least hesitation in undertaking work in higher counts if the orders were sufficiently large to make it worth while. The fly-shuttle loom, no matter what type, must be constructed to suit the work for which it is intended and a loom which may do very well for dungries or checks may be unsuited for fine counts and it is mainly owing to the neglect of this point that fly-shuttle weaving has made so little real progress among the Indian weavers.

From the time when these experiments in weaving were first started a great deal of attention has been paid to the various forms of loom which have been placed on the market and any pattern which offered the least promise of success has been thoroughly and carefully tried and I propose briefly to state the results of the observations. Work was started on hand-looms of the pattern generally found in mission schools in the south of India and it was found in such looms that although fly-shuttle enabled the rate of picking to be greatly

increased yet the increased time spent in mending broken threads in the warp almost entirely nullified its advantages. One by one the defects of this loom were remedied, the proportions were changed, the warp beam mounted on springs, an automatic take-up motion was introduced and the picking string carried over a guide pulley with the result that at the present time it can hold its own in fairly fine weaving against any loom which has so far been brought to my notice. In this loom there is nothing absolutely novel. It has simply been proportioned in its various parts to suit the work to be done and care has been taken to prevent it becoming complicated. For instance whilst we were engaged in making Madras handkerchiefs in which several colours are used in the weft it was thought that possibly the English drop box might prove a convenient addition to the slay but in practice it was found to be no great advantage and the use of the drop box was discontinued. In the English hand-loom, as in the native hand-loom, the picking motion is independent of the treadles which control the shedding motion and the weaver must learn to jerk the picking string with his hand when he has opened the sheds sufficiently through the levers controlled by his feet. The loom is in no sense automatic, but it is possible when the picking strings are carefully adjusted to make from 80 to 100 picks per minute through a warp 54" wide. At the present time at the Salem Factory where we use nothing but country warps sized by hand and provided with a lease and lease rods, to avoid frequent stoppages to shift the lease rods a fairly long spread of warp between the warping beam and the healds is necessary, and this is the most serious objection to this form of loom inasmuch as it makes it very bulky.

It became obvious at a very early stage in the experiments that the fly-shuttle slay could be used

in the native hand-loom, and that we could improve the rate of picking. I am not now certain to whom the credit of first making this suggestion is due, but it is a very important one, as it places in the hands of the native weaver a very great improvement in his loom, and one which can be obtained at a very small expense. This modification has been largely tried and with considerable success, but it does not secure all the advantages of the frame loom pattern and is to be regarded rather as an intermediate stage between the Native and the English loom. Experience has taught us that the greatest defect of this loom is the number of broken ends which occur in the process of weaving, and these have been much reduced by putting the warp on an elastic frame and by using brass reeds and healds with metallic eyes. The healds and reeds we employ are obtained from Messrs. Jones Brothers of Blackburn, England, through their agents Messrs. Hutheesing & Co. of Bombay. They are considerably more expensive than native healds and reeds, but those who have given them a fair trial consider that they are worth the money. It is not an uncommon custom for native weavers to vary the closeness of the texture of their cloths by using reeds set much closer together near the edge of the cloth than in the middle. The practice, if not actually fraudulent, is not to be recommended, as it is calculated to deceive the unwary, but it is widely in vogue and is likely to render English reeds unpopular unless they are made to conform to this practice. The automatic take-up motion is not an essential feature of the loom, nor is it a very popular one with native weavers, but it enables the weaver to produce cloth of a perfectly uniform texture and I am quite certain is fully appreciated by the weavers of such cloths who find them more durable. The cost of this loom complete varies with the amount of timber put into it, the quality

of the timber and the general style and finish. Complete with English healds and reeds it will not cost more than Rs. 100 and in large numbers can be produced for a somewhat smaller figure. In our experimental workshops we have made a good number of these looms and we sell them, exclusive of healds and reeds, for Rs. 85 each. These looms are purchased more as patterns to be copied than as actual working looms and our price is perhaps somewhat high.

I do not propose to furnish a dissertation on weaving mechanisms, but before discussing the results obtained with other types of loom it may well to explain that in all the improved hand-loom mechanism is provided whereby the picking and shedding motions are combined, and the weaver is reduced to a pure automaton who either works the loom through a pair of pedals or sets the mechanism in motion by causing the slay to swing in pendulum fashion by one or both hands. The weaver is a mere automaton so long as everything works well, but if anything goes wrong or if the driving force he supplies is insufficient a break down always occurs and his skill as a weaver will be called into play in repairing the damage done.

During the last few years the discussions about the hand-loom weaving in India have led many people, competent or otherwise, to attempt the improvement of the hand-loom, and many worthless patents have been taken up. During the last six years I have had under observation every loom that I have heard of which seemed to offer the least prospect of turning out successful, and the following is, I think, a complete list of the looms which have been tried :—

- (1) The Domestic hand-loom of Messrs. Hattersley & Sons.

- (2) The Domestic loom of Messrs. Raphael Brothers.
- (3) The Japanese hand-loom.
- (4) Mr. Churchill's loom (Ahmednagar).
- (5) Captain Maxwell's loom (Salvation Army).

I had the Hattersley's looms at work for a long time on a great variety of fabrics made from yarn of counts up to 40's, but the output was never satisfactory, as the work of driving the loom was far too heavy for the native weaver. For a time I tried them putting two weavers for each loom so that when one worked the other rested and this naturally increased the output but not to the extent that was to be expected. When the loom is driven at a perfectly uniform rate, it works very satisfactorily, but when the source of supply of power is an Indian weaver the supply is very irregular and the result unsatisfactory.

The Raphael loom was never actually at work in either the Madras or the Salem Weaving Shed and my knowledge and experience of its working is gained by observations made on the loom purchased by Mr. Theagaraya Chetty of Tondiarpet. This loom suffers from the same defects as the Hattersley's loom and is much too hard work for the undeveloped legs of the Indian weaver. To all intents and purposes both these looms are power-looms and unquestionably better work will be got from them if the treadles or pedals are done away with and an arrangement made to drive them off a line of shafting. The looms are made of cast iron and it is astonishing how easily the castings are broken and how helpless the Indian weaver is in face of even a simple fracture. These looms are totally unsuited for individual weavers working on their own account, and I fail to see what advantage

there is if they are gathered in large numbers in a factory and human labour is employed to drive them. Thirty or forty such looms can be driven by a small oil engine costing not more than Rs. 4 or 5 a day to run and there is not the least doubt that the output of these looms will be three or four times as much as when worked by hand-labour. I am inclined to think that small power-loom factories of this type might be worked with great success in this country and would afford an admirable training ground for the development of indigenous manufacturing genius. I am now dealing with hand-weaving and it will be out of place to discuss this suggestion any further, but I think that small power-loom factories of this kind would prove very successful if properly designed and worked on the right lines.

With the Japanese handloom my experience was very unsatisfactory. It was obtained from Mr. Shafi through the Ludhiana Loom Manufacturing Company and was found to be a crude and ill designed loom and no warp ever put into the loom was woven into a satisfactory cloth. Why the loom was brought from Japan to India I do not know and the sooner it sinks into the obscurity from which it was dragged the better. I have been told by Japanese connected with the weaving trade that the loom is not used in Japan and I am not surprised as at the best it is only suitable for very coarse work.

Mr. Churchill's loom.—When I visited the American Mission Industrial School at Ahmednagar in 1905, Mr. Churchill showed me a number of his looms at work on a kind of dungri, and I was much struck with the results obtained when weaving this kind of cloth. Subsequently Mr. Churchill built 6 looms for the Salem Weaving Factory to weave fine cloths from 45" to 54" wide. On such work the

loom has not been a success and the Salem weavers object to being put to work on it. The mechanism for timing the throw of the shuttle is defective and the shuttle is very liable to be caught in the warp when it is more than a yard wide. To make the shuttle travel properly the slay has to be moved forward with increasing rapidity and then suddenly brought to rest, and on the finer warps the percentage of broken threads renders the output of the loom much smaller than would be anticipated from the rate at which picking can be done when the warp is not too wide.

The last loom with which we are still experimenting at Salem is that invented by Captain Maxwell of the Salvation Army and known as the "Triumph" loom. I have only one of them at work at Salem with which fairly satisfactory results have been obtained and a second loom has been ordered with some slight modifications which it is hoped will improve its outturn. If this anticipation is realised, it is proposed to put down six more looms and to thoroughly test them on the same class of work against six looms of the English pattern already described.

In the looms of both Churchill and Maxwell the driving force is applied to the slay and I am inclined to think that, whilst this will work satisfactorily on coarse warps, the necessarily somewhat jerking motion of the slay is not conducive to a good output when the warp is fine. Personally I hold the opinion based on nearly seven years' experience with different types of hand-loom that, when the power-loom is converted into a hand-loom, it becomes an unsatisfactory machine owing to the irregularities in the driving force and that the hand-loom must be a simple piece of mechanism in which the irregularities of the weaver are compensated for by the gentleness of the action of the loom.

A power-loom will make from 200 to 250 picks a minute, and from careful observations which I have made of the outturn of hand-loom I find that the daily average has only in one instance exceeded 30 picks per minute and when weaving fine cloths an average of from 20 to 25 picks a minute may be considered very good work.* Mr. Churchill at Ahmednagar was able to weave 30 yards of dungri in $8\frac{1}{2}$ hours, the warp and weft being of 10's counts and the number of picks per inch 28. This is equivalent to an average rate of picking of 60 per minute and is an extraordinarily good result. I have often observed my weavers at Salem and I find that they can easily do from 80 to 100 picks per minute whilst actually weaving, but their daily out-turn under favourable circumstances shows that at this rate of picking less than 25 per cent. of their time is spent in plying the shuttle and that the rest is frittered away. Weaving is a very monotonous occupation and the weaver is certainly unable to go on picking for any length of time without a change of some kind. The changing of pirns, the repair of broken threads, the shifting of the lease rods and other little incidents break the monotony of the work, but they greatly impair the efficiency of the loom.

I am convinced that, if the fly-shuttle hand-loom is to be largely used in making the finer classes of native goods, the direction in which improvement should be sought for is not so much in increasing the rate of picking which is already quite fast enough but in improving the details of the shedding and the

* These facts are substantiated by the recently issued report of the weaving competition which took place at Calcutta at the exhibition associated with the Indian Industrial Conference of 1906. The Salvation Army loom, which was awarded the gold medal, was worked at the rate of 87.3 picks per minute for 7½ hours, but at the end of that time the weaver showed signs of distress as did all the other competitors and it was obvious that the result depended as much upon the endurance of the weaver as upon his skill or the merits of the loom.

working of the slay so that the operation of weaving subjects the comparatively delicate threads to the minimum amount of strain. The idiosyncracies of the weaver however remain and I doubt if, under any circumstance, the average rate of picking throughout a day will ever rise to as much as 40 or 50 per cent. of what may be termed the normal rate at which picking can be done. Even in a weaving factory it is very difficult to collect reliable data regarding the working of looms and their output. The conditions vary so much from time to time and the human element plays so important a part that some exceptional motive must be brought into play to obtain anything like uniform conditions. For this reason I attach considerable importance to the results obtained in weaving competitions when a powerful stimulus is supplied to each weaver to do the best he can under the circumstances. Under the auspices of Local Associations in the Madras Presidency one or two such competitions have already been held, and in February next a competition is to be held which is being organized on much more elaborate lines than any of those already mentioned. The main object of the competition is to ascertain the working capacity of the various hand-loom on the market under favourable conditions, but under as far as possible conditions which could be reproduced in a weaving factory. Each competition will last for six days and each weaver will have to work for 7 hours a day and the results will be judged by the week's outturn. In this way it is hoped we shall obtain reliable data regarding the output of the various types of loom when working on different kinds of cloth. A considerable number of competitions have been arranged for and the Government of Madras have contributed very largely to the prize fund which it is hoped will induce the makers of every practical type of loom to enter them in the competitions.

Details of the cost of Production.

	Cost in Rs	Percent- age of Total cost.	Cost in Rs.	Percent- age of Total cost.	Cost in Rs.	Percent- age of Total cost.	Cost in Rs	Percent- age of Total cost.	Cost in Rs	Percent- age of Total cost.	
Warp	2 0 0	22.2	1 6 0	19.5	14 0 0	33.2	11 4 0	24.7	2 0 0	58.2	
Weft	1 4 0	14.2	1 0 0	14.2	9 13 0	23.2	7 8 0	23.1			
Warping and sizing	1 8 0	17.2	1 2 0	15.9	4 7 0	10.5	2 9 0	7.9	0 10 0	17.6	
Beaming warps	0 8 0	8.7	0 4 0	5.6	0 14 0	3.1	0 14 0	3.7			
Fin winding	0 4 0	3.8	0 4 0	3.8	0 8 0	1.9	0 13 0	3.5			
Weaving	3 4 0	37.2	3 0 0	43.2	12 8 0	29.8	9 8 0	29.1	0 15 0	28.2	
Total Cost	8 12 0	100	7 0 0	100	42 2 0	100	32 8 0	100.0	3 9 0	100.0	
Cloth			Turbans.		Angavastrams.		Dhoties.		Women's cloth. *		Country towels.
Counts in warp and weft.			100 x 100		100 x 100		60 x 60		60 x 60		20 x 20
Length			34 yards.		12 yards.		100 yards		54 yards.		20 yards.
Breadth			28 inches.		45 inches		54 inches.		45 inches.		36 inches
Ends per inch width			90		88		80		80		40
Picks per inch			68		72		70		60		40
Rate of picking at Salem per minute.			18		16		23		12		..

* Turkey red yarn dyed with indigo

From data collected at the Weaving Factory at Salem a tabular statement has been prepared giving details of the cost of production of several kinds of goods most largely manufactured there and I would draw attention to the columns in which the cost of each item is given as a percentage of the total cost. These figures are very interesting and it would be well if similar figures could be produced from other weaving establishments and the various items discussed. It will be seen that in the very fine cloths like angavastrams and turbans the cost of the raw material is but little more than a third of the cost of the finished articles, whilst in the goods made in the lower counts the percentage varies between 56 and 60. At Salem the warping and sizing is done outside the factory by men who do nothing else but this sort of work and they use fairly efficient warping mills and from the figures for warping and sizing it is obvious that there is not a great amount of room for improvement. The cost of the actual weaving work is probably the main item in which improvement can be effected and this is emphasized by the figures given regarding the rate of picking which varies from 12 to 23 picks per minute excluding country towels, the figures for which are not given as they are usually made on native looms with a simple fly-shuttle attachment. The item 'warping and sizing' varies considerably with different kinds of cloths and the figures given are probably lower than would be obtained in many other places owing to the fact that in Salem the preparation of warps is to a large extent a special business and is carried out in a much more efficient manner than I have seen elsewhere.

Whilst the experimental plant was in Madras a great many experiments were carried out in different methods of sizing and various forms of hand-warping mill were tried. The problem of

preparing warps suitable for use on native handlooms was laid before the makers of warping machinery at home and after a great deal of discussion a plant was ordered from Messrs. Butterworth and Dickinson. It was set up and tried in Mr Theagoraya Chetty's factory at Tondiarpet, but the results were anything but satisfactory and on account of other and more important work the experiments are at present in abeyance. The main idea was to employ hank-sizing and a sectional warping machine capable of turning out cheeses of warp of 500 ends. To make up a warp containing 3,000 or 4,000 ends the requisite number of cheeses were put on a spindle and the required warp run off on to the weaver's beam. The principal defect is in the sizing which proved inferior to that which is done by the native method where the warp is stretched out on a frame and carefully brushed. It is my intention as soon as possible to set up this warping mill again and prepare warps of unsized yarn and then to expose the warp in sheet form and size it according to the ordinary native method. I cannot say that I am very sanguine that this will be a success, but it seems worth trying and should effect a considerable economy in the cost of warping. Recently Messrs. Hattersley & Sons have brought out a hand slasher sizing machine, which will probably give good results with low counts where the handlooms may be expected to turn out from 20 to 30 yards of cloth a day, but with much finer class of goods which we are weaving at Salem, where the outturn is seldom more than 5 yards a day, the use of very long warps is not recommended as they remain in the loom much too long a time and the sizing deteriorates so much that the warps have to be re-sized on the loom and, when this is done, it greatly diminishes the outturn.

Before concluding this paper it may be of interest to give some details regarding the factory

itself. For the present the factory is located in a rather large straggling bungalow in the middle of the town of Salem for which we pay a rent of Rs. 60 a month. It was intended originally to instal about 100 looms, but owing to the difficulty of getting weavers nothing like that number has yet been reached and we find it difficult to keep more than about 35 looms in full work. The cost of running the factory last year was about Rs. 300 a month in addition to the sale-proceeds which amounted to about Rs. 350 a month. A steady improvement is however going on and with between 40 and 50 looms installed and an average of 35 at work the sale-proceeds amount now to over Rs. 1,000 a month and the cost of running the factory to about Rs. 200 a month. Ultimately it is hoped that the factory will pay its own expenses and it can probably be made to do so now were commercial considerations of paramount importance.

To the capitalist who puts his money into a hand-weaving factory it is essential that a profit should be earned and as that is not done at Salem it may be well to indicate briefly why such a desirable result has not been attained. In the first place the factory is a Government institution, and it is generally recognised that commercial work cannot be carried on under Government with the same degree of economy as is possible when the control is vested in the hands of private individuals who are keenly interested in making it pay. In the factory we have arrived at some conclusions regarding looms which have already been stated, and if money-making was the object in view, we ought to at once discard all other types of loom and confine ourselves to those classes of work which pay best. New experiments are always being tried, looms are always being altered, the weavers have to accustom themselves to the new conditions, frequently a good deal of cloth is spoiled and

generally the efficiency of the institution as a factory is greatly impaired. It is for these reasons mainly then that the factory does not pay and those who examine the accounts must take these facts into consideration. If some of the gentlemen who have interested themselves in hand-weaving and have started hand-weaving factories could be induced to furnish accurate manufacturing accounts, they would be of great value, but it is hardly fair to expect business men to give away the results of their experience and those who would like to find out whether the investment of money in hand-weaving factories is likely to be a success, must examine the published accounts of the Salem Weaving Factory in the light of my remarks.

THE *the*
INDIAN SUGAR DUTIES.

A FEW WORDS AGAINST THEIR
IMPOSITION.

BY

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A NOTE ON THE SUGAR DUTIES

The support given by Indian public opinion to the Sugar Duties seem to me to be based upon some misconceptions of facts. It is needful to clear the ground of these misconceptions and state the actual facts.

A HALTING HALF-MEASURE

The Indian people have generally taken this Act to be an earnest of a policy of Protection which Lord Curzon is anxious to introduce into the government of India for the benefit of her people. So many of our most useful, long-cherished, and staple industries have been crushed out of existence, and so many of our infant and nascent industries hopelessly handicapped, by keen foreign competition, that it is not at all a matter of surprise that our countrymen should hail with delight any measures that look like 'protective'. It should be clearly understood by our people that the Government of India, whoever may be at the head of it, cannot and dare not cut at the root of the fiscal policy of England and pursue a course of Protection for the benefit of Indian industries, however sincerely anxious they may be to do so. There is this difference between India and the self-governing Colonies of England that, unlike the latter, the former

has no legislative independence and cannot initiate any measures that have not the approval and support of the British House of Commons. But then it is altogether a mistake to suppose that the Sugar Duties are a protective measure—protective of the Indian sugar industry—it is only a differential tariff meant to counteract the advantages derived by German and Austrian manufacturers of sugar over producers of other countries by the receipt of bounties from their respective governments. Our friends in England seem to attach considerable importance to the Act on the ground that it is a departure from the doctrines of Free Trade and a return to a long-abandoned fiscal policy—a lapse into exploded economical fallacies. We, who live in an entirely different environment and so far away from the influence of the Cobden Club, think that a policy of Protection would, if judiciously and consistently pursued, result in the material salvation of India. But the Sugar Duties are neither a very wide departure from free trade principles nor are they sufficiently protective. It would indeed have been a matter of sincere rejoicing for India if the duties had been extended to all sugar imported into this country, and the Act made effectively 'protective.' As it is, it does not protect the home industry from Mauritius sugar—the most formidable competitor that we have got—and is therefore only a halting half-measure. Neither our English friends have, therefore, much cause to regret, nor the Indian people much to congratulate themselves on, the passing of this measure.

THE GENESIS OF THE DUTIES

The second great misconception is that our people seem to think that this measure has been passed for the benefit of the sugar manufacturers and cultivators of the sugar-cane, the date, and the palm, trees of India. Refined Sugar industry had been dying, at least had remained stagnant for more than two decades, and all this time the attention of our paternal Government had not been drawn to it nor did the Government so long think it proper to interfere on its behalf. Why then have the Government *now* awakened to a sense of its duty by the cultivator of the sugar-cane and the manufacturer of sugar in India? For an answer to this, we have not to go very far. Sir James Westland took the public into his confidence and gave his colleagues in the Council a history of the origin of the Bill. "Honorable members are no doubt aware that a couple of years ago the attention of Her Majesty's Government was drawn to the critical condition of the sugar industry in the West India Islands. They sent out to inquire into the subject a Commission of which two members were my own distinguished predecessor, Sir David Barbour, and the Hon. Sir Edward Collen's distinguished predecessor, Sir Henry Norman. They made a report in which they showed that the sugar industry of the West India Islands, upon which the commercial prosperity and even administrative possibilities of the West Indian Colonies depended, was in an extremely critical state and they attributed it all to the existence of the bounty

system." This bounty system, Sir James Westland informed the Council, Her Majesty's Government wanted to revise, and a Conference of the European Powers was proposed to do it. The Conference that met in Brussels in the summer of 1898 to discuss this question parted without coming to any practical conclusion. This Conference proving infructuous, the Upper India and the Madras Chambers of Commerce, afterwards also the Calcutta Chamber, urged and pressed on the Government of India to lose no further time in imposing countervailing duties upon all bounty-fed sugar. This, together with the following resolution on behalf of the Mauritius sugar industry, is, in effect, the genesis of the duties under review. "That this chamber," wrote the President of the Chamber of Agriculture to a certain sugar firm, "that this chamber is of opinion that prejudice is caused to the staple industry of this colony by the importation into India, our principal market, of bounty-fed beet-sugar upon the same terms as our unprotected product ; that it is of the greatest importance that the admission of bounty-fed beet-root sugar into Indian markets should be discouraged." It needs to be pointed out here that almost all the planters and manufacturers of sugar in the West Indies and Mauritius are Englishmen and their principal market is India. This explains the anxiety of the Government of India to impose these duties and there can be no manner of doubt that they will have the desired effect—Mauritius sugar will be secured from keen European competition.

THE DUTIES IMPOSED NOT IN THE INTERESTS OF INDIA—

Mauritius has no doubt got what she wanted and her crisis averted, but what is there in these duties for India to feel happy? I venture to point out that the imported beet-root sugar of Europe do not at all enter into any competition with the crude and unrefined sugar consumed by our masses and which form by far the largest quantity of our indigenous manufacture of sugar. In the language of the late Finance Minister "the sugar which is affected by it (bounty-fed sugar) in this country is mostly the refined article." So long as imported sugar, beet or cane, cannot undersell the raw and unrefined sugar of home production—and unless a revolution in the processes of refining takes place to reduce the cost of production to a very considerable extent—there is absolutely no fresh cause for anxiety for the sugar-cane growers or the manufacturers of crude sugar of this country. As for refined Indian sugar, there is not much of it—there are only 6 large factories in all Bengal, 2 in the N. W. Provinces and Oudh, 1 in the Punjab, and 5 in Madras, besides about 90 large, and 3 to 4 hundred small, refineries that manufacture it. The outturn of all these factories and refineries together are supposed not to exceed more than 800,000 of cwts. of refined sugar or only a fifth of India's total consumption of this article. It would thus appear that, there being no competition between our unrefined, and the bounty-fed beet, sugar, and the

production of refined sugar from our own factories and refineries being, under the most favourable circumstances, only a negligible quantity, the duties could not have been imposed in the interests of India.

—**BUT OF MAURITIUS**—

It is impossible for our factories to meet with the very large demand of the country for refined sugar. We cannot, therefore, complain with any good grace if foreign countries supply the deficiencies of our production. According to the simple law of supply and demand, foreign sugar will continue to be imported into this country in spite of ourselves and these duties. Only it will be a little dearer in price, and, instead of coming from Europe principally, will come from Mauritius. Mauritius will therefore get the entire benefit of these duties and nothing has been done to tax Mauritius sugar or otherwise protect Indian refined sugar against importations from Mauritius. It would not, therefore, take much wisdom to see that this legislation could not have been intended for, and will not benefit, either the Indian producer or the Indian consumer. The only party who are likely to be benefitted—and immensely benefitted—by it are the planters and manufacturers of the West Indies and Mauritius, who are likely to recover much of their lost ground; and if the Act is to be regarded at all as a protective measure it should be clearly understood that it protects none other but the Mauritius industry.

**- AND ARE NOT LIKELY TO STIMULATE THE SUGAR
REFINING INDUSTRY IN INDIA**

A general hope has been entertained that the immediate effect of these Sugar Duties will be the establishment of a large number of factories and refineries, and the consequent expansion of the sugar-cane cultivation, in this country. Mr. R. C. Dutt has publicly given expression to this fond hope in a letter which has recently been published over his signature in the columns of the *Manchester Guardian*, a paper very well-known in India. We are sure that Mr. Dutt and those who take this view of the matter will not take a long time to be disillusioned, for where hitherto bounty-fed sugar was steadily replacing Mauritius sugar, there Mauritius will now again assert her position. Does Mr. Dutt forget, a man so well-informed as he cannot be ignorant of the facts, that though importation of German and Austrian sugar will be restricted, no such restrictions have been imposed upon the importation of Mauritius sugar, and that so long as Mauritius sugar finds a duty-free access in all parts of India the chances of Indian manufacturers successfully competing with it will be as few as they were fifteen years ago? Mauritius has the advantages of cheap labour, scientific method of production, an established industry, and a well-nigh perfect cultivation of the sugar-cane. In the beginning of this century, Mauritius got a good start and had its sugar industry firmly established by the labour of the slaves. When slavery was abolished, Mauritius

was threatened with ruin but the importation of Indian labour came to its rescue in time. To-day the number of Indian labourers in Mauritius come up to nearly 3 hundred thousand. These Indians are treated and paid as coolies—I need not repeat here how my countrymen are treated by Englishmen all over the Empire, particularly in the Anglo-African colonies—and with the help of their cheap labour, together with other mechanical and chemical appliances, Mauritius has slowly driven out Indian refined sugar from the Indian market. Before Germany first began to export sugar in any large quantity to India, Mauritius had almost a monopoly of the refined sugar trade, and, even after that year up till 1896, there has been a steady increase of the importation of Mauritius sugar in India. Now Mr. Dutt ought to know how supremely difficult it is for a new industry to compete with a long-established one on equal terms, and how successfully Mauritius has so long prevented the growth of sugar factories in India. Labour being equally cheap, if not cheaper, in Mauritius as in India and other costs of production being in favour of the former, and it being a fact that the Mauritius Otaheite cane yields about three times more sugar than the Indian,* it is not possible to expect any capitalists to embark lightly on such an enterprise as the revival of refined sugar industry. We have not had much to fear from beet-root sugar, as I have already

* Dr. Watt's Economic Products of India, vol. vi, part II, pp. 110, 115, 120, and table on page 116.

pointed out before, and, Mauritius remaining untaxed, will successfully prevent any large production of refined Indian sugar in the future as it has done in the past. Can Mr. Dutt give us any reasons why, before Germany and Austria began to export any large quantity of sugar to India and when there was really a protective duty of 5 per cent on all Indian importations, sugar and other things, that golden opportunity was not seized either by our countrymen or by European merchants for the expansion of the sugar-refining trade ?

Another side of the question remains to be considered—if the duties recently imposed are sufficient to give Indian capitalists any appreciable advantage over European manufacturers ? The bounty on beet-sugar in Germany amounts to 1s. 9d. on a hundredweight on refined, and 6d. less on unrefined, sugar. The bounties given in other countries of Europe do not vary much from this. The sugar duties that have been imposed lately are equal to the amount of bounties given. The question now is : if the advantage of 21d. on a cwt. is a sufficient bait to capitalists to undertake the building up of a large number of factories and refineries in India ? Considering the cost of approved scientific machinery, mechanical appliances, and the use of steam power, and how expensive it is to keep them in order and get them repaired in India, and also the disadvantage of working bad canes, I think the countervailing duties are too insignificant a set-off to be calculated upon seriously. I, for myself, therefore, do not look forward to that day when Mr. Dutt's hopes

will be realised and a large number of factories rear their heads in India.

In support of my view, I transcribe here a passage from a certain minute of the Director of Land Records and Agriculture of the N. W. Provinces : "Assuming that the cost of producing a given amount of crystallized sugar by modern processes is about the same in India and in the Mauritius (and from such informations as I have at hand, I do not think a sugar refinery in India could manufacture cheaper than the Mauritius planter), what are the probabilities of commercial success ? They are bounded, it seems to me, by the actual success attained by the Mauritius planters, and as we are constantly told that sugar in Mauritius does not pay, scientific sugar-refining in India is not a hopeful industry. The Rosa Factory in these Provinces depends more on its rum than on its sugar, and I believe this is the case with the few other similar concerns existing in other Provinces."

MAURITIUS VS. GERMANY AND AUSTRIA

It has been alleged by the framers and supporters of the duties that the remarkable shrinkage of the area under the sugar-cane and the large importation of European sugar in the last few years leave no room for doubt as to which way things are drifting themselves. We do not know if the one has any connection with the other, or if they have always gone in inverse ratio—but it appears to me that such a conclusion does not bear the test of close examination. It has been rightly

observed by the Bombay Chamber of Commerce that the importation of bounty-fed sugar operates principally to supply deficiencies in local production. This observation is borne out by the fact that the imported beet-sugar is mostly consumed by the sweetmeat and confectionary industry—the latest developments of which are an index to the changed mode of living of certain classes of people of this country. Now the large importation of continental sugar proves, if anything, the ever-increasing demand of the new sweetmeat industry and marks the falling-off of the importation of Mauritius sugar. With the extraneous aid of bounties, first granted in 1887-88 and doubled in 1896, Germany and Austria have found it an easy enough work to drive the Mauritius planters to the walls and successfully capture the very brisk trade that Mauritius used to make with India in refined sugar. The tables have been turned between Mauritius and Germany and Austria—that is all the difference. In the year before the famine, Mauritius sent us 84 per cent of our quantity of imported sugar and during the famine it came down to 61 per cent and in the year following Austria and Germany sent together 70, and Mauritius only 30, per cent. If the bounties, or the large importation, of European sugar, have harmed anybody, they have only harmed Mauritius. India, under the present circumstances, did not and could not aspire to meet this large demand for refined sugar out of her own home production. The cry of the Indian industry in danger is, therefore, entirely out of place in this con-

troversy. The case is entirely one of Mauritius versus Germany and Austria and India has no material stake in it. It makes very little difference to us that, instead of Germany and Austria, it is Mauritius which sends us the greater part of the refined sugar we want and kills our sugar industry.

SHRINKAGE OF SUGAR-CANE AREA

Then, as to the contraction of the area under the sugar-cane plantation, it appears that so far no case has been made out to attribute it to the importation of an unexpectedly large quantity of bounty-fed sugar. It is neither safe nor fair to make any generalisations upon the figures of a few years and to make false premises with a view to arrive at a certain conclusion. It is strange that it should have escaped the notice of our rulers and people alike that the acreage of sugar-cane cultivation has undergone many remarkable fluctuations long before 1896-97. But never previously was half so much anxiety shown on behalf of this particular crop. It has been held in some well-informed quarters that the falling-off of the acreage under sugar from 3,000,000 to 2,600,000 in 1896-97—a drop of 13 per cent—is due to the famine of that year and to such a physical factor as the failure of the monsoon rather than to any economical cause. What is there to prove that this view is not right and that undue capital has not been made of this temporary shrinkage? Has it been noticed that, in that very same year, the acreage under such staple crops as wheat and oil seeds suffer-

ed a severer contraction and that devoted to rice and pulses was also considerably reduced? The following figures will explain this view of the matter —

Crops.	Millions of acres		Reduction per cent.
	1895-96	1896-97	
Rice	69·2	66·2	4 $\frac{1}{3}$
Wheat	18·5	16·2	12 $\frac{1}{2}$
Pulse, etc.	84·2	78·2	7 $\frac{1}{4}$
Oil seeds	12·8	10·5	18
Sugar	3·1	2·8	10

The cry of a crisis over the sugar-cane cultivation has not now been raised for the first time. The question almost in its present form came up before the Government of Lord Ripon and also of Lord Lansdowne. In a despatch of Lord Lansdowne, dated 1891, he endorses the following statements contained in a despatch of the Government of India of 1882 :—

“The increasing import, and the decreasing export, do not, we consider, indicate the decadence of the industry in India. The area under sugar-cane has largely increased in Upper India through the development of canal irrigation, and is reported to be extending from the same causes in Bombay. More sugar is produced in India than formerly; but the demand is much greater. Not only has the increasing prosperity of the people increased the average consumption, but sugar is now borne by rail into tracts where the cane is cultivated to a limited extent, and which were

formerly very scantily supplied. The profitableness of the industry is seen in the high price which the Indian cultivator can obtain for his produce, and all the evidence before us lead to the belief that the capital invested in sugar cultivation is steadily increasing."

The despatch of 1891 adds that these remarks "may be taken to apply equally to the present condition of the sugar industry in India." Replying to the Secretary of the Upper India Chamber of Commerce, under date 7th April 1898, about a twelvemonths ago, Sir Anthony P. Macdonell observed: "The Lieutenant-Governor has not at present any reason to believe that the area under sugar-cane in these Provinces has been, or is likely to be, contracted by the importation of foreign sugar." Sir James Westland himself said in the Council while introducing the Bill: "Now we have obtained very full particulars of the recent condition of the sugar cultivation and of the sugar refining industry in the North-Western Provinces and may at once say that the immediate effect upon cultivation has not been very great." And the N. W. P. and Oudh, be it remembered, produce nearly half the entire sugar-cane of India. In a telegram sent to the Government of India by the Government of the Punjab at the time this Bill was before the Council, they distinctly said: "In the Punjab cultivation, though not extending, has not fallen off, as the demand of the agricultural population, which is chiefly for unrefined sugar, is still sufficient to main-

tain prices at a level which renders cultivation profitable." It has been stated in the Viceroy's Council by the honourable member of the Central Provinces that in his part of the country the acreage under sugar-cane has been steadily falling ; but the honourable member should have remembered that this contraction has begun years and years ago when no European sugar was imported into India and is principally due to local causes such as the fearful destruction of entire sugar-cane fields by white ants * and the great unsuitability of the black cotton soil of the Central Provinces for the cultivation of the sugar-cane.

The following figures which I have taken some pains to piece together in a table, from a number of official tables † clearly indicate where we stand as regards our sugar trade and sugar cultivations. Though there is no denying the fact that the imports are increasing very fast, it will nevertheless be observed that our exports in refined and unrefined sugar together, far from undergoing any diminution yet, have rather slightly increased, and as no diminution in the manufacture of sugar has taken place it follows that the acreage under the sugar-cane and other sugar-yielding plants have also suffered no contraction at all. Under the above circumstances, the case of the supporters of the Act falls to the ground and the arguments advanced on its behalf read very much like special pleading.

* C. B. Clarke in the *Kew Bulletin* of 1890, p. 72

† From the Fifth issue of the Financial and Commercial Statistics for British India, pp 540-556.

Years	IMPORTS		EXPORTS	
	Quantities in cwt.	Value in Rupees.	Quantities in cwt.	Value in Rupees.
76-77	258,105	4,036,070	1,144,491	9,995,410
77-78	475,105	7,980,350	908,250	8,506,130
78-79	923,381	14,808,800	368,593	3,504,810
79-80	652,009	10,687,880	373,275	2,891,380
80-81	986,321	16,111,570	644,531	5,070,550
81-82	775,982	12,437,580	980,341	7,236,400
82-83	672,672	10,869,610	1,428,360	9,890,690
83-84	726,909	11,483,600	1,777,157	11,797,200
84-85	2,616,874	21,408,370	1,251,059	7,913,620
85-86	1,171,186	14,580,970	1,331,103	7,308,250
86-87	1,749,555	20,805,400	1,144,718	7,020,200
87-88	1,808,479	21,136,170	1,195,805	6,488,690
88-89	1,617,710	17,909,390	1,183,203	7,510,430
89-90	1,723,113	22,000,470	1,615,996	11,847,910
90-91	2,931,901	33,998,860	985,309	6,152,210
91-92	2,213,125	25,619,960	1,137,186	7,010,450
92-93	1,959,818	26,256,830	1,064,900	8,359,950
93-94	2,127,905	28,231,900	1,532,250	12,309,020
94-95	2,490,671	28,752,970	1,232,257	8,221,200
95-96	2,730,963	31,068,130	1,240,596	7,913,170
96-97	2,861,400	31,518,290	1,348,473	9,164,370

THE SHUTTING DOWN OF NUMEROUS REFINERIES

Then again it has been pointed out in defence of the bill that a couple of hundred of small refineries have been closed owing to the large importation of bounty-fed sugar and a very large number of people have been thrown out of employment. Has it been definitely ascertained by anybody that other factors did

not enter to produce this result and that it was not entirely a local injury ?

In connection with this large question, I intend to bring prominently to notice the decline of the Bengal sugar-refining industry as an object-lesson. The ruin that has overtaken a large number of our refineries has also been cited as a case in point in support of this measure in this side of the country. We are glad to be able to say that necessary figures are not wanting to prove how popular impression is wide away from the truth in this respect. The following table taken from page 466 of the Fifth issue of the Financial and Commercial Statistics for British India will, I hope, demonstrate beyond doubt that a great misconception prevails on this subject.

NUMBER OF SUGAR FACTORIES IN BENGAL

1881	3	1885	unreported	1889	84	1893	91
1882	57	1886	130	1890	75	1894	94
1883	191	1887	173	1891	91	1895	85
1884	unreported	1888	103	1892	91	1896	86

The above do not include small concerns of which no statistics are available. It is remarkable that so long as a protective duty lasted on sugar and other things, Bengal did not avail herself of the splendid opportunity and facilities afforded for the building up of a large number of sugar manufactories, but it is strange that as soon as the import duties were abolished by Lord Ripon in 1882 and free trade declared in India, in one single year so many as 134 factories

were established in Bengal alone. But the great point to which I want to draw attention is that between the years 1883-90, before German sugar began to be imported—Sir James Westland has declared in the Council that “the year 1890-91 was almost the first year in which German sugar was imported to India”—so many as 89 factories had to close work in these provinces, and that since the time that bounty-fed foreign sugar has entered into any serious competition with either the indigenous refined or the Mauritius, sugar, a larger number of factories have worked in Bengal till the year 1895. In the light of these facts, it will not do to father the whole or any great portion of the injury of the Bengal industry upon bounty-fed sugar. I believe the decline of the Bengal refined sugar industry is to a great extent a local injury and it appears to me that in this case Bengal's loss has been Madras' gain. Madras has ousted Bengal sugar from Bombay and Burmah and the competition of Madras has told very injuriously upon Bengal sugar. Though Bengal possesses very nearly as great an area under sugar-yielding palms as Madras, some indefinite causes must have contributed to the success of Madras at the expense of Bengal. Then, again, the broad fact should not be overlooked that, since a long time, there has been a steady decline in the export of the refined sugar of Bengal and that now it has almost ceased to be exported at all. From 1832, the year in which the heavy import duties on Indian sugar were taken off till not a long time ago, Bengal used to send a large

and ever-increasing quantity of refined sugar to the United Kingdom. The continent of Europe, the United States of America, and other foreign countries also used to take, for a long time, a large quantity of our refined sugar. Now in recent years, by the stress of competition, all these markets have been lost to Bengal and no amount of countervailing or protective duties are likely to regain our lost ground. Is not the gradual contraction of the markets of our refined sugar a very potent factor in the decline of the Bengal industry, and does it not satisfactorily account for the collapse of a very large number of small refineries that once dotted over the districts of Shahabad, Jessore, Faridpore, Khulna, 24 Pergunahs, and Nuddea ?

Then it must be borne in mind that though India imports so large a quantity of foreign sugar, a large quantity of her own production of sugar, both refined and unrefined, is exported every year to England and Ceylon. England takes unrefined Indian sugar for her brewing trade and also for feeding stock and Ceylon takes a very large quantity of both her refined and unrefined sugar for domestic consumption. Would it be believed that the exports of refined sugar from Madras to Ceylon have steadily increased by 42 per cent and unrefined sugar by 64 per cent from 1884 to 1897 ? What would again be thought of the following remark of the Trade Review for 1897-98 (page 28) ? "It is noticeable that, although there were extraordinarily large imports of refined sugar, the price of Indian refined sugar rose during the last year."

Do the increased exports and the rise of price indicate any injury to sugar production in this country? Are the authorities quite sure that the severest famine of the century is not at all responsible for the shutting down of a large number of the most insignificant and ephemeral refineries in the land? And has it conclusively been proved that Mauritius sugar did not have any share in bringing about this unhappy result, and that, had the duties been imposed a couple of years ago, this fate would not have overtaken these refineries and they could have held their own yet for a long time forward? Even granting for argument's sake that the large importation of bounty-fed sugar has proved the ruin of many of our refineries and factories, would the Government of India have passed this measure if most of this sugar had come from the United Kingdom instead of from Germany and Austria? Has not the phenomenal increase of the importation of British cotton piece-goods done a much more severe and wide-spread injury to one of the most long-established and staple industries of India? And what has the Government of India done or intend doing to remedy and prevent it?

THE QUESTION OF EMPLOYMENT

As for the question of employment, it is so insignificant that, supposing that all the factories in India were to be closed up at once, it would throw not more than 4 to 5 thousand people out of employment.*

Dr. Watt's Economic Products of India, vol. vi, part II, p. 320.

I trust it will be allowed that a very much exaggerated account has been given of this particular question, and as it actually stands, it did not call for any legislative interference.

THE DUTIES MAY ULTIMATELY BENEFIT GERMANY AND AUSTRIA

Much stress seems to have been laid on the point that, as imported beet-sugar is consumed only by the well to-do classes, these duties should not be objected to on principle. Even the *Times*, on the authority of the Bengal Chamber of Commerce, brings this argument forward as a plea for them, and observes that, like the salt-tax, these will not touch the purses of the masses. Because of this very reason, I think the object of the Act is likely to be defeated. Those who use beet-sugar prefer it for its intrinsic fineness and superiority and are not likely to forego that luxury for a mere nominal increase in its price. People who can afford to pay for their likes are not exactly the class of men to lightly suffer their established tastes to be interfered with and be influenced into buying cheaper articles by mere sentimental considerations. I do not see any reasons for Germany and Austria to apprehend any serious check in the exportation of their sugar to this country, for certain classes of people here have already acquired a strong taste for beet-sugar; and as acquired tastes cannot be given up at any man's bidding, there will be a continued demand for this commodity which there is no chance of being met

from elsewhere, do what you may. Under the circumstances, the duties, in all likelihood, will benefit Germany and Austria more than this country, for while the duties will raise the price of beet-sugar to the disadvantage of the Indian consumer, they may ultimately lead those countries to discontinue paying any more bounties to such of their manufacturers as export sugar to India. Bounties are given to an industry only to enable it to undersell and break down its competitors ; but if there be a genuine and steady demand for the article even at a higher price—bounties are no longer required and no good purpose is served by continuing them.

PRECEDENT FOR THE DUTIES

The imposition of countervailing duties upon bounty-fed sugar of Europe by the United States of America and by the self-governing Colonies of Canada, Australia, and the Cape has also been brought forward in justification of the Indian Act. In those countries, the legislatures imposed these duties—and they are much more severe than what have been imposed here—with a view to create and foster a native industry and the result has justified their action. But so long as no restrictions are imposed upon Mauritius sugar in India and nothing is done to improve the cultivation of the sugar-cane and the methods of manufacture of sugar, and no direct encouragements are offered for the development of this industry, there is not the ghost of any chance for the Indian sugar

industry to make any headway, and the analogy between those countries and India does not, therefore, hold good.

A GIFT TO THE INDIAN PEOPLE

Every student of economics knows that bounties benefit the consumer more than the producer: the bounties on sugar in Germany and Austria are, therefore, almost a gift to the Indian people. Speaking recently to a representative of the *Morning Leader* of London, Sir William Wedderburn aptly observed: "If the German Government are anxious, by the distribution of bounties, to cheapen the Indian's sugar, then so much the better for the Indian, and I can only add that if they would double the bounty and halve the price to the consumer, we should be still more obliged to them." If my countrymen are not willing to accept this gift any more from the German and the Austrian peoples for the benefit of Mauritius—and admittedly the new sugar duties are a preferential tariff in favour of Mauritius—well and good. But if they think that this measure will benefit our sugar industry, I regret to say, they are bound to be deceived in no time. The refined sugar industry of India is doomed for ever and no power on earth can resuscitate it.

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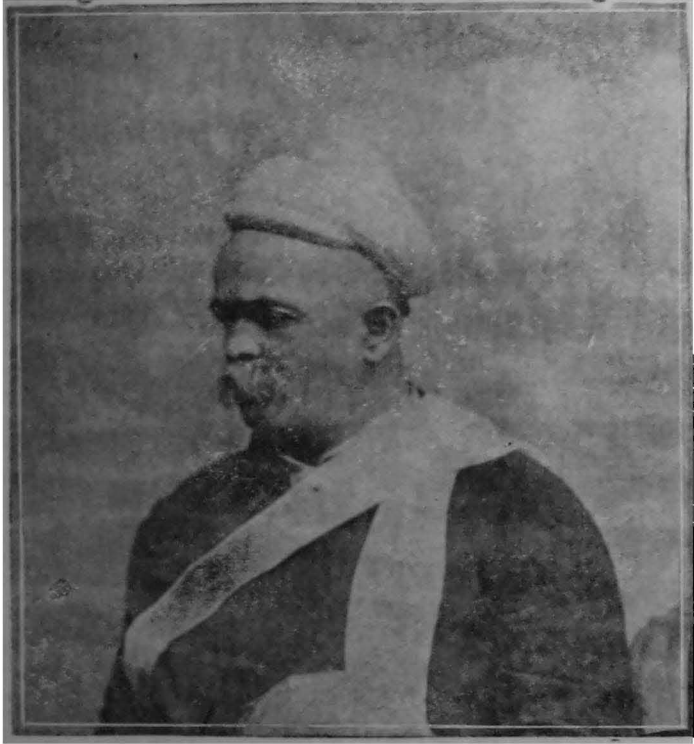
Honorary Director of the Institute.

Prof. K. R. Kanitkar, B.Sc., M.A.

Assistant Secretary of the Institute

L. V. Karkhij, L.Bg.

**The Late Mr. Justice M. G. Ranade,
M. A., L. L. B., C. I. E.**



Born, 18th. Jan. 1842. Died, 16th. Jan. 1901.

Chitra Shala, Poona.

CONTENTS.

	<i>PAGES.</i>
Statement of the Governing Board.	1—12
Appendix A—List of subscribers.....	i—x
Appendix B—Meeting of the Ranade Memorial Fund Committee (15th April 1908.) ...	xi—xiv
Appendix C—Dr. F. G. Selby's speech at the Ranade Memorial meeting (22nd July 1901)	xv—xix
Proceedings of the Opening Ceremony	xxi—xxxiii

THE
Ranade Industrial
AND
Economic Institute,
POONA.

It is now nearly ten years since the hand of death removed the late Mr. Justice M. G. Ranade from our midst; but the lapse of time has only served to illustrate how great and irreparable is the loss which the country has sustained by his death. Mr. Ranade was by common consent one of the foremost men of modern times in India. His great intellect, his profound learning, his prodigious industry, his deep devotion to the highest interests of his countrymen—these, joined to his inflexible integrity, his entire freedom from prejudice and the rare simplicity and grandeur of his soul, gave him a position in the country which was perfectly unique; and for the life-time of a generation and more he was the trusted guide and counsellor of his countrymen and exercised unrivalled influence over their thoughts and activities. It was no wonder, therefore, that when he passed away, his death was felt throughout India to be a great national calamity, and high and low, rich and poor, Europeans and Indians, members of all classes and of different communities drew together in a common grief to mourn his loss. Meetings were held all over the country to give public expression to the sorrow that was everywhere felt, and in several places memorial movements were started to take steps to perpetuate in a suitable manner the memory of services, of which the splendour and the magnitude were recognised on all hands. Of these meetings the two most important were those held in Bombay and Poona, the Bombay meeting being pre-

sided over by the then Governor, Lord Northcote, and that at Poona by Sir Charles Ollivant, then Senior Member of Council. A significant proof of the close co-operation of the European community with the Indian in honouring the memory of Mr. Ranade was supplied by the fact that the principal resolution at the Bombay meeting was proposed by the then Chief Justice, Sir Lawrence Jenkins, and that at Poona by Dr. F. G. Selby.

One of the finest tributes ever paid to Mr. Ranade's great personality was that delivered by Dr. Selby at the Poona meeting. The whole speech is reproduced as an appendix to this Report, but a few extracts from it may be given here. "It seems to me", Dr. Selby declared, "that we get the truest idea of the man, if we think of him as approximating the Platonic ideal of the philosopher, namely not merely a man with a great intellectual grasp or deeply versed in matters beyond the comprehension of the vulgar, but one who combines in himself the faculties of the sage, the saint and the patriot." "Mr. Ranade's knowledge was undoubtedly very great. But what must have struck most people about him was not so much what he knew as how ready his knowledge was—how he had it immediately at command when it was required." "I think we must say too that Mr. Ranade always regarded his knowledge—as he was a profoundly religious man, the metaphor is applicable—as a talent for the use of which he was responsible. The knowledge which he was always accumulating from books, from men and in his varied spheres of public service, he was always anxious to turn to account for the benefit of his countrymen." "His character corresponded to his intellectual attitudes and habits. He was singularly free from personal ambition. Whenever anything was accomplished, although it was well known that it was he who accomplished it, his one anxiety seemed to be to keep himself in the background and let some one

else have the credit. We may say of him, I think, what Bacon said of himself, that in the building of the temple of knowledge he was willing to play the part of hodman, to carry the bricks and mortar on his back, if only the temple were built." "He had a profound belief in the reality of a Providence in nature and history—a moral government of the Universe—and thus, I think, was the secret of his unwearying perseverance and his unconquerable optimism." "And surely too, Mr. Ranade was a patriot, if ever there was one. You all know how well he loved his country and his people. He was proud of everything good they had done in the past. He looked forward with confidence to greater achievements for them in the future.....And connected with his patriotism was his deep and intelligent loyalty to British Rule. It was, as it seemed to him, under the aegies of British sovereignty that the people of India were ordained by Providence to grow to the fulness of intellectual, moral and spiritual manhood. This, I imagine, was what he meant by the word 'tutelage,' which was his favourite word to the express the relationship between India and England." "He had made a profound study of our English system of Political Economy. He had realized the logic of it, *i. e.* he had seen the pre-suppositions on which it rests and had pondered deeply how far these pre-suppositions hold good in this country and consequently with what modifications and limitations it was necessary to apply its deductions here. He had a definite and connected theory of the conditions of economic progress in India and of the functions of Government and society in relation to it." "Mr. Ranade initiated a number of movements and carried them on a certain way as far as any one man could carry them. But they have not yet aroused a sufficiently general enthusiasm to go on of themselves. It is for you to say how far his work will last, and if the seed, which he sowed, shall grow. He,

at any rate, has left to you a noble example of a life dedicated to the glory of God and the relief of man's estate."

When it was decided to raise a separate memorial to Mr. Ranade at Poona, the question was naturally asked why Poona should want to have a separate memorial when it could easily join the movement started at Bombay under the distinguished auspices of the Governor of the Presidency. The question was answered by Sir Charles Ollivant in opening the proceedings of the Poona meeting. "The crowded meeting at Bombay," he said, "where Mr. Ranade held such a distinguished position was but a fitting testimony to the appreciation with which, he, as one of our most eminent public men, was regarded by Government and by all classes of the community. It was a testimony to the fame which Mr. Ranade had earned and to the pride which Western India took in him. But it would be strange indeed, were Maharashtra to fail to pay her own special tribute to the memory of one who of all her sons in this generation attained by his ability and force of character to such high pre-eminence. If Bombay was the scene of the crowning labours of his official career, Poona and the country and the people and the thoughts and aspirations which Poona represents, were, if I judged him aright, interwoven with the individuality of the man. It is given to few men to be as free as he was from deteriorating limitations and yet be absolutely loyal to the best traditions of his race and faith." For twenty-five years, Mr. Ranade had given the best that was in him to Poona and to Maharashtra. He was the source and fountain-head of all that ceaseless activity in different fields which had won for Poona the reputation she enjoyed in the last quarter of the 19th century as a great intellectual centre. And though his work was for the whole country and for all classes of the people, the city that undoubtedly held first place in his heart was Poona. It would, therefore, have been worse than strange, if Poona

and Maharashtra had taken no steps to commemorate in their own way their very special connection with Mr. Ranade. One of the first things done by the Committee, appointed by the Poona meeting to raise funds was to arrive at an understanding with the Bombay Committee as regards the respective spheres of their operations. It was agreed between them that the Poona Committee should confine itself to the Deccan, leaving the city of Bombay and the rest of the Presidency to the Bombay Committee, the Poona Committee being, however, free to work in other Provinces, if it found it practicable to do so. Considering the general poverty of the Deccan, its response to the Committee's appeal for funds must be regarded as extremely generous. The total amount of subscriptions realized by the Committee stands at about a lakh of rupees, of which over eighty thousand have been contributed by the Deccan. Of the remaining twenty thousand, about eleven thousand have been raised in the Central Provinces, about twenty-five hundred have been contributed by Berar, and the rest has come from a few individuals in different parts of the country. In addition to this amount, a sum of about twenty thousand rupees has upto the present been earned as interest on the collections made.

The Poona Memorial meeting was held on 22nd July 1901, and it entrusted the work of collecting funds and taking all other necessary steps to raise a suitable memorial to Mr. Ranade to a large and representative Committee of about seventy members. In the absence of any idea as to what would be the extent of public response to the appeal for funds, no announcement could then be made as to the form which the memorial would take. Before the end of 1903, however, the Committee was in a position to arrive at a tentative decision in the matter, and at a meeting held on 28th November 1903, it resolved that the idea of an Industrial and Economic Institute should be adopted and

that every effort should be made to carry the fund to a lakh of rupees. A prospectus was then issued, announcing the scheme to the public, and the work of collection was pushed on with fresh vigour. Two considerations specially weighed with the Committee in coming to this decision. In the first place, as all classes and creeds had subscribed to the fund, it was felt that the memorial should take a form which would be acceptable to all, and would at the same time seek to supply, as far as it could, one of the urgent needs of the country. And secondly, it was well known that no question was nearer Mr. Ranade's heart, especially during the closing years of his life, than that of providing new and healthy channels in this country, in which young men of education and capacity could find honourable and successful careers for themselves. Sir Charles Ollivant had referred to this in his opening speech at the Poona meeting and had mentioned the fact that the only long interview he ever had with Mr. Ranade was spent in discussing the best possible means of providing such new outlets to India's young men. The Committee, therefore, came to the conclusion that the best plan for it to adopt was to devote the memorial fund to the establishment of an Institute which would undertake to provide facilities to young men for higher industrial and scientific training and also maintain a Bureau of Information on Industrial and Economic subjects. In the prospectus issued by the Committee, explaining the scheme, it was stated that in addition to the interest on its own endowment, an endeavour would be made to secure annual contributions from Municipal and Local Boards, Chiefs of Native States and private individuals, so that the resources at the disposal of the Institute should not be altogether inadequate to the work to be taken in hand by it. As the previous sanction of the Government is necessary before Local Bodies can make a grant for such a purpose outside their own limits, the Committee considered

it advisable to lay the whole project before the Government before approaching any Local Bodies in the matter. And in August 1904 a representation was submitted to the Government, explaining the scheme and respectfully asking (1) for a general expression of the sympathy of the Government with the work of the proposed Institute and (2) for some indication that the Government would be pleased to permit Local Bodies to extend their support to the Institute, if they were desirous of doing so. The reply received from the Government to this representation was a sympathetic one. "The advancement of the industrial development of this country", it stated, "is a subject which His Excellency the Governor-in-Council has always at heart and private efforts to forward the movement have his warmest sympathy". After expressing the opinion that it would have been better if the Committee had first collected a more substantial amount than it then had (the sum actually realized up till then being only Rs. 25,000, though the amount promised was nearly Rs. 80,000) before approaching the Government, and after pointing out that there were at that time very few Local Bodies in the Presidency whose funds could justifiably be withdrawn from objects of strictly local utility, the Government concluded by assuring the Committee that the "applications with this object will, if supported by the local officers, receive their careful consideration." In view of this expression of opinion from the Government, the Committee decided to postpone applying to Local Bodies for assistance till the whole of the fund which it hoped to raise—namely, a lakh of rupees—had actually been realized and the work of the Institute started. The recurrence of plague, however, year after year, the frequent prevalence of famine conditions in several Deccan districts and other difficulties seriously retarded the work of collection, and it was not till 1908 that the lakh of rupees, which the Committee wanted to have in hand, was reached.

On 15th April of that year, the Memorial Committee met for the last time, with Dr. R. G. Bhandarkar in the chair. The meeting unanimously resolved that "the Ranade Memorial Fund, Poona, be devoted to the establishment and maintenance of an Industrial and Economic Institute in Poona, to be called 'the Ranade Industrial and Economic Institute'." The objects of the Institute were declared to be as follows :—

- (a) To promote the spread of industrial, technical and scientific knowledge in the country.
- (b) To collect statistical, historical and other information about other countries, which is likely to be useful to the industrial progress of India.
- (c) To publish from time to time reviews by competent persons of the economic position, needs and prospects of India.
- (d) To send, as funds permit, scholars with good qualifications in science, engineering or technical arts, and possessing the necessary aptitudes, to England, Japan and other countries to learn the manufacture of those articles, for which there is a plentiful supply of raw material in this country, and which might, therefore, be profitably manufactured here.
- (e) To provide facilities to such scholars, on their return to India, to enable them to demonstrate by experiments on a small scale that the manufactures in question can be successfully started.
- (f) To advance in other ways the industrial development of the country.

Rules providing for the proper management of the Institute were adopted, and after electing a Governing Board in accordance with those rules, consisting of ten members and two secretaries—the secretaries being *ex-officio* mem-

bers of the Board—the Memorial Committee declared itself dissolved. The proceedings of this meeting are given in Appendix B to this Report. The following are the present members of the Governing Board :—

1. Sir Gangadharrao Patvardhan, K.C.I.E., Chief of Miraj. (Chairman)
2. The Hon'ble Sardar Coopuswamy Mudliar
3. Sardar Nowroji Pudumji.
4. Shivram Hari Sathe, Esq.
5. J. MacNeill, Esq., I.C.S.
6. Rao Bahadur V. M. Kolhatkar
7. Dr. M. G. Deshmukh, M.D.
8. Rao Bahadur S. V. Patvardhan.
9. Rao Bahadur K. R. Godbole, M.C.E.
10. Dr. Harold H. Mann, D.Sc.

SECRETARIES.

1. The Hon. Mr. G. K. Gokhale, C.I.E.
2. Rao Bahadur A. B. Desai.

The first meeting of the Governing Board was held on 22nd April 1908. It was resolved that the Institute should have a Techno-Chemical Laboratory of its own, and a sum of Rs. 15,000, afterwards raised to Rs. 21,000, was sanctioned for a building for the Institute. Rs. 10,000 were also sanctioned for the first purchase of apparatus for the Techno-Chemical Laboratory. The selection of a suitable site for the Institute, however, proved a matter of great difficulty ; and when finally the present site was selected and secured, certain technical difficulties arose, in the matter of obtaining the requisite permission of Government to build on the site, to cause a further delay in commencing the work. All these difficulties were, however, overcome by the end of 1909, and on 16th January last, the ninth anniversary of Mr. Ranade's death, the foundation-stone of the building was privately laid by Mr. Shivram Hari Sathe, a life-long friend and co-worker of Mr. Ranade.

The Institute will have three departments—a Techno-Chemical Laboratory, a Bureau of Information and a Scholarship Fund.

The Techno-Chemical Laboratory.

The Techno-Chemical Laboratory will be placed under an Honorary Director, assisted by a full-time M. A. in Chemistry, who will devote himself to experimental and research work in connection with various suitable industries. This work of experiment and research will be carried on under the guidance of a Committee which will be composed of the following gentlemen :—

Dr. Harold H. Mann, D. Sc., Principal, College of Agriculture, Poona.

Dr. C. J. J. Fox, D. Sc., Professor of Chemistry, College of Science, Poona.

Prof. G. B. Kolhatkar, M.A., Professor of Chemistry, Fergusson College, Poona.

Prof. K. R. Kanitkar, B. Sc., M. A., Professor of Physics, Fergusson College, Poona.

The Laboratory will admit students, who have already obtained distinction in Science in their University course, for training in experimental and research work in industries for which there is a good scope on this side of India. The students so admitted will, as a rule, be expected to bear the cost of their training in accordance with a scale which will be laid down by the Governing Board. There are a large number of small indigenous industries, declining for want of scientific investigation. There are others, more or less foreign, which are daily increasing in importance in the every day economy of our life, and which it is believed may be successfully started in this country. The Institute thus has a considerable field for choice before it. But on account of the limited resources at the disposal of the Governing Board, it has been decided that, for the

present, the Institute should confine its attention to the following industries only :—

- (1) Cement.
- (2) Oils, Soaps, Candles &c.
- (3) Matches.
- (4) Sugar.
- (5) Extract of Myrobalans.
- (6) Bone-Products.

Even these will be taken in hand one by one.

The Bureau of Information.

The Bureau of Information will consist of a Library, containing literature on industrial and economic subjects, and a small Museum containing specimens of raw materials and their finished products. The literature on industrial and economic subjects will include books, periodicals, Reports and Government publications bearing on various industries, as also those that will give statistical, historical and other information about the growth of industries in different countries and their general economic condition. Special care will be taken to place in this Bureau information about the methods of manufacture employed in different countries for different industries. The information so collected and kept will be made available to the public on payment of a small fee.

The Scholarship Fund.

After due provision has been made for the purposes mentioned above, the Institute proposes, as far as the resources at its disposal permit, to establish a Scholarship Fund. It will be an obvious advantage to a student who has gone through a course of general training in the Techno-Chemical Laboratory to be provided with a scholarship, which will enable him to visit different places in the country for acquiring first-hand knowledge about the actual condition of the particular industry to which he may

desire specially to devote himself. This knowledge will give him a clearer idea of the work to be done by him and of its special needs. Research work done by a student with such first-hand knowledge will be productive of better results than that done by those whose ideas are gathered only from books or in the Laboratory. The advantage will be still greater, if such qualified students, after acquiring whatever first-hand knowledge it is possible to obtain in this country and completing their research work in the Laboratory, are enabled to proceed to foreign countries, where they could undergo higher and more specialized training in their own line. This means the establishment of scholarships, both Indian and foreign,—an undertaking, which, for its successful accomplishment, will require the generous support of all who are interested in the industrial development of the country. The Institute proposes to address a special appeal in this connection to Local Bodies, Rulers of Native States and wealthy individuals and it earnestly hopes that the appeal will not be made in vain.

Before concluding, the Governing Board begs leave to tender its warm and grateful thanks to all those subscribers who by their generous contributions have made the raising of this Memorial possible. It also desires to express its sincere acknowledgments to Rao Bahadur K. R. Godbole, Retired Executive Engineer, who has supervised the construction of the building, and to whom, as a personal friend of Mr. Ranade, it has no doubt been a labour of love. The Board also expresses its appreciation of the manner in which Mr. M. K. Agashe has executed the plans under Mr. Godbole's supervision.



APPENDIX A.

The Ranade Industrial & Economic Institute, Poona.



List of Subscribers.

	Rs.		Rs.
The Chief of Miraj ...	3000	Shet Hindumal Balmukund	
H. H. The Maharaja of		Poona	500
Kohapur	2000	D B. V. P. Madhavrao	
II H. The Maharaja of		Bangalore	500
Bhavnagar	2000	Rao Bahadur Balwantrao	
The Chief of Jamkhandli'	2000	Govind alias Babasaheb	
Indore State	2000	Bhaskute, Berhanpur ..	500
The Chief of Ichalkaranji.	1500	R. B. B. M. Kenyale, ...	400
The late Mr. K. C. Bedar-		Mr Gopalrao alias Bapu-	
kar	1200	sahab Bootee, Nagpur	400
II. H. The Maharaja of		The Chief of Jath	350
Baroda	1000	The late Prof. A V. Katha-	
The Chief of Ramdug ...	1000	vate,	300
The Chief of Akalkot		Mr. Vishnu R Ranade, ..	300
(Through the Admini-		The late Mr. R. D.	
strator)	1000	Nagarkar,	300
The Chief of Vishalgad...	1000	The Hon'ble Mr G. K	
Mr. S. H. Sathe	1000	Gokhale,	300
Mr. M. S. Kulkarni ...	1000	Mr. Vinayak T. Agashe..	300
Rao Bahadur M. B. Varad	601	Mr. S B. Bapat,	300
Mr. Krishnarao V. Mulye,	550	The Chief of Kagal,	
The late Mr. Dorabji		(Junior)	300
Pudumji,	501	Mh K (t. Ayrekar,	300
Shet Walchand Ramchand,	501	Mr G. M. Chitnavis,	
Shet Ravi Manchand ...	501	Nagpur... ..	300
The Chief of Oundh ...	500	Sir B. K. Bose, Nagpur	300
Sardar Kupuswami Mudliar	500	The Hon R B. R N.	
R. B. G. A. Mankur ...	500	Mudholkar,	300
R. B. S. V. Patvardhan...	500	Mr M V Joshi,	300
R. B. V. N. Pathak ...	500	Rai Bahadur Kalidas	
The late Sardar A.K. Raste	500	Chandhuri,	300
A Parsee Admirer, ...	500	Mt. N. G Ranade,	250
R. B. A. B. Desai, ...	500	Dr S G. Ranade,	250
Sardar Narsingrao Desai,	500	Mr Sannappa Naik ...	250
The Empress Mill, Nagpur,	500	Mr. Prabhashankar D.	
Mr. B. V. Dravid	500	Pattani,	250

	Rs.		Rs.
The Chief of Kurundwad (Senior) ...	250	Mr. M T. Gadre, ...	150
The late Mr. G G Gokhale, ...	200	Mr. N. T. Rajmachikar, ...	150
Sardar Abasaheb Purandhare, ...	200	R. B. M. K. Kumbhakar, ...	150
Mr. K B Godbole, ...	200	Mr. K A. Ghasvata, ...	150
Mr. M Visvesvaraya, ...	200	Mr. Vyankatrao M. Mudliar	150
Mr. Ichhamam Bhar, ...	200	Mr Vinayakrao N. Natu, ...	150
Mr. Shridharrao Natu, ...	200	Mr. H. S. Dixit, ...	150
Mr. Vinayakrao M. Natu, ...	200	Mr Naoroji P. Vakil, ...	150
Mr. K P Gadgil, ...	200	Mr. K. N. Pandit, ...	150
Mr Kaluram Bhau Mansa- Ram, ...	200	Mr. D V. Belvi, ...	150
Dr M. G. Deshmukh, ...	200	Mr. Ramchandra V Ginde, ...	150
Sardar G. D Pause, ...	200	Rao Bahadur Bapurao Dada, ...	150
Mr K. S Jatar, ...	200	Mr. Krishnarao Phatak, ...	150
A Brahmin Sympathiser, .	200	Mr. Bezouji Dadabhoj, ...	150
Mr Vishnu R. Kelkar, ...	200	Mr. M. Bhattacharya, ...	150
Mr. P L. Nagpurkar, ...	200	Shet Ratansay Premji, Thana ...	150
The late Mr. Balaji Pandu- rang, ...	200	Mr. A. R. Patkar ...	150
Messrs Babaji Sakharan & Co ...	200	„ R N. Apte ...	150
Mr B B. Deshpande, ...	200	Rao Bahadur Bhargavrao Gadgil, Nagpur, ...	150
Mr. G D. Madgaonkar, ...	200	Mr. V. K. Raslunkar, ...	150
Mr M. P. Khareghat, ...	200	Dr. H V. Bhat, ...	150
The Chief of Bavda, ...	200	Mr. K. B. Moghe ..	150
Mr. R. V Sabnis, ...	200	Shankar Ling Fund ...	135
Dr. H. S. Deva, ...	200	Vashumkar Sangit Mandali, ...	130
Mr K B Deval ...	200	Mr. Babasaheb Akbarnavis, ...	125
The Desai of Hungundi, ...	200	Mr. R. K. Shurgaonkar ...	125
Mr Narasingrao G Desai, .	200	Mr. Dhanjishah Rustumji, ...	111
Mr. Shrinivasrao M Desai, ...	200	Mr. J. McNeill ...	110
Mr. Malappa Nauk Tattu, ...	200	Mr. Pandurang R. Bari, ...	101
Rao Bhadur V. M Kolhat- kar, ...	200	Mr. Naoroji Ardesir, ...	101
Rao Bahadur Rajaram S Dixit, Nagpur ...	200	Shet Khimji Vishram & Co, ...	101
Mr Balvantrao Govind, Mahajani, Nagpur ...	200	„ Darsi Nanji ...	101
Mr. S. K. Apte ...	200	„ Narainji Ebji ...	101
Shrimant Nanasaheb Mangal- vedhekar ...	200	„ Vaghji Bechar & Co. ...	101
Shri Appasaheb Sarlashkar, Kolhapur ...	200	Shet Meghji Vallabhdas ...	101
Mr. K B Wagle ...	200	Mr. Shriram Keshav of A. K. Joshi & Co. ...	101
Rao Bahadur K. K. Thakur ...	200	Shet Bhimji Bhanji ...	101
A Sympathiser, Hoshanga- bad ...	200	Shet Dharsi Bhimji ...	101
Rao Bahadur Shet Vallabhdas ...	200	Sir Charles Olivant, ...	100
Mr. Gopal Anant Gari ...	200	Dr. F. G. Selby, ...	100
		Dr. S. A Chobe, ...	100
		R. B. R. N. Joglekar, ...	100
		Mr. H. N. Apte, ...	100
		R. S. V. A. Patvardhan, ...	100
		Mr. V. N. Vartak ..	100
		Prof G. C. Bhate ...	100
		Mr. G. M. Sathe ...	100

	Rs.		Ru
Mr. M. V Sathe ...	100	Mr S R Kulkar ...	100
Mr. N. V. Bhude ...	100	Mr G R Gokhale ...	100
Mr P. V. Gupte ...	100	Mr. G. K. Sathe ...	100
Mr D. G. Gharpure ...	100	Mr S. M. Nisal ...	100
Mr. L. N. Ransing ...	100	Mr K V. Patvardhan ...	100
The late Mr. V. S. Gandhi	100	Mr G. K. Chitale ...	100
R B K G. Kolkar ...	100	Mr M. K. Chitnis ..	100
Mr M. N. Thosar ...	100	R B R. R. Paudit ...	100
Mr. B. N. Bhajekar ...	100	Mr R Mitra ...	100
Mr Sojabji D. Dubash ...	100	Mr Vinayakrao M. Kulkar.	100
Mr W. R. Patvardhan ...	100	Mr Keshav Ramchandra	100
Mr. R. G. Mhaske...	100	Mr G G. Phatak ...	100
Mr A. L. Deshpande ...	100	Mr P P. Basal ...	100
The late Mr S. L. Kamat...	100	Mr T S Ayengar ...	100
Mr. K. B. Naik ...	100	R B Kashinath Narayan	
Mr Anandji Nanji ...	100	Bhangaonkar ...	100
Sir Subramant Iyer ...	100	R B Ramchandra Timbak	
" Hopeful " ...	100	alias Bhainsaheb Acharya	100
Mr M. C. Joshi ...	100	Mr. Sakhran Keshav Bbag-	
Mr V. N. Mutalik ...	100	wat, ...	100
Mr N G Deshpande ...	100	The Hon Mr V R Natu...	100
Mr. R. P. Karandikar ...	100	Shrmanant Sardar R. K.	
The late Mr. B. S. Sahasra-		Vinchurkar ...	100
Budhe ...	100	R B. Bapu Purushottam	
Mr. R. R. Kale ...	100	Joshi ...	100
Mr G B Deval ...	100	Mr K. Shrinivasa Rao	
Mr G R Abhyankar ...	100	Kurnool ...	100
Mr V K. Maikar ...	100	Mr D S Kale, Kolhapur	100
Mr. K. B. Gokhale ...	100	In memory of the late Justice	
Mr. G. K. Sovani ...	100	K. T. Telang ...	100
Mr K. K. Desai ...	100	Hon Mr Shivaswamy Iyer	100
Mr S. S. Kamlapukur ...	100	Shriment Dadasaheb Mangal-	
Mr S A Chhatre...	100	vedhekar ...	100
Mr C. P. Boyce ...	100	Hon Justice Shankaran Nair	100
Mr Gundopant Tilve ...	100	Mr Y Shrinivasa Rao ...	100
Mr Lalsing Contractor ...	100	A Friend ...	100
Mr. Burjorji Patel ...	100	Mr G G. Ghatate ...	100
Mr. Nilkanth Gouda Patil.	100	Mr. Narayanrao Subaji	100
Mr. Ramchandra K. Kul-		„ Raop Govind ...	100
karn ...	100	Mr Ganpatrao Shrinhande	100
Mr. Govind Naik Chukkeur		„ M. D. Ratnaparkhi...	100
Halgiri ...	100	„ N. D. Vadegaonkar	100
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" G. R. Shrikhande	10	The Late Sitaram Hallal	
The late Mr. Govindrao K.		shas Bajirao Jogtekar	10
Gokhale	10	Mr. A. Vinayak Shaligram	10
" D. D. Sontakke	10	" Bhagwant Appaji Padhey	10
" Ramrao Latkar	10	" Keshav Appaji Padhye	10
" G. P. Fadke	10	" Vinayak Hari Dongre	10
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" S. C. Dube ...	10	Elphinstone College ...	127
" Manoharlal ...	10	Medical College ...	444-8
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" Swamirao Venkat sh	10	Bombay ...	19-4
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" Pardeva Shivapuji ...	10	Ratnagiri ...	10
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wad ...	10	Mrs. Ramabai Ranade.	5000
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Total Rs. 1,00,187-14

APPENDIX B.

Proceedings of the meeting of the Ranade Memorial Fund Committee, Poona, held on 15th April, 1908.



A meeting of the Ranade Memorial Fund Committee, Poona, was held on Wednesday the 15th of April 1908 at 5-30 p. m. in the Servants of India Society's Hall, when the following gentlemen were present :—

1. The Hon. Dr. R. G. Bhandarkar (in the Chair).
2. Sardar Coopuswamy Mudliar.
3. The Hon. Sardar Naoroji Pudumji.
4. Rao Bahadur V. M. Kolhatkar.
5. Rao Bahadur S. V. Patwardhan.
6. Rao Bahadur M. K. Kumathekar.
7. Rao Bahadur B. B. Omkar.
8. Rao Saheb Ramnarayan Amarchand.
9. Rao Saheb V. A. Patwardhan.
10. Rao Saheb B. V. Mudliar.
11. N. C. Kelkar, Esc.
12. A. V. Patkar, Esc.
13. Keshav Ramchandra Ranade, Esq.
14. Hari Narayan Apte, Esq.
15. Shet Hanmant Ram Ramnath.
16. L. R. Gokhale, Esq.
17. Prof. K. R. Kanitkar.
18. The Hon. Mr. G. K. Gokhale.

The Hon. Mr. Gokhale, having briefly reviewed the history of the memorial movement and the work of collection, laid the accounts of the Committee before the meeting. These accounts showed that the total receipts by the Committee up to the day of the meeting had been Rs. 1,03,483-9-4, of which the amount of subscriptions was Rs. 97,910-14-0 and the interest realized, Rs. 5,572-11-4. The charges of collection on the other hand had till then been Rs. 3,704-13-5, leaving a balance of Rs. 99,778-11-11 deposited in various Banks.

On the motion of Rao Bahadur S. V. Patwardhan, seconded by Rao Saheb Ramnarayan Amarchand, the following eleven resolutions were then unanimously adopted :—

1. The Ranade Memorial Fund, Poona, be devoted to the establishment and maintenance of an Industrial and Economic Institute in Poona, to be called 'The Ranade Industrial and Economic Institute.'

2. The objects of the Institute shall be :—

- (a) To promote the spread of industrial, technical and scientific knowledge in the country.
- (b) To collect statistical, historical and other information about other countries, which is likely to be useful to the industrial progress of India.
- (c) To publish from time to time reviews by competent persons of the economic position, needs and prospects of India.
- (d) To send, as funds permit, scholars with good qualifications in Science, Engineering or Technical Arts and possessing the necessary aptitudes, to England, Japan and other countries to learn the manufacture of those articles, for which there is a plentiful supply of raw material in this country and which might, therefore, be profitably manufactured here.
- (e) To provide facilities to such scholars, on their return to India, to enable them to demonstrate by experiments on a small scale that the manufactures in question can be successfully started.
- (f) To advance in other ways the industrial development of the country.

3. The affairs of the Institute shall be managed by a Governing Board of ten members and two secretaries, who shall be ex-officio members, to be appointed in the first instance by the Ranade Memorial Fund Committee, Poona.

4. Any public body, or any institution or individual, contributing annually a sum of at least one thousand rupees to the Institute, shall have the right to send one member to the Governing Board during the time the subscription is paid.

5. Any vacancy among the members of the Governing Board, arising from resignation or death, shall be filled by the remaining members of the Board.

6. Any vacancy among the Secretaries, arising from resignation or death, shall be filled by the Governing Board.

7. The Governing Board shall have complete control over the funds—both permanent and current—of the Institute and it shall apply them to the furtherance of the objects of the Institute in such manner as it deems proper.

8. The permanent fund of the Institute shall be held by three Trustees. The first Trustees shall be Sir Gangadharao Patvardhan, K.C.I.E., Chief of Miraj, Mr. J. MacNeill, I.C.S., and the Hon. Mr. G. K. Gokhale, C. I. E. Any vacancy, arising from resignation or death among the Trustees, shall be filled by the Governing Board.

9. The Governing Board may appoint an Assistant Secretary to assist the Secretaries in their work.

10. The Governing Board may frame such bye-laws as it deems proper for the management of the affairs of the Institute, for the conduct of its own business and for generally carrying out the objects of the Institute.

11. The Governing Board shall have the power to add to, amend, alter or rescind any of the foregoing rules, provided such addition, amendment, alteration or rescinding

is not inconsistent with the objects of the Institute and is adopted at a meeting of the Board by a majority of at least two-thirds of the members of the Board.

Rao Bahadur B. B. Omkar proposed and Mr. N. C. Kelkar seconded that the following gentlemen be appointed to be the first members and secretaries of the Governing Board :—

1. Sir Gangadharrao Patvardhan, K. C. I. E.,
Chief of Miraj (*Chairman*).
2. Sardar Coopuswamy Mudliar.
3. The Hon. Sardar Naoroji Pudumji.
4. Shivram Hari Sathe, Esq.
5. J. Mac Neill, Esq. I. C. S.
6. Rao Bahadur V. M. Kolhatkar.
7. Dr. M. G. Deshmukh, M. D.
8. Rao Bahadur S. V. Patvardhan.
9. Rao Bahadur K. R. Godbole, M. C. E.
10. Prof. K. R. Kanitkar, M. A. B. Sc.

Secretaries.

1. The Hon. Mr. G. K. Gokhale, C. I. E.
2. Rao Bahadur A. B. Desai.

Rao Bahadur S. V. Patvardhan proposed and Rao Saheb Ramnarayan Amarchand seconded a vote of thanks to the Ranade Memorial Fund Committee, Poona, and especially to The Hon. Mr. Gokhale, Rao Bahadur A. B. Desai, and Rao Bahadur V. M. Kolhatkar for their splendid work of collection.

The Memorial Committee was then declared to be dissolved.

A vote of thanks to the Chairman concluded the proceedings.

APPENDIX C.

The Late Mr. Justice Ranade.

Dr. SELBY'S TRIBUTE.

The following is the text of the speech of Dr. F. G. Selby, then Principal of the Deccan College, at the Ranade Memorial meeting, held on July 22nd, 1901 in Poona :—

“I cannot of course pretend to have known Mr. Ranade nearly so intimately as many of you. Still I knew him for a great many years, as one does know a man with whom one is thrown constantly in contact by common work, and with whom one has the bond of common interest. It seems to me that we get the truest idea of the man, if we think of him as approximating the Platonic ideal of the philosopher, namely, not merely a man with great intellectual grasp or deeply versed in matters beyond the comprehension of the vulgar, but one who combines in himself the faculties of the sage, the saint, and the patriot. Mr. Ranade's knowledge was undoubtedly very great. But what must have struck most people about him was not so much what he knew, as how ready his knowledge always was—how he had it always immediately at command when it was required. Another noticeable feature about him was that he always strove to get beneath the surface of the individual fact to the principle involved—and not only that but also to see the precise bearings and limitations of the principle itself. A lawyer might perhaps be able to illustrate this from the judgments which he delivered in the High Court. To us it is more obvious in his economic studies. He had made a profound study of our

English system of Political Economy. He had realized the logic of it, that is, he had seen the presuppositions on which it rests, and he had pondered deeply how far these presuppositions hold good in this country, and consequently with what modifications and limitations it is necessary to apply its deductions here. He had a definite and connected theory of the conditions of economic progress in India, and of the functions of Government and society in relation to it. I think we must say too that Mr. Ranade always regarded his knowledge—as he was a profoundly religious man, the metaphor is applicable—as a talent for the use of which he was responsible. The knowledge which he was always accumulating from books, from men, and in his varied spheres of public service, he was always anxious to turn to account for the benefit of his countrymen. His character corresponded to his intellectual attitudes and habits. He lived habitually in a world of ideas too large and in interest too lofty to leave much room in his life for the play of meaner impulses and feelings that sway smaller men. He was singularly free from personal ambition. Whenever anything was accomplished, although it was well known that it was he who accomplished it, his one anxiety seemed to be to keep himself in the background and let some one else have the credit. We may say of him, I think, what Bacon said of himself, that in the building of the temple of knowledge he was willing to play the part of hodman, to carry the bricks and mortar on his back, if only the temple were built: Plato says that nothing is a surer mark of an unphilosophic mind than the habit of making persons and not things the matter of conversation. It must have struck every one how free Mr. Ranade was in his talk from all the trivialities of personal gossip which make up, I am afraid, too much of the conversation of most of us. He was remarkably free, generous, and charitable in his judgments of others, particularly of

those who opposed him, even though at times they opposed him in ways that seemed to some of us not quite fair. He was essentially a man of what Burke would call large and liberal ideas. He had a profound belief in the reality of a Providence in nature and history—a moral government of the universe—and this, I think, is the secret of his unwearying perseverance and his unconquerable optimism. When those about him despaired—and the young especially are impatient and quick to despair—we can imagine him encouraging them in the spirit of Rabbi bin Ezra :—

Grow old along with me,
 The best is yet to be—
 The last of life for which the first was made;
 Our times are in His hand.
 Who says, 'A whole I planned,'
 Youth shows but half: see all, trust God, nor be
 afraid.

Surely, too, Mr. Ranade was a patriot if ever there was one. You all know how well he loved his country and his people. He was proud of everything good they had done in the past. He looked forward with confidence to greater achievements for them in the future. Perhaps, of all the things he undertook, nothing was nearer his heart than the writing of the history of his people. And connected with his patriotism was his deep and intelligent loyalty to the British rule. It was, as it seemed to him, under the aegis of British sovereignty that you were ordained by Providence to grow to the fullness of intellectual, moral, and spiritual manhood. This, I imagine, was what he meant by the word 'tutelage' which was his favourite word to express the relationship between India and England. He saw how you might be braced by contact and competition with a race robuster than yourselves, and he saw how the West had

developed ideas and realized ideals which you have not, or which, if you ever had them, you have allowed to fade into the background. He had made a profound study of the culture of the West, and had assimilated whatever in it he found good for him and that not by any mere external adaptations, but by an absorption of it into the very tissue of his mind and character. He knew what man's capabilities were, so far as they can be learnt by a careful study of man's achievements, and he had a definite notion of what the State must be and do, if man is to be all that he may be, and so, if I may borrow one more image from Plato, he took the constitution of the society, and with his eye fixed upon the ideal, he would insert a feature here and a feature there, until he had made the ways of men, so far as possible, agreeable to the ways of God. And here it would be most ungracious if I did not take account of the very generous recognition which he always made—of the appreciation which he went out of his way to express—for any qualities my countrymen might possess, and for anything great and good which they have achieved in the world's history. Much has been said of Mr. Ranade's many-sided activities. This, I think, was but the outward expression of his comprehensiveness of view. He knew that if society is to move at all, it must move altogether—all along the line. In politics he was what we call a Liberal. Now Liberalism is, I take it, the recognition of the rights of capacity wherever capacity exists. Hence Mr. Ranade strove earnestly to promote the education of women. He saw that women had the capacity to serve the State in ways quite as important as men, though different. He saw how illogical it was that men should be fighting for their own political rights while denying to women the rights which their special capacities give them. And he saw how foolish a thing it was that society should lose the services of half its members because it would not educate

them to render them. He was consistently opposed to any thing like individualism, any merely mechanical view of society. He saw that society should have the unity of an organism, supporting its members and supported by them. Hence he set his face against the unnecessary but constantly multiplying divisions of caste which rend the oneness of your community. Lastly, he was a reformer in religion. He knew well that if thought is advancing in other departments it cannot stand still in one. People talk some times as if the controversy between what are popularly described as the orthodox and reform parties were peculiar to this country. As a matter of fact the controversy is going on all the world over. The question is whether your church shall stand by the creed, the formulas, and even the ritual of the middle ages, let the tide of advancing thought sweep by it, and leave it stranded high and dry upon the beach, or if it shall not rather provide for the eternal hopes and faiths, on which men have built, some new expression, which shall be consonant with our present knowledge and our present ways of thought. Mr. Ranade declared for the latter alternative. One question forces itself upon the mind inevitably to-day. What is to be the fruit of Mr. Ranade's life-work? How much of what he did will last? The answer to that is to be found in another question. What are you, his countrymen, prepared to do in the way of carrying on what he began? He initiated a number of movements and carried them on a certain way as far as any one man could carry them. But they have not yet aroused a sufficiently general enthusiasm to go on of themselves. It is for you, therefore, to say how far his work shall last and if the seed which he sowed shall grow. He, at any rate has left to you a noble example of a life dedicated to the glory of God and the relief of man's estate.

The Banade Industrial and Economic Institute.

PROCEEDINGS OF THE OPENING CEREMONY

The opening ceremony of the Banade Industrial and Economic Institute was performed by His Excellency Sir George Clarke, G. C. M. G., G. C. I. K., Governor of Bombay, on Thursday, the 15th September, 1910, at 5 P. M. in the presence of a large and distinguished gathering. The Institute is situated on the Lakdipool Road between the Fergusson College and the Lakdipool, in a grove of mango trees, and somewhat removed from the city. This makes the site a pleasant and healthy one and the building, possessed as it is of considerable architectural merit, lends itself remarkably well to the surrounding view. The building consists of a central hall for the Techno-Chemical Laboratory and several rooms of various sizes, which are meant to accommodate the Bureau of Information, the Director's laboratory, the Museum and other subordinate departments. A large pandal had been erected in front of the building for the occasion and tastefully decorated. The presence of most of the prominent citizens of Poona, of many high officials, European and Indian, of over 200 ladies, European, Parsi and Hindu, the last alone numbering about 150, and of a

large number of College students, gave the gathering a unique character Among those present were :—

Sir Gangadharrao Patvardhan, K. C. I. E., Chief of Miraj, the Hon. Mr. Lamb, the Hon. Mr. Chaubal, the Hon. Mr. Morrison, Dr. R. G. Bhandarkar, the Hon. Mr. Gokhale, the Hon. Mr. and Mrs. Carmichael, the Hon. Mr. Curtis, the Hon. Shrimant Babasaheb, Chief of Ichalkaranji, Shrimant Balasaheb Pant Pratinidhi, Chief of Aundh, Shrimant Babasaheb Pant Sachiv of Bhor, the Hon. Mr. Sharp, General and Mrs. Stevenson, Mr. Du Boulay, the Hon. Mr. Cameron, Capt. Eric Drummond, Mr. and Mrs. Drew, General and Mrs. Sloggett, Mrs. Alderson, Mr. Narottam Morarjee Gokuldas, Sirdar Naorojee Pudumjee, the Hon. Thakore Sahab of Amod, the Hon. Sirdar Cupuswamy Mudliar, Mr. L. Robertson, Mr. J. McNeill, Mr. L. C. Swift, Mr. and Mrs. G. F. Keatinge, the Hon. Sirdar Y. T. Mirikar, Mr. and Mrs. G. D. Madgaonkar, Mr. P. J. Mead, Mr. and Mrs. Fitz-Gibbon, Mr. Laird Mac-Gregor, Mr. L. Crump, Major and Mrs. Kirkwood, Lieut-Col. and Mrs. Dyson, Mr. and Mrs. R. P. Paranjpye, the Hon. Mr. Rafiuddin Ahmed, Major and Mrs. Scudamore, Dr. H. H. Mann, Nawab Jaffer Ali, K. B. M. H. Dastur, Col. and Mrs. Sanjana, Mr. Tribhuvandas Mangaldas, Dastoor Byramjee Jamaspjee, Sir Cabanis De'Mello, Col. and Mrs. Perkins, Mr. and Mrs. Harker, Mr. and Mrs. Ingle, Mr. and Mrs. Calvert, Rev. A. and Mrs. Robertson, Mr. and Mrs. Roper, Mr. and Mrs. Barlee, Sirdar Raste, Sirdar Abasaheb Purandare, Sirdar N. T. Rajmachikar, Sirdar Natu, Sirdar G. D. Panse, R. B. V. N. Pathak of Satara, Mr. Shivram H. Sathe, R. B. V. M. Kolhatkar, R. B. S. V. Patvardhan, R. B. K. R. Godbole, B. B. A. B. Desai, Sirdar K. A. Dastur, R. B. R. N.

Joglekar, Dewan Bahadur V. M. Samarth, Mr. K. B. Marathe, R. B. M. K. Kumthekar, Mr. G. M. Sathe, R. B. K. G. Kelkar, R. B. Dandekar, R. B. Patwardhan, Kazi Kabiruddin, Mr. Jusuff H. Jaffer, R. B. Ram Narayan Amarchand, Mr. K. B. Deval, R. S. G. J. Agashe, Mr. and Mrs. H. D. Pudumjee, Prof. V. K. Rajvade, Prof. G. C. Bhate, Prof. C. G. Bhanu, Prof. N. S. Panse, Prof. H. G. Limaye, Prof. D. K. Karve, Prof. K. R. Kavitkar, Prof. G. B. Kolhatkar, Prof. V. B. Patwardhan, Prof. V. G. Kale, Prof. D. L. Dikshit and others of the Fergusson College, Prof. and Mrs. Knight, Prof. W. Burns, Prof. G. D. Mehta, Prof. V. S. Ghate, Prof. D. D. Kapadia, Prof. R. S. Creebrown, K. B. Major and Mrs. Khambatta, Mr. N. C. Kelkar, Mr. B. S. Kamat, Miss Bhore, Miss Sorabji, Mrs. Venubai Namjoshi, Miss Burn, Dr. and Mrs. Shikhare, Dr. and Mrs. Gokhale, Dr. and Mrs. Bharucha, Dr. and Mrs. Wadia, Dr. and Mrs. Satpute and many others.

His Excellency, on arrival, was received at the entrance by Sir Gangadharrao Patwardhan, Chief of Miraj, the Chairman and members of the Governing Board of the Institute, and conducted to the dais. In welcoming His Excellency, Sir Gangadharrao, as Chairman, made the following speech :—

YOUR EXCELLENCY, LADIES AND GENTLEMEN,

I deem it a great privilege that it falls to my lot, as Chairman of the Governing Board of the Ranade Industrial and Economic Institute, to welcome Your Excellency on this occasion. The auspicious function which Your Excellency will perform to-day completes the first stage of the work started eight years ago to perpetuate the memory of the late Mr. Justice Ranade. During the last thirty years of the nineteenth century, Mr. Ranade inspired and organised every healthy and useful activity on this side of India and the debt

of gratitude which his countrymen owe to him is immense. We are trying to discharge in a small measure this debt by raising the present memorial. And in honouring Mr. Ranade's memory, we feel we are only honouring ourselves. The statement of the Governing Board which will be read to-day will give you a brief account of the memorial movement started in 1901 and some idea of the work which this Institute proposes to undertake. I need not, therefore, go over that ground in my few remarks; but one observation, I think, I may be permitted to make. This Institute is intended to provide facilities for work and studies calculated to promote the industrial development of the country, and it is peculiarly in the fitness of things that Your Excellency, whose high scientific attainments and deep interest in the extension of scientific studies are so well-known, should perform to-day's opening ceremony. The Governing Board is deeply grateful to Your Excellency for your great kindness in honouring our invitation and for coming here in the midst of numerous and heavy calls on your time, to open the Institute. With these few words I call upon the Hon'ble Mr. Gokhale to read the Statement of the Governing Board.

The Hon'ble Mr. Gokhale, one of the Secretaries, then read the Statement which is printed on pages 1-12 of this booklet. Before resuming his seat, he announced that Mr. S. K. Pimpalkhare, a well-known local artist had presented to the Institute a full-size oil-painting of Mr. Ranade, which His Excellency had graciously consented to unveil that day, and on behalf of the Governing Board of the Institute he tendered their best thanks to Mr. Pimpalkhare for his gift. The portrait is an excellent likeness and it will be hung in the hall of the Institute. His Excellency then addressed the assembly and declared the Institute open.

H. E. THE GOVERNOR'S SPEECH.

His Excellency said :—

“ Ladies and gentlemen,

This is not the first time that I have been called upon to play a part in inaugurating a memorial to a great public man, of whom our Presidency and India as a whole have a right to be proud. It is not only fitting but a duty owed to the memory of Mr. Justice Ranade that his distinguished name should be honoured and kept alive in the country that he served so strenuously and so well, and nothing could be more appropriate for the purpose than an Institute which will carry on the work on which he had set his heart. Again, as on other occasions like this, I find myself in a position of great disadvantage, because I had not the honour of knowing Mr. Ranade and of forming that impression of his rare qualities which can only be derived from personal contact. The fine tribute paid to his personality and to his life-work by Dr. Selby, of which extracts have been read to us, leaves me little to say. That tribute was not only eloquent, but it bears on its face the stamp of conviction, of enthusiastic appreciation, and of the spirit of true friendship. East and West cannot be so very far apart, when the mind of an eminent Indian can be so well interpreted, as it evidently was by our late distinguished Principal of the Deccan College and Director of Public Instruction. Between these two, so differently circumstanced, and with hereditary and acquired characteristics so varied, there was no intellectual barrier. Probing the depths of Mr. Ranade's mind and inspirations, Dr. Selby said of him: “ He had profound belief in the reality of a Providence in nature and history—a moral Government of the Universe—and this, I think, was the secret of his unwearying perseverance and his unconquerable optimism.” This perhaps is the greatest lesson that Mr. Ranade has bequeathed to us all. If we can grasp that lesson, we shall find a solace in all discouragement and we shall be enabled to work together with hope and confidence for the progress of India.

For myself, after trying to gather an impression of Mr. Ranade's many written legacies to his countrymen, I am forcibly struck by his great versatility and the breadth of his studies. His range of activity was as wide as his sympathies, which embraced all subjects that bore upon the advancement—moral, intellectual and material—of his fellow-countrymen. Great as was his enthusiasm in the many causes he espoused, I find in his writings the signs of an admirable restraint, which is too often absent from enthusiasms and which may render them futile and even dangerous. Mr. Ranade never permitted himself to adopt hasty generalizations, which are usually false. He had a great capacity for taking trouble, which we can all seek to acquire with advantage to ourselves and to others, and there was in him what has been called "sweet reasonableness," which lent force to the conclusions at which he arrived.

I trace these and other qualities in a valuable address on the 'present state of Indian manufactures and their outlook,' which he delivered at the Industrial Conference held in Poona in 1893. Mr. Ranade uttered no despairing wail over the decadence of some ancient industries in India, but he set himself to examine the causes and to ascertain the trend of existing conditions. I do not think he realized adequately that precisely the same process of decadence had been the experience of Western countries, the fact being that steam power in the 19th century effected an industrial revolution from which Great Britain, as the first country to develop the new methods of manufacture, reaped the initial advantages, while it was impossible to India to follow in the same direction for many years. But Mr. Ranade clearly saw that in the 20 years, preceding the time at which he wrote, an important movement was in progress throughout India and he was able to show the extent of the new development, which he rightly attributed to the efforts of the Indian people assisted to a large extent by the influx of British capital and enterprise. The moral he drew was this:—"We have to organize labour and capital by co-operation, and to import

freely foreign skill and machinery till we learn our lessons properly and need no help" No advice could be wiser than this, and I only wish that, Mr Ranade's investigations could be followed up by others who would certainly discover that his hopes have been justified, and that the tendency he noted has been steadily strengthening. I must not weary you with statistics on this occasion, and I will only say a few words on one most important item. Mr. Ranade drew attention to the growth of the output of Indian coal and to "the success which has attended the flow of English capital" in this direction. The output in 1892 was two million tons, of which the Railway companies took one-half. But the output of coal has increased by 177 per cent. in the last 10 years. In 1908 it exceeded 12½ million tons and India is the largest producer of coal of all external British territories. The exports of coal are not increasing and the whole of this great increase of production is being utilized in India. About 94 per cent. of the total railway consumption of coal is now produced in India. Even Mr. Ranade's well-founded hopes did not go as far as the facts which confront us to-day.

Valuable as were Mr. Ranade's contributions to Indian Political Economy, I gather from his remarkable addresses at the Social Conference that he regarded social reforms and social progress as the principal watchwords of his earnest life. The advance of India in this direction cannot be measured in figures; but that there has been advance, as Mr. Ranade claimed, is beyond all question. The strength of any great movement is apt to be measured by the amount of opposition which it encounters, and when that opposition diminishes we are apt to believe that the movement is languishing. The very opposite is generally the truth, and though progress in India can never be rapid, I think that already we are in danger of forgetting the difficulties which Mr. Ranade had to face and the great part he played in quickening the tendencies we now see. I may recall to you some striking words from the address to the Social Conference at Allahabad in 1892. "Particular reforms," he said, "may be out of our

reach or may not be for our advantage ; but the earnest desire for reforms, and sincere efforts of self-sacrifice directed towards their attainment-cannot but elevate us above our weaknesses and strengthen our strong points, and plant the banner of union in hearts torn with centuries of strife and dissension." I find in these words the ring of eternal truth and the fervent faith of the speaker. Mr. Ranade was a powerful advocate of women's education, and the establishment of the High School for girls in Poona was mainly due to his efforts. But now we are becoming accustomed to demands for more girls' schools to meet the growing desire for women's education, and in this and other directions we can trace the results of Mr. Ranade's labours.

We have met to-day to inaugurate a permanent memorial to a great citizen of India in the historic city, which, as we have been told, "undoubtedly held the first place in his heart." I am sure we all feel that the memorial could not have taken a more appropriate form than this Industrial and Economic Institute. That a sum of more than Rs. 80,000 has been contributed from the arid Deccan is a touching proof of the high regard which Mr. Ranade won from its people. His studies in Indian Economics led him to the inevitable conclusion that new outlets for the energies of Indians were urgently needed. The development of Indian industries, which was his ardent desire, required special training that was most inadequately provided. I may say that I was deeply impressed with this same need before I became acquainted with the life-work of Mr. Ranade and in my first address at the convocation of the University I borrowed unconsciously from his store of learning. We have progressed since he was called away, but much more remains to be done, and I hope that the Science Institutes of Bombay and Ahmedabad, which the generous munificence of four distinguished citizens have rendered possible, will mark another great step in the direction, in which Mr. Ranade wished his countrymen to move. Meanwhile Poona is to have this Institute as the best tribute which it could pay to his revered memory, and from the general outline of its objects

and aims which has been given to us, we may draw bright hopes for its future. Poona is the centre of much intellectual activity, which is liable to expend itself in ways that cannot be said to promote the practical progress of India. It will now have a centre devoted to "the spread of industrial, technical and scientific knowledge in the country." And further, this Institute is to serve as a bureau for the collection of "statistical, historical and other information about other countries" and for the dissemination of reviews of the "economic position, needs and prospects of India." It will thus carry on an important branch of the life-work of Mr. Ranade, and I shall hope to see some day a continuation of his masterly address to which I have referred, bringing up-to-date his survey of the industrial progress of this great country with the same painstaking accuracy that marked all he undertook. There is nothing that India needs so much as accurate knowledge on the part of those who instruct the people. Such knowledge does not come by inspiration. It demands careful and serious study, of which the life of Mr. Ranade affords a shining example, and the attractions of smart writing should never be allowed to blind us to the logic of fact, or induce us to believe that progress can be achieved at the expense of truth.

This Institute, although it has wisely been decided to start on a modest basis, will require support. The establishment of scholarships to be awarded with the most careful judgment will be an important feature in its programme. It is, therefore, a great pleasure to me to inform you that the Chief of Miraj Senior has generously promised to devote the interest on Rs. 30,000 to the creation under the auspices of this Institute of scholarships in India from a fund set apart as a memorial to his mother. I hope that the example of the Chief of Miraj may find followers. Another source of possible income to which the Institute looks is to be found in contributions from Local Bodies anxious to assist in industrial and economic progress. As we have been told, the Committee approached Government six years ago on this subject and received

a sympathetic but cautious answer. The present Government is, as you all know, anxious to give Local Bodies as free a hand as possible in administering their finances. If, therefore, this Institute succeeds, as we confidently expect, you may be assured that any applications from Local Bodies to allocate funds in aid of the special form of education which it will provide will be favourably considered.

And now I have only to say how glad I am to be able to add my tribute to the memory of Mr. Ranade and to be associated with the Institute created in his honour. I can well believe that nothing would have given him greater pleasure than to know that his work was to be permanently carried on in the city of Poona. In declaring the Ranade Industrial and Economic Institute to be open, I wish it the fullest measure of practical success. I am certain that it will be carried on in the spirit which animated the great teacher whose name it will bear, and that it will not only serve to remind future generations of what a true patriot can be and can accomplish, but will help to promote the progress of India which we all have at heart.

On his way to open the Institute, His Excellency stopped at the steps and unveiled the oil-painting of Mr. Ranade, executed and presented by Prof. Pimpalkhare. In doing so, His Excellency said he hoped that the students of that Institute would always endeavour to follow in the footsteps of that great and good man whose portrait he had great pleasure in unveiling. After turning the key and inspecting the building, His Excellency returned to the dais. Dr. R. G. Bhandarkar then proposed a vote of thanks to His Excellency in the following terms:—

“ Ladies and gentlemen,

It is now my pleasant duty to move a vote of thanks to His Excellency for having graced this occasion by his presence and presided over these functions. His Excellency's conception of his mission in this country seems to be not only to govern us and rule over us but to act as our friend, our

mentor and our guide. You must have read the words of wisdom that he addressed to the students of the Fergusson College the other day, and it appears to me, he is present here to-day to discharge the same function. Mr. Ranade and his co-adjutors were convinced that India could progress and attain her proper position among the races and nations of the world only under the guidance and protection of the British. In fact, it was almost the universal idea prevalent amongst the early generations of educated Indians, especially in consideration of the fact that the country contained so many races and castes and was in an extremely backward condition. Among the co-adjutors was the late Mr. K. L. Nulkar, who was the Chairman of the Committee of the Sarvajanic Sabha for a long time and latterly a member of the Supreme Legislative Council and as such he fought bravely in favour of the Age of Consent Bill against a host of determined opponents.

Mr. Ranade was complimented by Lord Reay when he attended a meeting to receive an address on the occasion of his departure from India by being called a sagacious statesman. Mr. Ranade devoted his life to the advancement of his country along all the lines of human activity, literary, social, economical, religious and political. His mind was full of ideas and plans for the amelioration of the condition of India and to carry out these he worked so vigorously and energetically, that I had the honour of dubbing him 'the steam-engine'; and this epithet was current amongst some of our friends. He loved Poona above all places and I remember on one occasion at a meeting of the University Syndicate, when I said that Poona had now become a suburb of Bombay, Mr. Ranade from the opposite side spoke out, "No; say rather that Bombay had become the suburb of Poona." He wished to make Poona the centre of all kinds of activity. The starting of a paper-mill here and of the cotton-and-silk-mill was his idea and he tried hard to carry it out. He was one of the most active promoters of the High School for native girls here and helped also in bringing about Industrial Exhibitions in Poona. I take it that His Excellency the

“Governor has set the seal of his approval on this work of Mr Ranade by his presence here to-day and therefore he deserves our warmest thanks ”

Mr. H. A. Wadia in seconding the vote said :—

“ Ladies and gentlemen,

I have great pleasure in seconding the Resolution which the learned and venerable Doctor has just proposed with such singular fitness. It is, of course, a privilege to follow Dr. Bhandarkar and I have ventured to accept the privilege, only because I happen to be one of the very few now present, who knew Mahadeo Govind Ranade from the day when he commenced his famed career as our greatest graduate to the day when he lived and died the greatest Hindu of his time. More than forty years ago, the late Sir Alexander Grant held him up to us as a great and shining exemplar. Such he remained throughout life. Such indeed he has remained even in death. Sitting here this afternoon, I could not but think what it would have been for us and for Ranade himself, had he lived in the period of Sir George Clarke's Governorship. I am sure he would have lived in greater usefulness and died in higher hope. I am equally sure that this Presidency, if not India at large, would have escaped much of what is so dark in our latest history's page and that he would have taught us and prepared us to reap in fuller measure the harvest of the good seeds which have been sown so recently.

We are sincerely thankful to his Excellency for joining us in our tribute this evening and for associating in this memorial to one, who both in his private and his public life was so worthy of our lasting esteem and grateful remembrance. I do not find it an easy task, ladies and gentlemen, to speak in His Excellency's praise in His Excellency's presence. But I find some consolation in believing that perhaps the first to pardon me for this deficiency will be Sir George Clarke himself. And I trust, you too, ladies and gentlemen, will not take me seriously to task for it, for, after all what

could I say in His Excellency's praise that you do not know already too well? For all that he has done and achieved and striven for, our gratitude is graven in our hearts. And I will only venture to add that our hopes for what he will do hereafter are associated with our earnest wish and prayer that in the period which remains of his Governorship there may be in store for His Excellency, not less than for our people, a better and a happier time."

His Excellency briefly acknowledged the vote. He said:—

"I must thank Dr. Bhandarkar and Mr. Wadya for their kind words, and you, ladies and gentlemen, for your cordial reception. I am afraid you heard too much of my voice to-day. I will not detain you any longer. But when you go away, I hope you will go away with a determination to follow the example of the late Mr. Ranade and work for the good of India."

His Excellency was then garlanded by Sir Gangadharrao Patwardhan, and the distribution of flowers, pansupari &c. terminated the proceedings.

Leaflet



B

Reasons Against Countervailing Duties on Sugar.

BY

THE RIGHT HON. LORD FARRER.

1. THE proposed duties will be of no use at all to the West Indies unless they raise the price of sugar
2. Sugar is one of our most important articles of consumption
3. It is a comfort, almost a necessary of life, in every cottage.
4. Many of our most flourishing manufactures are founded on cheap sugar.
5. The proposed duties may be small at first; but duties which profess to be protective always grow. Once profess Protection, and we must go on till we do protect, and in the end sugar will be made as dear here as it is now in Protectionist countries.
6. To impose countervailing duties would be to introduce vexatious interference by the Customs; interference at once futile, demoralising, and as injurious to trade as the duties themselves.
7. Countervailing duties would involve breaches of Commercial Treaties
8. No one knows exactly what the bounties amount to, and, therefore, it is impracticable to devise duties which shall exactly countervail them
9. Protective duties are as injurious to British producers as bounties; but we do not retaliate on protective duties.

10. There is even less reason why we should retaliate on bounties than on protective duties, since, injurious as they are admitted to be to producers, they do confer some benefit on the British consumer, at the cost of foreign nations.

11. There is no evidence that the abolition of bounties would enable the West Indian producer to compete successfully either with beet sugar or with other cane sugar which is not bounty fed.

12. On the contrary, the condition and circumstances of the West Indian sugar interest are such as to lead to the conclusion that it is not bounties which have ruined it, and that the abolition of bounties (which we all admit to be desirable) would not restore it to prosperity.

13. If countervailing duties, stopped at the bounty-fed beet sugar of France and Germany it would be bad enough. But they will not. There are bounty-fed articles of many kinds, within and without the Empire—sugar, ships, meat, and exports of all sorts, with bounties in all sorts of forms. Are we to retaliate on all these? And if we retaliate against bounties, which bring some compensation to us, how about protective duties, which bring none? Once begin to retaliate and we are soon landed in Protection. It was with a mighty struggle that we raised ourselves to the "loftier air" of Free Trade. *Facilis descensus Averni.* Beware the first step downwards!

14. As regards the West Indies, it is not for their true interest to encourage them to rely on legislation for the protection of a failing industry, instead of developing their other resources.

15. As regards the people of the United Kingdom, they are no more called on to protect the West Indian capitalist than to protect the landowner of Essex or of Lincolnshire; and if the distressed sugar labourer of the West Indies has a claim on them, it would be a lighter burden upon them to feed that labourer on turtle and champagne, than to break down, in his supposed interest, the Free Trade system of the United Kingdom, which has during the last half century contributed so largely to the wealth of the country and to the welfare of its people.

Under these circumstances it is scarcely credible that our Government intend to propose countervailing duties. But it is further to be hoped that they are not, in pursuance of suggestions of some of their supporters in the Press, again going to invite a Conference without knowing where it will lead them.

It is to be hoped that, guided by the experience of 1889, they will, before entering upon any negotiations for the abolition of bounties, make up their own minds clearly that they will not, under any circumstances, be led into proposing countervailing duties, and that they will make their intentions known. If they act otherwise they will in all probability be outwitted by the foreign negotiators, as Baron de Worms was outwitted in the negotiations of 1888; and will, when the sense of the country comes to be taken, be exposed to the same humiliation which Lord Salisbury's Government suffered in 1889.

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DECEMBER, 1897

Leaflet



No. LV.

Sir Thomas Henry Farrer, Bart., on Sugar Bounties.

SHALL WE RETALIATE ON SUGAR BOUNTIES?

WE DO NOT RETALIATE ON PROTECTIVE DUTIES.

BOUNTIES are bad things. They interfere with the natural course of trade, and rob certain industries in order to nurse others. So also do protective duties, but we do not retaliate upon them. When the Americans or the Canadians put a prohibitive duty on our iron, they rob their own consumers in order to nurse their own iron-masters, and they take the bread out of the mouths of the workers in Cleveland, Staffordshire, and South Wales. But we do not prohibit or put a retaliatory duty on American or Canadian corn or beef. Why? Because if we did, we should in the first place be making corn and beef dearer to ourselves; and, in the second place, we should be taking away work and employment from those British workmen who make the English goods which are exported to pay for the imported corn and beef. We might hurt America and Canada by the retaliation, but we should hurt ourselves still more.

WHY, THEN, RETALIATE ON BOUNTIES?

The same reasons apply to retaliation against bounties. If we prohibit bounty fed sugar, we make sugar dearer to our own people, and we put a stop to those manufactures which we now export in order to pay for the

bounty-fed sugar. At the time when our sugar imports from Germany, Holland, and Belgium increased by three millions—in consequence, it is said, whether truly or not, of bounties—our exports to those countries increased by more than four millions.

WHY BOUNTIES CAUSE SO LOUD AN OUTCRY.

How is it that bounties have become special objects of aversion? Probably because the immediate effect of foreign protective duties is distant, and therefore unseen, whilst bounties invade our own market. When German refined sugar replaces English refined sugar in our shops, we see that we are ourselves buying German instead of English sugar, and that a number of men who might have been employed in the refineries of London or Greenock are thrown out of work. When the American or Canadian protective duties put a stop to the export of Staffordshire iron to the States or Canada, we do not see the substitution of American or Canadian iron for English iron, because it takes place in the States or in Canada; but the displacement of English labour is just as great, indeed much greater, than in the case of the sugar. In this respect—viz, the displacement of English labour—the effect of foreign protective duties is really just as bad as that of foreign bounties.

WE GET NO GOOD FROM PROTECTIVE DUTIES: WE DO GET GOOD FROM BOUNTIES.

But there is a great deal more to be said about it. Foreign protective duties do us no good at all; there is nothing in them to make up in any way for the mischief they do us. But bounties do us a great deal of good, and they do it at the cost of the foreigner. Foreign Governments, when they give bounties on sugar, make their own taxpayers—i.e., their own capitalists and work-people—pay their sugar-makers for selling sugar cheap to English people.

A GERMAN'S VIEW OF GERMAN SUGAR BOUNTIES.

Hear what a German deputy says, and says truly. After giving figures from which he concludes that in one year the German Government gave £2,000,000 in sugar bounties, he winds up as follows:—“I cannot discern the smallest gain to our country. The profits of the system have only been reaped by England. It is German sugar that has enabled England to give sugar to her cattle; it is German capital that has

so developed the English manufacture of sweets, that it successfully competes with the German manufacturer in the markets of the world and in Germany itself. We pay one and a half to two millions sterling to enable England to consume what would probably be worked up by our German industry. Gentlemen, I fear that this system has made us the laughing-stock of our English cousins !”

ARE WE TO REJECT WHAT FOREIGNERS GIVE US ?

Deputy Gehlert may possibly exaggerate the bounty and its effect. Cheap sugar in England is owing to many things besides the bounty. But let us assume that it is all owing to the bounty. Let us go farther, and suppose that Germany and France agreed to give us our sugar for nothing. Should we refuse it? Should we say, as I have read we once did in answer to an offer from Ireland of a gift of cattle in time of famine : “Thank you, no. We decline a gift to our people amounting to £30,000,000 a year, because we have a refining industry with a capital of about one-tenth of that sum which would be injured by the gift?”

CHEAP SUGAR MEANS A CHEAP COMFORT TO ALL OUR PEOPLE.

Think, for a moment, what cheap sugar means. It means a cheap supply of an article so important that it costs the whole nation as much as half its whole wheat supply. It means that every householder in the country gets good sugar at less than one-half the price paid for it in the countries where it is made. It means a cheap luxury in every cottage. A cheap cup of tea ; cheap jam ; a cheap tart ; a cheap pudding.

CHEAP SUGAR MEANS EMPLOYMENT OF ENGLISH LABOUR.

It means cheap material for the jam and confectionery business. It meant in 1884 as much as 100,000 tons of sugar employed in that business. It also meant in 1884 employment in that business alone for more than 12,000 hands, or more than twice the number of hands employed in British sugar refineries. It means employment of other kinds in other businesses: in the biscuit trade ; in fruit growing ; in packing ; and in a variety of subsidiary trades. Are these interests to be trifled with? And trifled with they will be if we attempt any retaliation on bounty-fed sugar.

'ANY RETALIATION MUST BE MADE IN THE DARK.

For no one can tell with certainty in what cases bounties exist ; what their amount is ; or what their effect is. The bounty is to be found in the drawback given to the exporter of sugar of the tax previously levied on the raw material ; and it consists in the excess of the drawback over the tax, arising from the excess of the sugar actually made out of a given quantity of raw material over the estimate of the Government of what should be made out of it. This estimate must be an average, and therefore wrong in its application to individual cases : it is both erroneous and continually varying in its errors. The bounties vary with every different system of tax and of drawback ; with every improved process of manufacture ; and even with every parcel of sugar. It would puzzle the cleverest expert to tell us on what sugar to retaliate, or how much retaliation would be necessary in any given case to counteract an alleged bounty. If we once begin to prohibit or to put on duties under the guise of retaliation, there is no knowing what we may not keep out, or what injury we may not do.

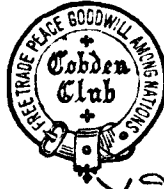
WHY TAX OURSELVES IN ORDER TO SAVE FOREIGNERS FROM THE CONSEQUENCES OF THEIR OWN FOLLY ?

Let foreign nations take care of themselves. When they in their folly offer us a free gift, do not let us be such fools as to refuse it. Above all, let us on no account trifle with that two-edged weapon, "Retaliation." If we once begin to indulge in the expensive and suicidal luxury of prohibition or retaliatory duties in respect of sugar, we shall be led into restricting one of the greatest comforts of the poor—one of the principal materials of our own industry.

IF WE KEEP OUT SUGAR SHALL WE NOT KEEP OUT CORN ?

It would be well if the mischief were to end there. But it would not. Retaliation on bounty-fed sugar would be a precedent for still more dangerous retaliations. If it is right to retaliate on bounties it is much more right to retaliate on protective duties. If we refuse sugar because it is the produce of a protective system, how long shall we continue to accept corn which comes from Protectionist countries ?

Leaflet



No. CIX.

X9 (F-68) :-

SUGAR BOUNTIES, COUNTERVAILING DUTIES, AND THE WEST. INDIES.

*The following article appeared in "The Spectator"
for November 20, 1897.*

ON Tuesday last the Conference of Conservative delegates passed a resolution in favour of protecting the West Indian Colonies from the effects of the sugar bounties.

Though the resolution was moderately, and indeed vaguely, worded, its intention was perfectly clear. Those who proposed it and supported it obviously intended to urge upon the Government the necessity for imposing countervailing duties on bounty-fed sugar—duties, that is, which shall take away the benefit conferred on the foreign producer of sugar by the bounty system.

We most sincerely trust that the Government will not be influenced by this resolution.

We fully realise how strongly they must be tempted to endeavour to cure the terrible evils from which our West Indian islands are suffering, by the apparently easy and simple method of killing the bounties by a countervailing duty. At the same time, it is their plain duty, and also the only course consistent with **the interests of the country**, with their own interests, and with the interests of their party, to **resist the temptation**.

It is our deliberate and most anxiously considered opinion that if they try to get rid of the bounties by imposing a countervailing duty they will not only **do the West Indies no good**, but will bring the Unionist party to ruin.

In a matter of such moment there is no room for anything but plain speaking. Let us justify our double contention.

Before doing so, however, we wish to state most clearly that we do not desire to take up any mere doctrinaire attitude in regard to the matter, or to dismiss the question as settled before it is raised because it involves an infringement of the policy of Free-trade.

Though we hold that **the freer the trade the less the waste of wealth**, and so **the richer those who trade and use the results of trade**, we admit that there are greater things than wealth in this world, and that cases are conceivable in which it might be right and necessary for a nation to decrease its wealth in order to attain some moral object.

But the imposition of a **countervailing duty on bounty-fed sugar is not one of these cases**, for it could not accomplish its prime object, and it must bring in its train indirect evils of the most serious kind.

That our West Indian islands are in a very serious economic condition no one who reads the Report of the Commission can, of course, doubt for a moment. It is also clear from the Report that they are suffering from the effects of the depression in the sugar industry.

The West Indies are in the position in which many firms in England and elsewhere have found themselves from time to

time. They are carrying on an industry without profit, possibly at a loss, and under conditions which, in spite of a very commendable exercise of energy on their part, forbid them to make a success of the industry.

Can these conditions be changed in such a way as to make them favourable to the production of sugar on a large scale?

The only change in the conditions which it is certain would make the sugar industry flourish would be the virtual closing of the English markets to foreign sugar by the imposition of a prohibitive duty on non-West Indian sugar.

This would, of course, mean **discriminating against the sugar of India, of Queensland, of Mauritius, of Fiji, and of other British possessions.**

But no one in his senses would dream of such a proposal.

The only possible plan would be, then, not to discriminate directly in favour of the West Indies, but to do away with the advantage, which the bounties give to foreign sugar, by a countervailing duty—*i.e.* to let the West Indies start fair in the economic race.

But even granted this could be done, it is **more than doubtful whether the West Indian sugar industry would really be placed on its legs.**

"A rise of price," says the Report of the Commission—probably Sir Henry Norman must be taken to demur to this paragraph—"such as might reasonably be anticipated from the imposition of countervailing duties, **would not, according to the representations made to us in evidence, place the West Indian sugar industry in a satisfactory position.**"

The reason for this is clear.

The West Indies are not the only, and also not the best, places in the world for growing cane-sugar. If they held a monopoly of sugar-cane growing, we might feel sure that they would benefit by an imposition of countervailing duties.

But they hold no such monopoly.

There are plenty of places better fitted for cane-growing.

Hence the preference incidentally given to cane-sugar in the British market by the imposition of a countervailing duty on bounty-fed sugar would almost certainly fall **not to the West Indies, but to other places.**

Cuba could grow cane-sugar for half the world, and if, directly the war is over, she were tempted to do so by a change in our policy, she could "cut in" and quite easily rend from our Colonies the morsel intended for them.

The new and sharp competition excited among the cane-producing countries by a change in our policy would **not** then improve the position of the **West Indies**, and would seem to them **as disastrous as now seem the sugar-bounties.**

It is therefore almost certain, or at any rate as certain as anything can be which has not been actually tried, that the **extinction of the bounties would not make sugar-growing pay in the West Indies**, and that, two years after the abolition of the bounties by treaty or countervailing duties, we should be met with the cry that the **islands must perish economically** unless they received preferential treatment, unless, in fact, we returned in their case to the old "Colonial system."

Let us, however, assume for the purposes of argument that, if the bounties could be countervailed, the price of cane-sugar would rise and the West Indies get the benefit.

We must next ask, **Could we successfully countervail the bounties** short of a policy of excluding bounty-fed sugar as we exclude plague rags and tuberculous beef?

We hold it to be **certain that we could not.**

Foreign Governments will not, we believe, give up the bounties through negotiation, even if the negotiation is supported by the threat of countervailing duties.

It may be true that they would dearly like to stop the drain on their Exchequers, but they dare not offend the peasant beet-root growers, all voters, who receive the bounties.

There never was a bounty which filtered into so many channels.

But if we try to extinguish the bounties by equivalent countervailing duties, it is **practically certain that the Foreign Governments will reply by further raising their bounties.**

Theoretically two can play at that game, no doubt, but we ask our readers whether it is likely that the British public, always rather half-hearted in the matter, would agree to such methods as these?

Besides, the counter-countervailing bounties could at a pinch be given in a cryptic, indirect way which it would be almost impossible to again counteract

Again, how are we to prevent the bounty-fed sugar being shipped from some obliging smaller country which would give up its own bounties in order to get the transport trade?

Are our Custom House officials to taste all the sugar that comes, and declare that, though such-and-such sugar has a Belgian or Dutch label, and is certified to have been packed in Antwerp or Amsterdam, it is really French or German sugar?

Such a policy as that—and no other policy would be in the end effective—would be a revival of Napoleon's policy as set forth in the Milan and Berlin decrees.

If, then, foreign countries were determined to go on with their bounties, they could certainly **make our countervailing duties of no avail.**

But, as we have suggested above, they dare not give up the bounty system. The sugar-refining industry and the beet-growing industry are too powerful to be resisted. No Minister abroad dare face such a combination of peasant, manufacturer, and merchant fighting for their lives.

Look at the efforts made by the West Indian sugar-growers, and imagine all those men and their labourers and employees not merely able to use indirect appeals to sentiment and charitable feeling, but armed with votes, and supported by a public sentiment which regards it as the prime duty of Government to help, foster, and protect a threatened industry

Depend upon it, in a war against bounties we, who do not think that the way to make people rich is to raise the prices of what they use, would tire long before the German and the Frenchman, who obey the dictates of an opposite policy.

We have contended that the abolition of the bounties will not be obtainable, and even if it were obtained, that it would **not save the sugar industry, in the West Indies**. It remains to point out that if all these arguments are wrong, and if the countervailing policy were by a miracle to succeed, we should do a great and **serious injury** not only to the **British consumer**, but to **our trade and commerce** as a whole.

To do any good the countervailing duties must **raise the price of sugar**. That is admitted.

What would be the result?

Not only that the poor man would be taxed more than he is at present, but also that **several of our most flourishing industries would be very seriously injured**.

Let any one who wants to understand the sugar question go into a village shop and note what is being sold most. He will be surprised at the enormous amount of jam, of sweet biscuits, of sweets, and of aerated waters, such as ginger-ale and lemonade, that pass over the counter.

The trade in these commodities in the shops of the poor is enormous

Jam and biscuits were once the luxuries of the well-to-do. Now they are a regular part of the food of the poor.

In the last ten years these industries have developed beyond all belief

But the corner-stone on which they all rest is **cheap sugar—sugar that is so cheap that it can be used like barley-meal**.

Raising the price of sugar means, therefore, not merely making the housewife put a little less in her tea or in her puddings, but **crippling these great industries**.

That is a side of the question which must never be forgotten. Physically, even, the results of cheap sugar are most valuable.

The doctors declare that the modern child is often strong and well grown even in a very poor house because it can so easily get sugar, the food which gives the body necessary heat.

* * * * *

We feel sure that however much the Government may be tempted by their desire—*per se* a very laudable one—to help the West Indies, neither the Report of the Commission nor the resolution of the Conservative delegates will induce them to take so suicidal a step as the attempt to impose countervailing duties on sugar. The more they consider the plan, the less chance is there of its adoption.

Nor need a negative decision mean a refusal of **help to the West Indies**. There are **other and far better ways of improving their position**.

The true method is to treat the West Indies as we have treated the congested districts of Ireland. Let us appoint a Commission for the purpose, and give it, say, £40,000 a year for ten years, and the right to raise a loan of £300,000, to be spent in the work of improvement.

That will do the West Indies far more good than a policy of countervailing duties, and it will save the Government and the country from plunging into the **fiscal Slough of Despond** towards which the **Puck of Protection**, under his various aliases, is always attempting to lead us.

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Leaflet



No. CX.

Bounties on Sugar

AND

Dangers Ahead.

*From Lord Farrer's Speech at the Annual Meeting of
the Cobden Club, November 30th, 1897.*

I TURN to a subject on which I think there is some danger—the subject of bounties upon sugar.

Upon that point we as Free Traders must walk warily. We must admit to the fullest degree that sugar bounties are an abomination, and we must not, because they make sugar a little cheaper in this country, say they ought to be continued.

If Mr. Chamberlain were able in any fair way to get foreign nations to do away with their bounties, we ought to wish him God speed.

So long as these bounties remain they will afford a reasonable ground of foundation for the agitation against foreign importations. And on that ground alone it will be to our interest that they shall be put an end to.

At the same time, while bounties are an abomination, countervailing duties are a much greater abomination.

I am not going to trouble you with all the arguments on that point. They will be found set out in a report of the majority of the West India Commission, and if you wish to see them summarised in an admirable form you will find them in an article in the *Spectator* of November 20th.

But I have one argument which I have not seen used.

The Commissioners speak as if they knew correctly what the bounties are, and as if, consequently, countervailing duties might be imposed exactly corresponding to the bounties.

I do not know how that is now, but when I was at the Board of Trade, and had to do with the subject in former years,

one of the great difficulties was to know what the duties really were.

And the reason is this, that the bounty originally was (and I believe to a considerable extent still consists of) an excess of the drawbacks paid by the Government on the manufactured sugar over the duties which had been paid by the manufacturer on the raw material

The endeavour of the Government was to repay the exact sum the manufacturer paid to the Government.

But more sugar was made out of the raw material than the Government calculated, and the manufacturer consequently got a larger return in the form of drawbacks than he had paid in the form of duties.

I do not see myself how a bounty of this kind can ever be reduced to exact figures, because it would always depend upon the manufacturer's success, *i.e.* upon the quantity of sugar he gets out of his raw material.

That appears to me to be an additional argument, and therefore I have ventured to mention it as supplementary to those which have been so well put forward by the Commissioners.

The dealing with this matter will, in the first instance, rest with a man who is one of the most powerful members of the Government—Mr. Chamberlain.

If Mr. Chamberlain sees an advantage in a certain course, he is totally impervious to economic arguments against that course.

You will not beat him on that ground.

But no man sees more clearly than Mr Chamberlain what is the nature of the forces opposed to him, and if Mr. Chamberlain is thoroughly satisfied that the forces opposed to him on this point are such as he cannot overcome, you may depend upon it Mr. Chamberlain will not burn his fingers with duties.

My advice, therefore, is to all who are interested in cheap sugar, and in freedom of trade in sugar, that they should **show their teeth at once before the Government are committed.**

There are the consumers in this country constituting the whole of the community, and especially the poorer population. There are the grocers who sell to them, there are the co-operative societies who also sell to them. Above all there are the manufacturers who have founded a **gigantic industry** on cheap sugar, and whose interest it is that sugar should come to this country as freely as possible.

I strongly advise **all those interests** to show that it is their intention that **no duties shall be placed upon sugar**—duties which, however small they may appear to be in the first instance, are sure, if once imposed, to **grow into a formidable system of Protection until sugar becomes as dear in this country as it is in the countries which levy heavy Protective duties upon it.**

Leaflet



No. CXII.

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SUGAR-BOUNTY C8

CONFERENCE, 1898.

A Retrospect and a Warning.

BY

THE RIGHT HON. LORD FARRER.

1. THE Government are about to take part in another Conference for the purpose of getting rid of Sugar Bounties. As memories are short, it may not be amiss, by way of warning, to call to mind what was the result of a similar attempt ten years ago; more especially since the owners of sugar estates in the West Indies (as might well be expected from an interest demoralised by slavery, by Protection, and by absenteeism) are straining every nerve to induce this Government to prohibit bounty-fed sugar, and by their ubiquitous pertinacity make themselves appear much more important than they really are.

2. We are all agreed that bounties are bad and foolish things, and—though in this particular case England on the whole gains by them at the expense of the countries which give them—we are willing, in the interest of the Free Trade principles we profess, to countenance their abolition, provided we are not asked in so doing

to sacrifice important interests, to throw overboard our Free Trade principles, or to make a dangerous precedent.

3. For this reason Free Traders did not, as a body, object to the conduct of Lord Salisbury's Ministry when, in 1888, a Conference was summoned in London to consider the subject of Sugar Bounties, on which Lord Pirbright (then Baron de Worms) was authorised to represent the English Government. Nor was there anything in the original proposals of our Government to shock Free Traders.

4. The proceedings of the Conference* began with a draft Convention submitted by Baron de Worms, which was a very different thing from the Convention as signed. It was indeed little more than a Platonic declaration that the contracting parties would give no bounties on the exportation of sugars; and if that draft Convention had been adopted, whatever might have been thought of the wisdom of the negotiation, there would have been little to complain of.

5. On consideration of the draft Convention proposed by England, Germany showed her hand at once.† She intimated that the regulation of the sugar trade must be made stringent; that an international body should be created to judge of infractions; that penal measures should be taken against offending countries, and that her beet-sugar should be guaranteed the same treatment as colonial cane-sugar. In short, Germany, which already possessed, and possibly groaned under, a strict system of State supervision, which at that time lost more than any other nation by its system of bounties, and which sent, and still sends, to England more cheap bounty-fed sugar than any other country, was naturally anxious to put the sugar trade of other countries under similar restrictions, to get the help of England in abolishing her own suicidal bounties, and at the same time to reserve the English market for her own producers. Germany, intimated the German delegate in the meeting of the 7th of May,‡ would think it sufficient if England alone were compelled to boycott bounty-fed sugar. In these objects, thanks to the complacent co-operation of Baron de

* Commercial, Nos 3 and 15, 1888.

† Commercial, No. 13, 1888, page 235.

‡ *Ibid.*, page 372.

Worms, she succeeded only too well. Austria, on the whole, backed Germany in her criticisms on the English draft, and the other Powers concerned made various suggestions.* Spain, which desired to get back for her cane-growing colonies the custom from which beet-sugar had ousted them, proposed a boycotting clause † France signified her opinion that the adherence of all sugar-producing countries was essential. The United States, Brazil, and Sweden signified their non-adherence at an early period, and Belgium was, and to the end remained, doubtful.

6. The new features in the Convention, which had thus been originally suggested by Germany—viz. the obligation to manufacture in bond; the provisions for an International Commission, which was to supervise and practically control the manufacture of sugar not only in countries parties to the Convention but in all sugar-producing countries; the boycotting by England of sugar from any countries which might be adjudged by a majority of the parties to the Convention to have infringed the rules of the Convention; and, finally, the stipulation by which the fiscal freedom of England and her colonies in the matter of differential duties was surrendered—*were adopted one by one, generally after remonstrances against them by the English delegate, Baron de Worms, and ultimately in articles framed and proposed by himself.* In the end the United States, France, Austria, Belgium, Sweden, Denmark, and Brazil remained practically outside the Convention, constituting an area of sugar-consuming nations sufficient to render any effectual boycott of bounty-fed sugar impossible; and an area of sugar-producing and of bounty-giving nations sufficient, if boycotted in the terms of the Convention, to restrict most materially and injuriously the markets in which English people can buy their sugar.

7. Among much dreary reading in the protocols there are some touches of humour. For instance, at the meeting of the 28th of April, ‡ it is stated that M. Pallain, the French delegate, was full of praise for the manner in which the debates had been directed by its distinguished president, Baron de Worms. "Would it," he said,

* Commercial, No. 13, 1888, pages 235 to 285.

† See further as to this, page 40.

‡ *Ibid.*, page 336.

“be possible for the French delegates to answer the charge of having been captivated by the charm and ascendancy of the president, who directs these debates with so much authority, if they were not careful to conform scrupulously to their instructions? They cannot forget, among the delights of London hospitality, the English saying, ‘Business is business,’ and that the Conference-room of the Foreign Office, where the Sugar Union is in course of preparation—an event which may seriously affect the trade and agriculture of the countries represented, unless all the interested States take part in it, and unless the conditions are the same for all the rival industries—is no longer the room where courtesy performs the agreeable duty of not running contrary to the opinion of the master of the house!”

8. Even more humorous, if more serious, is the discussion on differential duties. Some of the delegates had pointed out, with perfect truth, that surtaxes—*i.e.* differential and protective duties, which exist in many, if not in most, countries other than our own—are just as great an impediment to freedom of manufacture and of trade as bounties, and had proposed their abolition or restriction. M. Jordan, the German delegate, at the meeting of the 8th of May, after saying that his own Government wished to reserve its entire liberty of action in this matter of duties, added that “he would be glad to receive an assurance that sugars from the contracting countries would continue to receive the same treatment as now.”* M. Jordan had further, according to the words of the protocol, the assurance to remind the Conference “that the Convention would be entirely in the interests of Great Britain! He would, therefore, be glad if the spirit of reciprocity should lead England not to modify her present system as long as the Convention lasts!”

9. *Baron de Worms, as usual, at first resisted the German proposal, only to propose it himself at a later date.* But for such an answer as the English representative might have given to this astounding reminder we look in vain. M. Jordan's irony was quite lost on the Baron. We might have expected him to say to the German delegate—

I protest against your reminder. It is in your interest that the Convention

* Commercial, No. 13, 1888, page 380.

is made. England is here because she has no taxes and gives no bounties, and is neutral. She sacrifices, indeed, by the Convention the present which your suicidal legislation is now making to her, and she does so because she feels, whatever her immediate interests, that bounties are an infraction of the great commercial principles she advocates.

10. But no such language proceeded from the Baron. On the contrary, his language on the 23rd of April * had invited the German statement, and his language on the 12th of May † endorsed and confirmed it. In the end, as usual, he himself, after having protested that England would never for herself and her colonies give up a freedom which other nations had reserved, did of his own accord, on the 16th of August, 1888, ‡ propose the following article :—

ARTICLE IV.

Her Britannic Majesty's Government agree not to impose differential duties on cane or beet sugar imported from countries, provinces beyond the seas, colonies, or foreign possessions taking part in the Convention. As long as the Convention lasts, therefore, *no higher duties shall be imposed on beetroot sugar than on cane-sugar on importation into the United Kingdom or the colonies and foreign possessions of the British Empire taking part in the Convention.*

It is agreed, moreover, that sugar imported into the United Kingdom from the countries, provinces beyond the seas, colonies, or foreign possessions taking part in the Convention, shall not be subject to duties which shall not equally apply to similar sugar of national origin or manufacture

And he added, not without reason, that he trusted that the plenipotentiaries would take note of the conciliatory attitude manifested in this article. Great Britain, as he truly said, had done all she possibly could with a view to meet the urgent requests formulated by several of the delegates in the course of the preceding session of the Conference.

11. In short, England, who imposed no taxes, who gave no bounties, who accepted sugar from all sources without let or preference, and who alone stood to lose by the other parts of this Convention, did, by this article, deliberately give up the freedom of self-taxation *both for herself and her colonies* which all the other nations reserved to themselves, and which most of them exercised

* Commercial, No. 13, 1888, page 331.

† *Ibid.*, page 397.

‡ *Ibid.*, page 410.

by giving special favours and privileges to their own producers, their own refiners, their own colonists.

Not only so, but England, by this article, assumed to exercise over her self-governing colonies, in the interests of Germany and other beet-growing nations, a control which she would not dream of exercising in her own interests, by requiring them to give to German and other beet-sugar the same treatment which they gave to their own cane-sugar. And all this, not only without any consideration passing from the beet-growing countries to England under the Convention but in spite of, and in addition to, other gains which those countries get at England's expense!

12 In short, Baron de Worms, having in the first instance placed himself in a false position by proposing to France and Germany the abolition of bounties which injured them but did not injure us, naturally became the catspaw of foreign Governments, and ended by a simple surrender of our rights and interest, which was laughed out of court, not without humiliation to the Government, so soon as the country understood its real nature.

13. The fact is that Baron de Worms did not, before he began, know with accuracy or certainty what were the interests with which he had to deal, what it was that he proposed to do, how far he was prepared to go in the way of concession, and where he meant to stop. The consequence was that the foreign negotiators, who did know those things, got what they wanted, and Baron de Worms made a mess of the whole business.

14. *What has happened before may happen again.* Mr. Chamberlain is not likely to go, cap in hand, to foreign Governments to beg them to make sugar dearer, nor will he have the opportunity of displaying the genial hospitality which played so large a part in Baron de Worms's negotiations. But in other respects the situation is even more dangerous now than it was in 1888. The sugar bounties are larger and more pronounced; the West Indies, or some of them, are in real distress; and we have, as Colonial Minister, a powerful statesman who has declared himself in favour of Imperial Protection to the Colonies, and who has only been driven out of that insane scheme by the refusal of the Colonies to have anything to do with it. Our Government is again inviting foreign Governments not to send us cheap sugar

at the cost of their own taxpayers, and are laying themselves open to the natural retort, "Will you refuse to receive it from any nation who still continues to send it to you?" It will need more than usual caution and foresight on the part of the Government and its representatives at the coming Conference to avoid being led into the difficulties which proved fatal to Baron de Worms.

15. Under such circumstances it is for all friends of the Government who do not wish to see a repetition of the fiasco of 1888-89 to warn them against the risks they will run if they attempt anything in the nature of "retaliation or protection." Those who know that cheap sugar next to cheap wheat is the most valuable article of food and comfort to our people; that it is the basis and material of some of our most flourishing manufactures; and that any attempt to restrict its import or raise its price would be a fatal mistake; those who believe that the total repeal of the Sugar Duties, so happily effected by Sir Stafford Northcote, was not only a great boon to the consumer but an important relief to the trader; and that any attempt to reintroduce any portion of them, especially if accompanied by certificates of origin or other Customs vexations, would be an embarrassment to the trade in sugar and a dangerous precedent for interference with other trades; finally, those who think that the principle and practice of Free Trade will be endangered if we close our markets to goods which our people want because they have been produced under financial systems which differ from our own, or by methods of which we do not approve—will do wisely if they take time by the forelock and, before the Government is committed, give it to be understood that any attempt, to boycott bounty-fed sugar by prohibition or by countervailing duties will meet with widespread and determined opposition.

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LIFT IRRIGATION.

BY
ALFRED CHATTERTON.

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LIFT IRRIGATION.

107

Mr object in presenting this paper to the Industrial Conference is to draw attention to the advance which has recently been made in the Madras Presidency in the scientific study of subterranean water and well irrigation, and to place at the disposal of those interested in the improvement of the agriculture of India the information which has been gathered in the Irrigation Pumping Department during the four years it has been at work.

Although wells and subterranean water are worthy of the attention of Engineers it is a matter of regret that in India they have been very much neglected in the past and that the cultivators have been left almost entirely to their own resources. In 1882 Captain Clibborn, who was afterwards Principal of the Roorkee Engineering College, submitted a long report on well irrigation in the North-West Provinces and Oudh, arriving at the result that "well irrigation is only profitable under favourable conditions and that there is reason to believe that in most districts cultivators have already very fully availed themselves of their opportunities." In Bombay Mr. F. D. Campbell, an Executive Engineer of the Public Works Department of that Presidency, spent some months on special duty and as the final result of his enquiries formulated the opinion that "nothing can be done to introduce new or cheaper systems of well construction or of lifts than those which the ryot is already familiar with." Much later in 1896, in a report on water-lifts recording the results of some experiments on the efficiency of various systems of water-lifting, I wrote "Steam-pumping machinery is utterly beyond the means of

the ryots, and the force of the wind is too uncertain and in general in India it is too weak to be profitably utilised by wind-mills even of the most modern type. Animals are, therefore, the only source of power available, and water-lifts in the future must continue to be, as they always have been, worked by cattle. Moreover, the Indian agricultural population are so singularly devoid of even the most rudimentary mechanical skill that it is absolutely necessary that machines intended for their use should be designed to work without complicated gearing of any kind."

At that time it seemed as though the last word had been said on the subject of well irrigation, as all the attempts to improve on indigenous methods of lifting water had led to no decisive results, and the engineers who tackled the problem retired baffled by the difficulty of providing a water-lift of superior efficiency to the native water-lifts without incurring too great an initial outlay and without forcing the cultivator to use a machine too complex for his comprehension and beyond the resources of the ordinary village artisans when it needed repair. Further the opinion was generally held throughout the Madras Presidency that few wells could be found which would yield sufficient water to keep even small pumps of modern construction at work for a sufficient time, to make it worth while to instal them. It was assumed that the cultivator must keep his bullocks for agricultural work and that in their off time they could be employed working whotes on the wells and that such work practically cost nothing.

In 1900 in an article on "Underground water-supply" I wrote: "Underground water has never in India been studied properly by engineers or geologists and wells are sunk in a happy-go-lucky manner to a haphazard depth. They are constructed

with primitive appliances and at small cost. Expectations are not usually great and as they are generally realized the people are content. The depth of the well is limited by the fact that the primitive methods of sinking in vogue among the ryots prevent them going more than a few feet below the hot weather level of the water. With an engine and pump to keep the well dry much greater depths might be attained and possibly the supply of water enormously increased." And again in 1902 in an article on "Well Irrigation" the following passage occurs: "In the south of India well sinking is a very primitive business and the better the supply of water, generally the shallower the well. A ryot wants a well and having selected a spot which he thinks suitable he sets to work and either sinks a hollow cylinder of brickwork into the ground till water in sufficient quantity to satisfy his expectations is reached, or he excavates a big rectangular hole in the disintegrated rock which forms the sub-soil and goes on deepening it till the inflow of water is greater than can be dealt with by the modest water-lifting appliances at his disposal. Year after year, in the hot weather when the water-level is low, he may increase the depth by adding to the number of whotes on the well, and in this way many valuable water-yielding wells have been sunk. Let us suppose, however, that the unwatering of the well in the hot weather is accomplished by a powerful engine and pump, the work of excavating will be easy and the depth may be rapidly increased till either the inflow is greater than can be dealt with or practical considerations indicate that it is not worth while to go any deeper."

These remarks were consequent upon experience with the working of oil engines. For small powers they had been found to be inexpensive reliable motors, that required no great amount of skill to run them. Even with kerosine oil as the fuel it

was obviously practicable to employ them for lifting water under favourable conditions, but when later on it was found that there was no difficulty in using the much cheaper liquid fuel which is imported into India, the possibilities of their employment were vastly increased. It was not very difficult to convince the Government of Madras in the Irrigation Department that experiments in this direction were well worth trying and that in fact the time had arrived when the question of well irrigation might again be taken up with some prospect of doing useful work and of evolving means of making much greater use for irrigation purposes of subterranean water than had been previously possible. Moreover increased experience in the management of indigenous industrial work had led me to think that the mechanical inaptitude of the people of this country can be cured if proper means for training them are provided.

One of the causes of the poverty of the people of India is the little use they make of mechanical appliances and efforts should be made to effect a change in this direction. The great rise in the price of food-stuffs, accompanied as it is by an equivalent or even greater rise in the wages of the labouring classes, has brought many of the wealthier agriculturists to a similar conclusion, and it is certain that in the next few years a great advance will be made by the substitution of oil and gas engines for bullock-power in many of the processes for preparing agricultural produce for the market. It is necessary that this opinion should gain ground and be more widely accepted and that mechanical engineers should be induced to devote their ingenuity and skill to providing simple machines capable of being driven by engines of a few horse-power, for such operations as extracting oil from seeds, the juice from the sugarcane, hulling paddy or grinding wheat. It is true that most of these operations

can be carried out in an extremely satisfactory manner if the scale of working is only sufficiently large, but the day for big enterprises of this kind has not yet arrived, and for the present it is desirable to provide special machinery which can be worked on a small scale and which can be purchased and set in operation with the comparatively small amount of capital which as yet is available among individuals. Co-operative enterprise is still a thing of the future and till that is realized our efforts must be directed to providing for the small capitalist.

It is true that there are many machines for doing this kind of work already on the market, but save in the case of sugar mills I do not think that any of them are quite satisfactory and their use is not extending as rapidly as would be the case if they were better adapted to the work they have to perform. Fortunately for lifting water the centrifugal pump is almost ideally suited to the work which it has to perform. Its first cost is small, it is extremely simple and fairly efficient and combined with the oil-engine there is likely to be a wide field for its employment in this country.

It must not, however, be imagined that the oil-engine and centrifugal pump will replace to any appreciable extent the indigenous methods of lifting water. According to the latest returns (for the year 1905-1906) there are in the ryotwari tracts of the Madras Presidency upwards of 628,400 wells in good working order and a further 61,000 out of repair. The number in the zamindaris is not known, but the total for the whole Province may well be over three-quarters of a million. To lift water from these wells either the picottah or the country mhote is used, the number of special forms of water-lift being absolutely insignificant. Only a small percentage of these wells yield water sufficient to keep more than a single mhote or a single picottah at work. Not

that many of them could not be made to yield a much larger supply of water, but the owners either have not enough land to use the water on or are too poor to provide the labour necessary to lift the water.

The idea is generally prevalent that native methods of lifting water are extremely cheap since the cattle must be kept under any circumstances, but careful investigation shows that it is only true within certain limits and those limits have already been reached. Well cultivation is carried on to the utmost extent possible under the existing conditions and if any great extension is to take place in the immediate future, it must be by supplying the ryots with additional power for lifting water. At the same time the cost of that power must be very much less than that they now pay for any work done in the way of lifting water which is beyond the capacity of the cattle they keep for general agricultural purposes.

It is therefore a most important matter that we should endeavour to ascertain the actual cost of lifting water by native methods and at the outset it may be conceded that within the limits already referred to the ryot can lift water fairly cheaply. The question is what he will have to pay, and what does he pay, for lifting water when cattle have to be kept specially for work, or when he has to hire cattle. Five and twenty years ago at the Agricultural College Farm, Saidapet, Mr. Benson, as the result of long and careful trials, came to the conclusion that the cost of keeping a pair of good cattle amounted to 12 annas per day and that they were capable of lifting 240 cubic feet of water to a height of 25 feet for 8 hours a day. Or in other words 4,000 cubic feet of water could be raised one foot for one anna, or an acre inch of water could be raised 25 feet for Rs. 1-6-8. In the last 25 years rates have risen very considerably and the cost of lifting

water has increased, so that under the conditions of Mr. Benson's estimate it is hardly likely that 3,000 cubic feet can now be raised one foot for one anna.

Simple as the problem may seem, it is extremely difficult to find out how much work is done by a pair of cattle under normal conditions. Any attempt at an experiment interferes with the normal conditions, the efficiency is temporarily increased and better results are obtained than are possible without some kind of special supervision. Two years ago I made some enquiries in the Chingleput district and I found that a fair day's work for a single mhote was as follows :

On a lift of 20 feet, using a bucket holding 20 gallons of water, 30 lifts per hour would be made for 9 hours a day. The minimum cost of keeping the cattle was Rs. 15 a month and the usual rate for hiring them was Re. 1 per day. Taking the minimum figure this works out at 2,160 cubic feet lifted one foot for one anna. These figures are corroborated by some data collected by the late Mr. H. A. Moss who was Executive Engineer in the same district. In a report on "Wells and Well Irrigation in the Chingleput district" he states :

"Water is usually raised by picottah when the lift is 15 feet and under, when more, bullock mhotes are used. The cost of raising water for about 6 to 10 feet is about 4 pies per thousand cubic feet per one foot lift. From 10 to 15 feet the cost comes to about 5 pies and from 15 to 20 feet it is about 6 pies per thousand cubic feet per one foot lift."

The Chingleput district is in no way exceptional and the figures obtained will more or less apply to the rest of the country. Any great exactitude is impossible, but it will not be far from the truth then to put the cost of lifting water either by means of the picottah or the mhote at one anna for every 2,000 cubic feet lifted one foot. Under favourable conditions and with water-lifts specially adapted to

the work better results than this can be obtained. For instance in South Arcot, where there is an abundant water-supply at about 15 feet below the surface of the ground, double mshots worked with a rotary whim are largely in use and are very much more efficient than the ordinary water-lift in other parts of the country. It is not, however, with the extremely favourable cases that we have to deal. If lift irrigation is to be extended largely the conditions will generally be more difficult to deal with than has hitherto been the case and the means provided must be capable of working under a fairly wide range of conditions.

During the last four years through the agency of the Irrigation Pumping Department we have been gradually introducing the use of oil-engines and pumps for irrigation work and have tried them under a great variety of conditions, many of them being extremely unfavourable and none of them ideal. I do not propose to burden this paper with technical details as evidence regarding the statements which will be made is furnished in full in the various official reports which from time to time are issued by the Department. In an appendix to this paper is given a complete list of such reports.

Oil-engines and pumps are only economical and their employment therefore can only be recommended when the quantity of water to be dealt with is fairly large. If a well yield a thousand cubic feet a day, it will give ample employment for a mshot, but to make it worth while to instal an engine and pump the yield should be not less than 10,000 cubic feet a day for the greater part of the year. It is true that engines, and pumps are working, and working at a profit, where the supply falls below this limit, but the circumstances are more or less special and it is doubtful if they could be repeated indefinitely. The following figures taken from the administra-

tion report of this year show what has actually been the cost of working at a number of installations:—

	Number of cubic feet of water lifted one foot for one anna.	
	1906-07.	1905-06
Melrosapuram	3,900	...
Kadiampatti	4,013	6,400
Villupuram	3,230	5,800
Cuddalore	9,370	6,750
Saidapet	8,300	4,126
Katalai	...	6,500
Bezvada	3,340	3,200

In the report for last year it was shown that under very favourable conditions a small oil-engine and pump, dealing with 216,000 gallons of water per day on a lift of 25 feet, could raise 13,500 cubic feet one foot for one anna. This may be considered a maximum seldom if ever attained under actual working conditions. The figures given in the table fall very far short of the ideal, but the worst are as good as the best that can be obtained from cattle-power and the best show that water can be lifted at from one-third to one-fourth the cost of doing it by cattle. The larger the scale of pumping operations, the more cheaply can each unit of work be done whilst the indigenous methods of lifting water are only applicable on a very small scale and would utterly break down if any attempt were made to use them for lifting large quantities of water.

In the report by Mr. Moss already alluded to some information is given regarding the duty of water. He says:

“The cost of irrigating paddy from wells alone is expensive especially when the rainfall is at all deficient. On the other hand the return per acre from well-irrigated paddy is much more than from that irrigated by tanks and channels. It is generally half as much again and may be even twice as much, six months paddy usually requires 40 waterings of about 2,000 cubic feet per acre. The cost from a well

about 15 feet deep may be taken at one rupee per watering. If the land is far from the well it will be more, owing to the loss by absorption. If the rainfall is bad, 60 waterings would be required and the outturn without the rain is always deficient. As the water in the well will be low the return to the ryot is very small and paddy is not worth cultivating under such circumstances.

“Four months paddy requires usually 30 waterings at a cost of about Rs 30. The cost of watering is less than that for 6 months paddy but the return in grain is less.”

The average area irrigated by a well is about 3 acres and as paddy requires more water than any other crop grown under wells, it is obvious that the average yield of the wells is less than that which can be deduced from observations on paddy cultivation. Taking Mr. Moss's figures we find that 1,333 cubic feet of water per day are required for 3 acres of paddy. It is therefore probable that the average yield of the wells in this Presidency is not more than 1,000 cubic feet per day and in many cases it is certainly less than this. In the large irrigation systems where the distribution of water is under proper control, the duty of water is from 90 to 100 acres per cubic foot per second; that is to say, a continuous flow of one cubic foot per second will irrigate from 90 to 100 acres of land. The water used by the ryot yields a duty of 195 acres or practically twice as much and this is probably the best result that can be obtained as we may by fairly certain that the accumulated experience of many generations of paddy growers instinctively prevents the Indian cultivator from using too much water. In the note on “Irrigation by pumping from a well at Melrosapuram” published as an Agricultural Bulletin the data collected at that station are furnished which corroborate this estimate. The high figures at Melrosapuram are largely due to the use of masonry channels for conveying the water from the well to the field. Even to the ryot the loss of water by soakage from his channels is a serious

matter, though the land to be irrigated is close to the well. To the man who uses an oil-engine and pump it is still more important as the length of channel is much greater, and generally it may be assumed that the larger the irrigation system and the greater the area deriving its water from one source of supply the larger will be the percentage lost from the canals and the distributaries themselves.

The cost of lifting water for irrigation by mechanical means depends very largely upon the continuity of the supply and the number of days during the year on which water is supplied. Interest and depreciation bulk very largely in the total cost of running the plant and an economical result can only be obtained when the percentage of working hours is large. The ryot in one way or another pays from Rs. 5 to Rs. 8 a month for the irrigation of an acre of land. In most cases this heavy charge is not severely felt, as it is met by the utilisation of what would otherwise be bye-products, but as soon as these bye-products are exhausted the full cost is felt and the ryot realises that it is impossible to grow the ordinary crops at a profit. With oil-engines and pumps the cost of irrigation varies considerably and for small schemes of from 20 to 40 acres it may be taken that the irrigation will cost from Rs. 1-8-0 to Rs. 3 per month. The larger the scheme the lower the cost of irrigation will be; the best result being that which will probably be obtained in the Divi Island Pumping scheme where 50,000 acres of land are to be irrigated and where the water may have to be lifted to a maximum height of 10 feet. It is estimated that the working expenses will not amount to more than Rs. 2 per acre for the season or an average of about 8 annas per acre per month. As a lift irrigation scheme the Divi Pumping Project is exceptional in regard to the size of the plant and

the extent of the area irrigated, but in many places along the Coast similar schemes of a smaller character are practicable, and where the lift does not exceed 10 or 12 feet paddy cultivation may be carried on profitably. For the most part, however, pumping will not be under such favourable conditions, the lift will usually be greater, the supply irregular and the plant much smaller. Even if paddy cultivation pays, there is no reason why it should be encouraged, as other and more valuable crops can equally well be grown. People who have the enterprise to instal engines and pumps generally take a great deal of interest in the cultivation under them, and as usually they have some command of capital, the tendency is to go in for intense cultivation and to grow crops which yield a very much larger profit per acre than can possibly be obtained when the common food-grains are cultivated. So far sugar-cane, plantains and ground-nuts have yielded the best results, but large profits are also made in the cultivation of tobacco, turmeric and the ordinary garden crops. A supply of water which can be relied upon all the year round is practically wasted if it is not utilized for crops which require water the whole year through. These are the crops which yield the largest return to the cultivator, partly because the extent to which they can be grown is limited, and partly because their cultivation necessitates the possession of a considerable amount of capital. With a perennial supply of water under engines and pumps the gross return from the cultivated area ought to be never less than Rs. 100 an acre, and it often amounts to two or three times this sum.

When the Experimental Pumping Department was first started the impression generally prevailed among those who were best acquainted with the agricultural conditions of the country that the

scope for its operations would be extremely limited, because of the difficulty of finding sites where a sufficient water-supply could be obtained combined with landholders in the neighbourhood who would have sufficient capital to avail themselves of it. The fact that there are now about 100 pumping plants at work in the Madras Presidency is evidence that there is a much wider field for their employment than was anticipated, and the investigations which have been carried on, before installing these plants, have put us in possession of a large amount of information of a most satisfactory character. Certainly there will be absolutely no difficulty whatever in irrigating hundreds of thousands of acres by engines and pumps if only the capital required to lift the water can be found, and the ryots can be taught to make use of the water in a proper way.

The great obstacles to progress are the poverty of the people and the extraordinarily minute way in which the land is sub-divided. The smallest area which can be profitably cultivated by an engine and pump is from 15 to 20 acres, and the number of such holdings in one block is small. Still there are a sufficiently large number to enable a great deal of work to be done in exploiting this method of lifting water, and long before the possibilities of large holdings are exhausted, the owners of smaller holdings will perceive the advantage of combining together and by co-operation securing to themselves the benefits consequent upon this cheap method of lifting water. I do not think it is any exaggeration to say that the oil-engine and pump will prove, and in fact are proving, extremely potent agents in the development of the material resources of the country. Already in some of the rural tracts the ryots are familiar with them, recognise their merits and regard them as desirable

things to possess, whilst those who have got them have been led to take a much deeper interest in agriculture than they did before and being intelligent men with capital, their farms are becoming the centres for the diffusion of improved agricultural practices throughout the country. I am in hopes that in the course of a year or two it may be possible to form an Agricultural Association every member of which will be the user of an oil-engine and pump, the main object of the Association being to encourage the extension of the use of such methods of lifting water and to supply the members with information which will enable them to make the best possible use of the water at their command. So far Agriculture. Associations in this country are an exotic growth, and without official support few of them would be in existence. The Association I am contemplating will stand on a different footing, its members will all be agriculturists operating on a fairly large scale and keen to make the most of the capital they have put into their land.

The supplies of water sufficiently large to give employment for engines and pumps are mainly to be found in the Coast districts and along the margins of some of the big rivers. In such districts as Coimbatore, where well cultivation has reached its highest development on indigenous lines there are apparently not many places where wells can be sunk which will yield sufficient water to give employment to an engine and pump. Here and there, there is one, but certainly not one in a hundred of the 75,000 wells in the district could furnish enough water to make it worth while to put in an oil-engine and pump. On the other hand in South Arcot, Chingleput and North Arcot abundant evidence has been obtained that over very considerable tracts of country the ordinary native wells can easily be improved so as to yield enormously greater supplies of water than

have hitherto been drawn from them. In these districts the water mainly occurs in vast beds of coarse sand which form subterranean reservoirs of considerable but as yet quite unknown extent. In some cases the sand is covered by a comparatively thin layer of alluvial deposit and the water can be found by sinking wells from 15 to 20 feet deep. In other cases the sand lies at a considerably greater depth and is overlaid by impervious beds of clay which have to be pierced to get at the water. In the South Arcot district between Pondicherry and Cuddalore these beds are more than 200 feet below the surface of the ground, but the water is under pressure sufficient to force it up the boreholes and form true artesian wells. To the north of Madras similar sand beds are found at a much smaller depth, but the pressure is not sufficient to constitute true artesian wells and the water has to be lifted in some way or other. Some 30 or 40 boreholes have been put down in the bottom of existing wells and have successfully tapped the sub-artesian water-supply. Most of the pipes are of 4" diameter and the yield of the water varies from 50 to 200 gallons per minute. It is probable that in most cases a much larger flow could be obtained by either inserting a pipe of larger diameter or by deepening the well and lifting the water from a lower level so as to diminish the pressure against which the water is forced up from below. In one case two 7" pipes have been put down and the yield of water is over 500 gallons a minute which is lifted out of the well by a 12 H.P. engine driving a 6" centrifugal pump. In nearly every case these improved wells will yield sufficient water to justify the installation of engines and pumps, but as yet the people are too poor and too dubious about the continuance of the flow of water to do anything in this direction. In a year or two they will be in a better position to realize the value

of the water beneath their lands and may then be anxious to avail themselves of any means whereby they can secure to a larger extent of land an unfailling supply of water.

In the tract of country to the south of Pondicherry many hundreds of boreholes have been put down and the water-supply derived from the artesian beds is very considerable and it is not improbable that to the north of Madras the development of sub-artesian water will be found to be of similar extent. In other places there is reason to suppose similar water-bearing deposits exist, but as yet they have not been explored and their capacity is entirely unknown. Where the water-bearing sands occur nearer the surface and where the surface slope of the country is considerable they have been drained to some extent by 'spring heads' or *kasams*. These consist of a pond often of considerable size which has been excavated till the water-bearing sands are reached. From the pond a deep channel with a small bed-fall leads the water out on to the lower lands. This channel is generally a mile or two long and a good deal of the water drained from the pond must be lost on its way to the land. The supply in the pond is apparently maintained by percolation from the beds of sand which lie at a higher level. The sand in these *kasams* is usually very coarse and the flow of water apparently very free. As a rule in the hot weather they dry up altogether, or the water has to be lifted out of them by baling with picottahs or mhotes. Unquestionably the installation of engines and pumps would enable a very much larger body of sand to be drained of water and it is probable that in most cases a perennial supply of water could be obtained in place of the present supply which is only sufficient for a single crop.

Where the slope of the country is small it is obvious that irrigation by *kasams* is impracticable,

but very extensive beds of coarse sand exist and have been tapped and tested in many places and at no very great cost it is practicable to put in wells which will yield from 200 to 300 gallons of water per minute. A considerable number of these have already been sunk and there is no doubt that they will steadily increase in number. It is impossible to say what area of land is underlaid by these water-bearing sands in the Madras Presidency, but it certainly runs into thousands of square miles and there is probably water sufficient for the irrigation of several hundred thousand acres. The withdrawal of large quantities of water will lower the level at which it is found, but there is fair ground for assuming that most of these sand deposits are in direct connection with the main drainage lines of the country and every fresh which passes down an adjoining river will tend to restore the original water level.

There does not seem to be much hope that deep-seated artesian water-supplies will prove of value for irrigation. In the Gódávári district artesian water has been tapped in several places, by mining prospectors in the Polavaram Zamindari, by the Madras Railway at Ellore and by various people in the neighbourhood of Samalkota and Cocanada. At Ellore a borehole was put down to a depth of 430 feet and cost nearly Rs. 13,000, whilst the yield of water does not appear to have been much more than about 3,000 gallons per hour. Further details regarding the cost of artesian wells will be found in a note by Mr. E. W. Stoney, C.I.E., in the November number of the Indian Engineer.

The sandy beds of most of our rivers are probably the next most important source of water-supply and one which, as yet, has been but little made use of. The indigenous method of getting at the water is extremely ingenious, but it involves the expenditure

of a very large amount of labour. Channels or ditches are dug in the beds of the rivers with a bedfall considerably less than that of the river. In the upper part of the channel the water from the surrounding sand drains into the channel, flows down it and is carried away through a cut in the river bank. In some districts "doruvu" wells are employed to some extent. They are wells sunk in or close to the river bank and derive their water-supply from the sand. Apparently the engineering work involved is beyond the ordinary ryot and such wells are not popular. Where they exist they require study and where they do not exist it is desirable to encourage them as much as possible.

It has always been assumed in the past that there was a slow flow of water beneath the sand in the river-beds and it was tacitly accepted that the spring channels probably drew off most of the available water as no large supply could ever be obtained at any one point. A careful review of the evidence furnished by the partial failure of several attempts to get at the water in the sandy beds of these rivers lead to an examination of the conditions under which spring channels work and it was then found that the prevailing ideas were erroneous and that there is no flow of water in the sand of a river-bed except between pool and pool, where the slope of the water plane in the sand may be very steep. Below a certain level the sand in the beds of rivers is saturated with water which remains motionless unless a local hydraulic gradient is established sufficiently steep to cause the water to flow. I do not propose to go into the evidence upon which these conclusions have been based, as it has already been published in this year's report. Every cubic foot of sand below the saturation level contains rather more than 2 gallons of water, so that a square mile of sand 10 feet deep is a reservoir containing over 550 million gallons of water, or sufficient for the

irrigation of a thousand acres of land. Allowing for the fact that the sand in the river-beds is not always 10 feet deep and that it is impossible to extract all the water from the sand but without taking into account any water 20 feet below the level of the saturation line it is quite certain that for every square mile of river-bed we might have an equivalent of square mile of irrigation. The problem which remains unsolved is how to get at this vast quantity of water. In this matter our experience is gradually increasing and one certain conclusion is that owing to the resistance which the sand offers to the motion of water it is impossible, except at great expense, to collect any large quantity of water at one point. On the Hagari river we found it a simple matter to obtain 150 gallons a minute and for a moderate outlay * we are drawing 750 gallons a minute from the river-bed, but to obtain more water than this at our pumping station seems likely to prove a difficult matter. By sinking wells in the river-beds it is found that in most cases a comparatively small well will yield 300 or 400 gallons of water per minute so that, if a large quantity of water is to be withdrawn, a large number of wells should be sunk at a sufficient distance apart to prevent one well materially interfering with another. In many cases these wells can be sunk inside the river bank, in others quite close to the bank and when this is practicable the pumping work may be done by power distributed electrically. To get at the water in the middle of the river-bed when the bed is very wide is a much more difficult matter and may be considered for the present outside the range of practical engineering.

All the experience we have gathered so far points to the fact that with brick wells from 12 to 15 feet in diameter we can get enough water to

* Rs. 2,300.

supply a 4" centrifugal pump with a depression of the water surface of 3 or 4 feet. Some day I think there will be a chain of such wells extending along both banks of most of our rivers and at intervals of about 10 miles there will be electric generating stations supplying current to electro-motors to drive these pumps.

The perennial flow of most of our rivers is already diverted by means of anicuts which in the upper reaches of the river, where the bed is rocky, are often very numerous. Still there are a few cases where the water-supply is wasted by being allowed to flow into the sandy expanses in the lower reaches of the rivers and the remedy is obviously to instal engines and pumps. Of installations of this kind there are already one or two at work, and there would be more if permission to pumps could be obtained.

On the West Coast in Cochin and Travancore there are extensive tracts of irrigated land formed by bunding off the backwaters and draining them. The system of irrigation is of great antiquity, but of late years it has been modified by the introduction of pumping machinery and there are a large number of steam and oil engines now employed in draining these lands. A great deal of enterprise has been exhibited in this work but not much engineering skill and unquestionably the Kole cultivation, as it is called, could be enormously improved by combining irrigation with drainage and by putting the operations in each section under one control.

In some of the swamps along the coast and in lakes like the Kolair, between the Kistna and Gódávári rivers, there is a considerable body of fresh water which only requires to be lifted a few feet to render it available for the irrigation of the neighbouring lands. Years ago in the Kolair Lake and in the Lankas bordering on the Uppeteru river such

cultivation was established under steam pumps and proved moderately remunerative, but gradually interest in the matter died out and the pumping stations were abandoned. The successful working of the oil engines has revived interest in the matter and pumping has recommenced and may possibly be largely resorted to.

In connection with the development of this modern phase of lift irrigation the improvement of existing wells is a matter of great importance and if only a small percentage are found suitable for working with oil engines and pumps, the absolute number will be large and they may become important inasmuch as they will often occur in those tracts of country which are most liable to be affected by the vicissitudes of the seasons. Owners of wells have generally some vague idea of the quantity of water they will yield, but they have very little notion as to the quantity of water which a 3" centrifugal pump will lift, and it frequently happens they want to set up pumps when the water-supply is quite inadequate. The most satisfactory way of investigating cases like this is to first of all ascertain the yield of the existing well towards the end of the hot weather and to put down an exploratory borehole to determine the nature of the surrounding rock. The borehole will generally furnish sufficient evidence to enable an opinion to be formed as to whether it is worth while to deepen the well. Sometimes the borehole taps fissures carrying water under pressure and materially increases the flow into the well; sometimes it reveals beds of porous rock which only require opening out to yield a copious supply of water. Where the rock is hard and the water is mainly found in fissures, the explosion of a charge of dynamite at the bottom of the borehole will sometimes materially improve the supply. As yet we have done very little work in this direction, but I am not without hopes from the experience already gained

that when wells can be sunk to a much greater depth than has hitherto been the native practice, it will be found that the inflow will in many cases justify resorting to pumping machinery. Where we can keep our engines fully employed, which means wherever we can command from 150 to 200 thousand gallons of water per day, the depth from which it can be lifted before this becomes an unprofitable operation is much greater than is the case in ordinary well irrigation. With this the limit is about 40 feet whilst 150 feet will probably be found practicable with oil engines and pumps. It is not so much the height to which the water has to be lifted as the risking of a large capital outlay in what must of necessity always be an uncertain undertaking which makes it at present doubtful whether sinking wells to any very great depth is to be encouraged. In some cases we have found that a very slight addition to the depth of a well enormously increases the inflow and it is just at this point that native well sinkers have to stop as the unwatering of the well becomes an exceedingly difficult operation when only mhotes or picottahs can be employed. Where the water is contained in sand it is not difficult to frame an estimate of the cost of getting at a certain quantity of the water and we do so by putting down an exploratory borehole to ascertain the thickness of the deposit of sand, which sand is itself examined to determine the size of the grains of which it is composed, but with wells sunk in rock we are in no such satisfactory position. We have but little more knowledge and much less experience than the professional well-sinkers of the country, and we shall have to make many experiments before we can teach the people of this country anything. To this end we have recently ordered a portable petrol-pumping plant which can easily be carried about and can be put down any well and used either for baling during construction work or for observations on the rate of

inflow. The Government of Madras have also sanctioned a sufficient sum of money for a systematic series of tests as to the advantage or otherwise of torpedoing boreholes sunk in hard rock. Our progress with wells of this type is not likely to be very rapid unless we can secure the interest and co-operation of the more intelligent men who are interested in the improvement of water-supplies for irrigation. Throughout the country there is doubtless a good deal of empirical information the collection and study of which would be of value. It would help us to make a better start, but I do not think it will carry us very far on our way as the water-supplies, which we are searching for, must lie at a much greater depth than is within the range of indigenous experience and to make them available we require an enormously greater supply of power than has ever been at the disposal of the owners of wells in the past.

The financial aspects of this method of lift irrigation have already been dealt with to some extent when we were discussing the relative cost of lifting water by the old and by the new methods, because in the figures given for the new methods of lift and proper allowance has been made for interest and depreciation on the capital outlay involved in setting up a plant. In an appendix to this paper will be found figures giving the actual cost of a number of installations which have been set up. The cost per acre to be ultimately brought under irrigation varies considerably. It may be as low as Rs. 50 an acre or as much as Rs. 200 an acre, but obviously for high-class cultivation where the yield per annum may be valued at Rs. 400 or Rs. 500 an acre it may pay very well to expend a great deal more than Rs. 200 per acre to get a good supply of water. In the Deccan under some canals near Poona as much as Rs. 50 per acre is the water-rate on land growing sugarcane, and in this Presidency many gardens and

plantations could easily stand a water-rate of a similar amount. It would have afforded me very great satisfaction to have presented accurate figures regarding the working expenses and return on a number of farms where this new system of lift irrigation prevails, but no one cares to furnish them. There is, however, ample evidence that it is very profitable and the best indication that it is appreciated is to be found in the fact that the rate of increase in the number of installations is greatest in those places where the number is already largest or where they have been longest at work. In ordinary years and under normal conditions, given a sufficient water-supply, there should be no difficulty in turning it to very profitable account, but often with oil-engines and pumps the greatest profit will be made in years when the season is unfavourable, scarcity prevalent and prices high.

In many cases oil-engines and pumps may be used to supplement other sources of supply and convert agriculture of an uncertain type into one of great certainty. One of the earliest installations in this Presidency was erected on the banks of the Cauvery from which river the water-supply to the pump is derived. The lands ordinarily depend upon channels from the river for irrigation water, but this is extremely uncertain, and partial or total failure of the crops occurred at such frequent intervals that the owners of the land derived nothing from it and the ryots who cultivated it earned a precarious livelihood. Over a tract of 300 acres a 12" pump has completely changed this. The natural water-supply may fail, but the pump is there to take its place and the whole area can be converted to perennial irrigation. The owner reports that during the last eighteen months 55 acres have been under plantain cultivation and have yielded a gross return of over Rs. 400 per acre, or about one and-a-half times the whole of the capital outlay

on the pumping plant. In a good year the return from paddy cultivation would have been about Rs. 50 per acre and the net profit very small. Under plantains the net profit on the 55 acres must have been sufficient to pay 50 per cent. on the initial expenditure. The area under perennial irrigation, such as plantains or sugarcane, would have been much larger, but it is restricted to 60 acres at this place by the Revenue authorities lest the water-supply to lands lower down the river should be interfered with.

From the figures given in the appendix it will be seen that the minimum cost of a pumping installation is about Rs. 2,000, and the actual out-of-pocket working expenses, being the necessary expenses for fuel, lubricating oil, stores and repairs, will be about Rs. 50 a month. The installation of engines and pumps is therefore a financial operation of considerable magnitude even with comparatively wealthy ryots. Very few, if any, have sufficient ready money, and a certain number of installations have been paid for by loans under the Agricultural Land Improvement Loans Act, such loans being usually repayable in twelve annual instalments. This method of financing these pumping schemes would be entirely satisfactory were it not for the difficulty which the borrowers experience in finding the necessary security. My experience is that the majority of loans applied for are rejected for this reason and it may possibly be desirable in the future to amend the Act so as to provide greater facilities for obtaining loans for the purchase of engines and pumps. If the machinery could be taken into account when assessing the value of the security for the loan, there would be no difficulty and loans would be freely applied for. Greater success has attended the sale of engines and pumps under the hire-purchase system which has been worked out by Messrs. Massey & Co. Under this method the would-be

owner of the pump has to pay one-fourth of the money down and the balance in instalments generally extending over two or three years during which time he has to pay 8 per cent. interest on the balance debited to him. He is thus able to get his engine and pump for a comparatively small initial outlay and to pay the balance out of profits accruing from the use of the pump. So far the system of working has proved satisfactory and it is probable that it will be resorted to very largely in the future when it becomes more generally recognised that irrigation under oil-engines and pumps can be made a very profitable business. The hire-purchase system is a very vicious one when applied to afford facilities for the purchase of unproductive goods by those who cannot afford them, but it has distinct merits in some cases and is an extremely simple method of financing small industrial undertakings as it provides the small capitalist with ready means to obtain money or the equivalent of money on fairly easy terms. It is possible that a great deal more might be done in this way if Government took the matter up, purchased the engines and pumps themselves and sold them on easier terms than private firms can do. The risk of loss will be very small as the engines and pumps would remain the property of Government till they are fully paid for, and they would never be sold except for use under conditions which will have to be investigated by the expert officers of Government and reported as satisfactory.

The number of oil-engines in use in this Presidency for minor industrial undertakings as well as for lifting water is growing rapidly and there has naturally sprung up a rather keen demand for men capable of driving the engines. The extreme simplicity of the oil-engine renders it possible to train fitters to look after them in a few days and there has never been any great difficulty about

getting drivers, but a good fitter is rather wasted when put to drive a small oil engine and his pay adds quite unnecessarily to the working expenses. In Madras we have started a school for Oil-engine Drivers where practical instruction is given in the driving of various kinds of oil engines and the pupils are put through an elementary course of fitting so as to enable them to take the engine to pieces, clean them and fit them together again. Anything more than this it is not considered necessary that a driver should know. If the engine really gets out of order it is better that it should be overhauled by a skilled mechanic and the driver in charge of it should be nothing more than a driver. A good many people, who have bought engines, have sent their men or servants up to this school to be trained, and after a course of instruction lasting from 3 to 6 months they are generally found quite capable of looking after the engine. In this way Oil-engine Drivers can be provided at a cost no greater to the owner than if he had to provide a man to look after a pair of bullocks. With large engines the saving in this direction is not a matter of much importance, but with small plants the fact that local men could be trained to do all the work that is necessary has tended much to increase the popularity of these engines. The Engine Driving school was originally started in the School of Arts, but it has now been taken over by, and forms part of, the Chengelroya Naiker's Technical Institute. The class is popular as the men who pass through it can always obtain work.

The fact that large monetary transactions are involved wherever oil-engines and pumps are set up and where the fuel for working them has to be purchased and paid for in cash has in a remarkable way led to a more definite appreciation of the monetary value of irrigation. This is still more emphasized by the rise in the price of food stuffs and

the tendency to pay farm labourers in cash instead of in kind. The farm is no longer so self-contained as it was, the working of it necessitates transactions outside the village and the crops have to be selected by the ryots not merely with a view to their own internal requirements and to meet the demands of Government and the District Board, but also to meet the charges connected with the working of the engine. Outside markets have to be studied to a greater extent than formerly and the cultivator is brought into more intimate contact with the outside world. Of course the movement is a very small one at present but the tendency is one in the right direction and should ultimately conduce to the development and education of the agricultural community.

In the South Arcot District where more pumps have been fitted up than in any other part of the country and where nearly all the wells have an unfailing supply of water, the owners of pumping plants are beginning to raise water and sell it to their neighbours when they do not want it themselves. At the Panampet pumping station which was leased to Messrs. Parry & Co. two systems of selling water were tried. Ground-nut crops were irrigated for Rs. 5 per acre per month and for other crops the whole supply of the pump was sold to any ryot who wanted water for a fixed rate per hour. This practice is very largely in vogue in the Western States of America where water for irrigation is a vital necessity, and if it is once recognised in this country that water is a commodity which can be bought and sold, it will probably greatly simplify some of the problems connected with the development of this kind of irrigation. Where the water-supply is very abundant and where the ryots have no capital and the land is sub-divided into small plots, it might be practicable to establish local water-supply companies who would raise water and

sell it to the ryots either for a share in the produce of the land, or for a fixed rate per unit of volume or a fixed charge per acre irrigated. If anything of this kind is to be brought about, it will probably be necessary for Government to pioneer the way and to provide sufficient legal protection to induce capital to flow in this direction.

It must be recognised that only in a few places will it be possible to pump large quantities of water from a single source of supply. The wells must be numerous and it will probably be found most economical to have a single power-generating station and to distribute the power electrically, driving centrifugal pumps with electromotors. Large power-stations are much more economical than small ones, and it is quite possible to put in motors and pumps that require no more supervision than that a man should go round and oil them once a day. Such water-supply corporations exist in America and have worked successfully for years past, and it is quite certain that there are no engineering difficulties worth speaking of. On the other hand in India it will require an immense amount of tact and patience to get the advantages of such a system acknowledged. To make it profitable intensive cultivation must be adopted, and even if the capital is forthcoming to enable this to be carried on, it is doubtful if the ryots possess the requisite experience to make it a success. After studying the question of the better utilisation of subterranean water for but a very short time I am convinced that there are no serious difficulties from the Engineer's point of view, either as to a sufficiency of supply or as to the cost of raising it above the ground so as to make it available. On the other hand the practical administrator, who would like to make use of this water and apply it to the land so that the people may be placed in a

position which will enable them to carry on their agricultural work with a fair amount of certainty, will find the achievement of his wishes a task of extreme difficulty.

The purchase of land is a favourite form of investment in this country and the line of least resistance seems to lie in the direction of encouraging people who have amassed wealth to purchase land which is capable of improvement and to reserve a considerable amount of their capital for the improvement of the land they have purchased. Money invested in land yields a very poor return, but, judiciously invested in the improvement of land, the results are likely to be much more profitable and the value of the land permanently increased. The work which is being done in this direction by men like Mr. Gopinatha Tawker, at Surapet, Mr. Tota Ramanujam Chetty, at Katalai, Mr. Panduranga Mudaliar, at Cuddalore, Mr. Tilla Govinda Gramani, at Nellikuppam, Mr. Abraham Pandither, at Tanjore, and by many others, is pioneer work of the utmost public value and deserves recognition at the hands of their fellow countrymen.

Irrigation by pumping is still in its infancy, but the success which has already attended the earlier installations renders it certain that it will grow rapidly and there is a vast field for it in Southern India. What has been accomplished so far is the direct result of the modern developments of the internal combustion engine in its various forms, and there is reasonable ground for hoping that further improvements may be effected in the future rendering motive power still cheaper and pumping appliances more effective.

APPENDIX I.

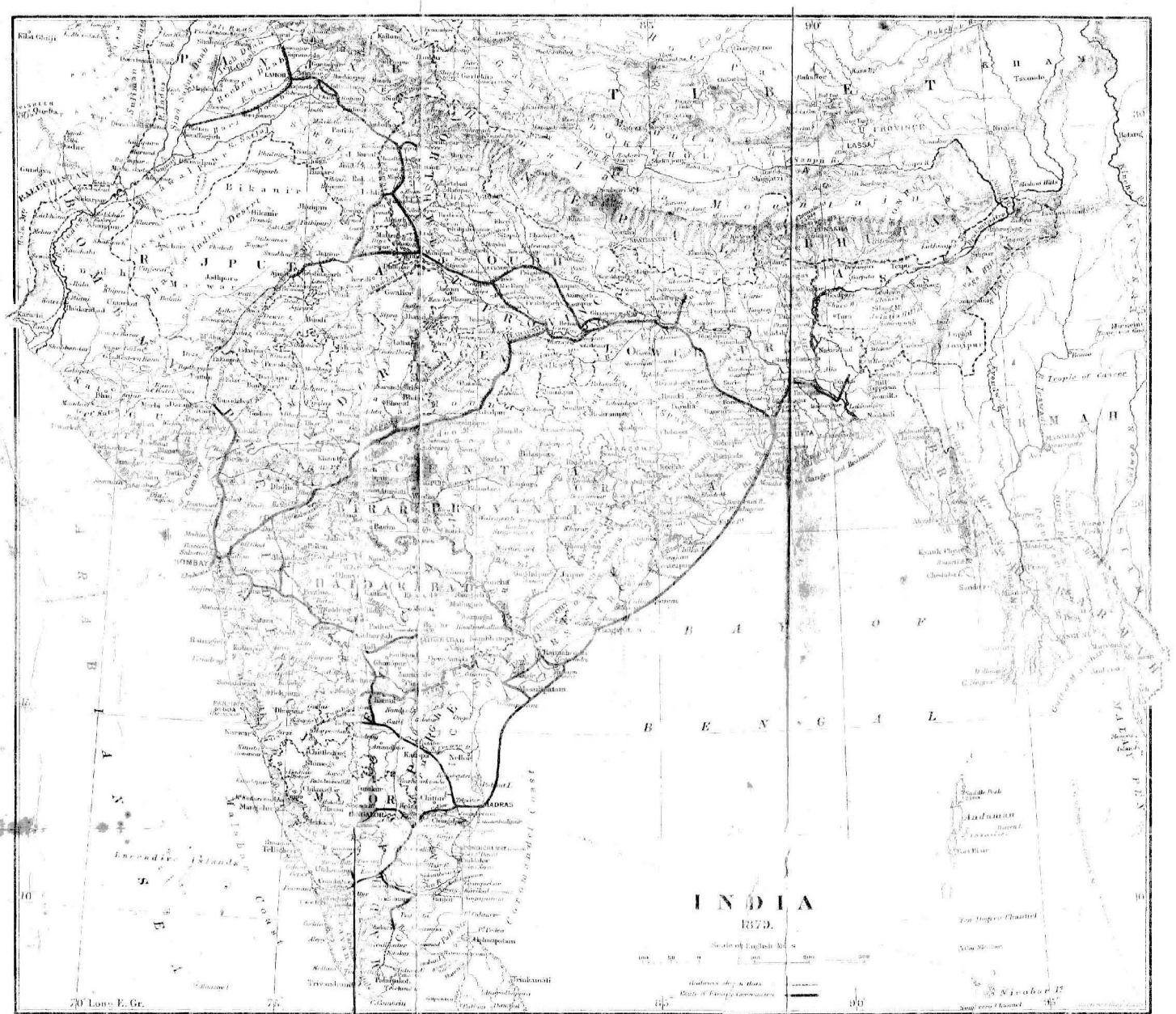
List of Papers on Subjects connected with Lift Irrigation.

- 1 Construction of Wells for Irrigation in the North-West Provinces.—Captain CLIBBORN, B.Sc.
- 2 Note on the Construction of Wells on the Ava Estate —W. J. WILSON. (*Department of Agriculture and Commerce, North-West Provinces and Oudh.*)
- 3 A Note on Trials of an aermotor in Well Irrigation — W. H. MORELAND. (*Bulletin No. 11 of 1900—Department of Land Records and Agriculture, North-West Provinces and Oudh.*)
- 4 Hydraulic Experiments in the Kistna Delta —ALFRED CHATTERTON. (*Professional Papers No. 2, College of Engineering, Madras*)
- 5 Experiments with Water Lifts —ALFRED CHATTERTON (*Bulletin No. 32*)
6. Water Lifts —ALFRED CHATTERTON. (*Bulletin No. 35.*)
- 7 Note on Irrigation by Pumping from a Well at Melrosapuram.—ALFRED CHATTERTON. (*Bulletin No. 55—Department of Land Records and Agriculture, Madras, Agricultural Branch.*)
8. The Value of Wind-mills in India —ALFRED CHATTERTON.
- 9 Lift Irrigation (pp xi-240).—ALFRED CHATTERTON. (*G. A. Natesan & Co, Madras*)
10. Report on Industrial and Agricultural Development.—ALFRED CHATTERTON. (*Government of Madras (Revenue) G.O., No 393 of 5th May 1905.*)
- 11 Manual of Irrigation Wells —E. A. MOLONY (*Bulletin No. 22—Department of Land Records and Agriculture, United Provinces*)
12. Report on Experiments with oil-engines and centrifugal pumps in 1905-1906.—ALFRED CHATTERTON.
13. Report of the Experimental Pumping Department in 1906-1907. - ALFRED CHATTERTON.
14. Report on the Trials of M R Ry Rao Bahadur C. K. Subba Rao's improved water lift.—W. H. JAMES. (*Proceedings of the Board of Revenue, No. 386 of 18th October 1906.*)
15. Report on the Operations of the Department of Agriculture, Madras Presidency, 1905-1906.
16. Report on the Operations of the Department of Agriculture, Madras Presidency, 1906-1907.

APPENDIX II.

Actual Cost of Installations under the Sub-heads.

Serial number.	Name of station.	Engine.			Pump.			Storage of oil.	Foundations.	Engine shed.	Polding.	Miscellaneous including circuiting cistern and fitting charges.	Total.
		B.H.P.	Cost of engine.	Cost of fittings.	Size of pump.	Cost of pump.	Cost of fittings.						
1	Kuhoor	3 $\frac{1}{2}$	965	150	3"	285	93	30	40	30	50	82	1,725
2	Unjalur	5	1,288	77	3"	270	145	20	50	35	31	86	2,000
3	Thimmanacharikuppam	5	1,272	42	3"	270	103	20	70	30	31	82	1,920
4	Tanjore	5	1,286	180	3"	300	78	30	110	35	20	108	2,140
5	Pagalpatti	7 $\frac{1}{2}$	1,472	108	3"	285	90	30	60	35	30	105	2,215
6	Dorgallu	7 $\frac{1}{2}$	1,420	82	3"	300	145	30	50	150	43	110	2,330
7	Thirukkarugavoor	7 $\frac{1}{2}$	1,597	77	4"	365	135	30	50	150	40	121	2,565
8	Bangalaputhur	7 $\frac{1}{2}$	1,548	101	4"	345	165	30	50	35	40	118	2,430
9	Ramiyyapatam	7 $\frac{1}{2}$	1,548	91	4"	315	127	30	150	35	57	119	2,470
10	Nellikuppam	9	1,794	93	4"	365	128	30	80	50	40	130	2,710
11	Pallavaram	14	2,474	180	5"	450	.	30	80	200	81	175	3,670
12	Laccavaram	14	2,240	318	6"	385	243	60	100	200	81	183	3,810
13	Kataisi	25	4,423	730	12"	1,265	445	150	200	750	123	404	8,400
14	Haigari	28	4,800	755	10"	1,100	411	150	250	1,000	100	429	8,995



INDIA

1870.

Scale of English Miles
0 100 200 300 400 500

Indians by a Day
Days of European Commerce

70 Long E. Gr.

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See the
1870

ASSOCIATION
THE
INDIAN SUGAR QUESTION.

Three Articles contributed to the
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By
"INDIAN ECONOMICS."

X9(F68).2

BOMBAY:

PRINTED AT THE "TIMES OF INDIA" STEAM PRESS.

1899.

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THE
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1899.

NOTE,

WITHOUT necessarily committing the Association to take any particular side in the theoretical portion of the discussion raised by the writer in the earlier portion of the accompanying letters, the most practical question to which he has endeavoured to draw public attention in the bulk of his contributions is deserving of consideration. No doubt, in the Presidency of Bombay at least, the Excise policy of the Government has been not a little prejudicial to the growth of sugar manufacture, and it is to be hoped that this contribution by "Indian Economics" may prove so far helpful as to lead to a wider discussion and bring about a modification of the views of the Government of India and the local Government in their attitude in reference to the discouragement of sugar manufacture by reason of sacrificing of large interests to the success of an easily managed District Excise revenue.

FREE TRADE AND BOUNTIES.

PROFESSOR FAWCETT'S PLEA EXAMINED.

The importance of the issues which have been raised by the Government of India in the enactment of the Tariff Amendment Act of the 20th March, 1899, can hardly admit of dispute. The scope of the issues thus raised may not, perhaps, have been fully realized in the minds of some of the advocates on either side. But when argument and discussion take place, more especially when men's interests sharpen their wits, much of the hesitation felt at first disappears, and a welcome light dawns on what otherwise looks hazy and dim. The time that has elapsed since the 20th March is not sufficient for the consideration of many side issues; but some obvious fallacies have already disappeared. Among others, one thing is clear that there is a great preponderance of opinion, both European and Indian, in the Press and in the Council, in support of the action taken by the Government. The divergence of the Bombay Chamber of Commerce from other Chambers has been satisfactorily explained by the fact that the dissenting Chamber represents the interests of the mercantile importers of foreign sugar rather than the general interest of the country at large.

The interests of India in this matter are identical with those of the British Colonies in all parts of the Empire. It now appears that, even before Lord Curzon was enabled to congratulate the Council on its unanimity of views on this point, the decision had been arrived at in Lord Elgin's time, so far as the main question of the

bounties was concerned. The only hesitation Lord Elgin's Government felt in the matter was as to how far countervailing duties would accomplish the main purpose of checking the disastrous and unfair competition of some of the foreign Powers. On this point, the Government of India appear to have been satisfied by the arguments addressed from Home, that an admittedly urgent situation could be adequately met only by one line of conduct. It has been said that the Colonial Minister, Mr. Chamberlain, has borne down the opposition of his colleagues ; and that he was moved to do so more in the interest of the Mauritius planters than the real interest of India. The correctness of the position has been impugned. Certain it is that Mr. Chamberlain has himself been a late convert to the views of countervailing duties. He opposed such duties many years back in 1884, as a member of Mr. Gladstone's Cabinet, and if he has been since converted by the effect of his contact with the sugar industry in the West Indies, it is hardly fair to hold him responsible for the energy with which he naturally throws himself into this and similar questions. It is not Mr. Chamberlain who is the author of the fiscal change of policy that has taken place in the front ranks of the Conservative leaders. The real credit of the change is due to the Premier, Lord Salisbury, who for the last fifteen years and more has steadfastly contended that the extreme position of the Free Trade School required a modification amongst the peculiar development taken by the protectionist policy which has found extensive favour in the great Continental powers. If English opinion has been slowly gained over to this view it has been due to the ruin of the West Indies sugar industry,

in whose case the advocates of Free Trade have no other consolation to offer than what has been afforded by the large money gratuities sanctioned by the House of Commons to prevent the ruin of the planters. The United States, more circumspect in their wisdom, adopted differential duties, and some of the Australian Colonies took the same precaution in self-defence. It is not to be wondered at, therefore, that the Government of India, though at first themselves unwilling to have recourse to extreme measures, were finally persuaded to change their views until at least a concert of European powers could be arranged to give up this doubtful privilege of bounties on sugar exports.

This is the true genesis of the situation, and now that the question has come before the House of Commons in a side issue raised by the action of the Government of India, its vote will raise much larger issues and solve or ought to solve the whole question of bounties on exports as against countervailing or, if you like, protective duties. Conferences and Conventions have been tried since 1887, with the result that things, so far from being mended, have gone from bad to worse in a policy of mere drift. The real problem is not one of academical discussion. The issue is, as was well put by the Marquis of Salisbury twelve years ago, "You may expostulate with your neighbour, and point out the imprudence of his action; but if such expostulation is not likely to lead to a satisfactory conclusion, you can only bring him round by acting as he is acting to you." This is the whole philosophy of the question, and now that the issue is raised, the House of Commons will decide not only the weal of India but also of the whole British Empire.

We propose to discuss Professor Fawcett's plea in his paper on Free Trade and Protection, where he especially devotes a chapter to the French Sugar bounties, as they were permitted to work in England twenty years ago. Lord Farrar's Cobden Club papers follow the same line as Professor Fawcett. They both contend that in respect of bounties the only question England need consider is the cheapness in the value of bounty-fed sugar imported into Great Britain. If that cheapness is ensured, it is a matter of no consequence whether it is brought about by foreign subsidies or railway or steamer concessions afforded at State expense, or whether it is due to normal and natural considerations regulating the cost of relative production, natural advantages, or even monopolies. This is the extreme position of the school, and it was in respect of this extreme position that H. E. the Viceroy spoke in a rather uncomplimentary way of "the mutterings of the high priest at the shrine of Free Trade." Of course nobody questions the right of France, or Austria, or Germany to compete with each other in India or any other country to sell their goods cheaply in the ordinary flow of natural competition. Such under-selling is in the general interest of the greater number, but it is neither Free Trade nor equity when the under-selling or cheapness is brought about by artificial means made disposable at the expense of the State treasury, with a view to run rivals in the first instance, and, in the case of weak communities such as those in India, to rule in the end the markets, once this strong foothold is obtained. Though Professor Fawcett and Lord Farrar hold that cheapness is the only consideration, the great Cobden did not seek Free Trade principally for the sake of purchasing goods at a

cheaper money value. The only cheapness he valued was that determined by natural price in the world's market. Whether this natural price made goods dearer with Free Trade, or cheaper, it did not matter to Mr. Cobden in the least. He was only anxious that the people of England should have the world's goods at the natural prices "when every source of available supply is opened as nature and nature's God intended it." It will be thus seen that Cobden would not have favoured the view of cheapness ensured not by nature and nature's God, but by a combination made possible by State subsidies.

Professor Fawcett, in his second chapter on bounties, observes that "if French bounties enabled England to purchase French sugar at a considerably lower price, and the French Government continued this course, we should be in England the last to complain that the French are willing thus to tax themselves for the benefit of others." Professor Fawcett notices that English sugar refiners protested in 1876 against this subsidised competition, and these refiners called upon the English Government to levy countervailing duties with a view to neutralise the effect of the bounties. The controversy as thus raised in the second chapter of Professor Fawcett's work clearly raised the question which the Government of India has now dealt with in the interest of this country. In arguing with his opponents, Professor Fawcett admits that "the interests of the English sugar refiners are greatly injured by the French authorities bribing their own sugar refiners, with a view to enable these last to sell their goods in foreign markets at a price which without State subvention would not have proved remunerative. The injury on one side and the unfair advantage

on the other being thus admitted, one would suppose that Professor Fawcett would denounce this illegitimate violation of Free Trade principles. He, however, prefers the sole consideration of present cheapness, and urges in support of a policy of inaction the only ground that "if we once embark on protecting special trades against the harm which may be done by other countries, we should soon ourselves be involved in a labyrinth of commercial restrictions and protective tariffs." This is the only argument which satisfies Professor Fawcett, and it must strike any reader that the statement made above shows its hollowness and involves a patent fallacy. A man may be a Free Trader, but the Free Trade position does not involve a concession in which injury may be done to the native producer, and the foreigner is given an unfair advantage secured not by his own resources but by State policy. Underlying the so-called Free Trade, the position of a fair and reciprocal equity cannot be altogether ignored. Whether the advantage is legitimate or otherwise, and whether the immediate cheapness ensured may not lead in the near future to the ruin of incipient industries in other countries—both these considerations cannot be wholly kept out of view. One would think that Professor Fawcett would have been able to set up a much better case than this. Of course if no incipient industries are likely to be interfered with for the worse, the cheapest argument might be accepted, and no question asked, as we do not generally look a gift horse in the mouth. This is said to be the case in England, where the refiner's trade has almost been killed. In the West Indies, Australia, and in the Mauritius, the situation of things is admittedly otherwise, and here in India there is clear proof of injury to the new

incipient industries in refined sugar, and of an unlimited possibility of depression to the unrefined sugar industry.

In India considerations of temporary cheapness ensured by foreign subsidies cannot, therefore, be left out of account. The question whether the area of sugarcane production has been sensibly diminished by reason of cheapened imports from European countries will be considered later on, but even if, as observed by some, the reduction in area is only apparent and is due to famine and other causes, the issue will not be much affected. The question still remains whether foreign countries compete with India on natural terms of competition. If they do not, and domestic industries suffer more or less, there is a clear case for action. Another side issue has been raised as to whether the domestic production of unrefined sugar is chiefly used by the vast majority of the people, and only a very small proportion of the community only uses the foreign refined sugar. The point is itself worth consideration, and will be treated later on, but this issue also is outside the question. It is admitted by publicists on the other side that a refining industry has risen up to the extent of 75 lakhs; but supposing it was less than that figure, still the possibilities in the near future cannot be wholly neglected where an unfair advantage is being pushed on for an admittedly great stake. If once the Indian industry in its higher stages is swamped nothing is more likely than that the Indian producer will settle down to his usual resigned condition, and that the whole market will be commanded by the foreigner. These points do not appear to have struck Mr. Harold Cox, Secretary of the Cobden Club, in his

recent pamphlet. He, indeed, speaks of the duty of encouraging the Indian producer to attempt to take to higher enterprize, and he calls on the Government of India to help it. This, however, involves a breathing time, and in the meanwhile things cannot drift hopelessly. We hope to consider this question also, and point out that over and above the countervailing duties the Government of India has a function to encourage the growth of industries. A third side issue has been raised, which seeks to distinguish between the interests of India and those of Mauritius. It is supposed that a clever bait has been thrown out by the Mauritius planters, and that Mr Chamberlain, Lord George Hamilton, and the Government of India have yielded to the temptation. If Mauritius competed unfairly, or its Government subsidised its planters, the mere consideration that it was a British Colony would not justify India from crying down the injustice. As it is, however, the Mauritius planters seek to protect themselves and others, and India has no reason why it should not seek to make common cause with Mauritius, even though the immediate advantages might be more decidedly in favour of Mauritius than of India.

We propose in another article to notice these side issues, but we hope we have shown here that the main question is in a nutshell, and that when thus considered, Professor Fawcett's defence of Free Trade *versus* Bounties does not appear to be a very cogent argument in support of the policy of inaction. On his own principles the action taken by the Government of India is amply supported and fully justified.

INDIAN ECONOMICS.

COUNTERVAILING DUTIES.

THE BOMBAY PLEA EXAMINED.

In the *Times of India* of May 23rd, the writer undertook to consider the question how far the area of sugarcane production has been sensibly diminished by reason of cheapened imports from European countries. The recent publication in the *Gazette of India* of the reports of the several local Governments throws fresh light on the discussion of this inquiry, which was ordered by the Supreme Government to ascertain the effects which the increasing imports of refined sugar from Europe and Mauritius have so far exercised on the market, with respect to the price of Indian grown sugar, and the profits of sugarcane cultivation. Of all the provincial Governments consulted, it is most noticeable that the Government of Bombay alone was led to hold that neither the commercial nor the agricultural interests of the Presidency have been injuriously affected by the increasing imports of foreign sugar, and that these interests do not call at present for the imposition of countervailing duties upon that part of the imported sugar, the export of which to this country is aided by bounties. Mr. Muir-Mackenzie, Secretary to the Government of Bombay, admits that the importations of European sugar, of recent years, were altogether abnormal, but it is stated that these importations were due to famine, and that they did not check the cultivation of cane or the production of unrefined sugar, to which practically the whole of the cane produce is devoted in this Presidency. Unfortunately, neither of

these three positions is borne out by the experience of the other provinces, nor by the statistics furnished in the statements which accompany the report from the Government of Bombay.

Turning first to other provinces, it seems that the Lieutenant-Governor of the North-West Provinces holds the opinion that foreign competition has already begun to affect the native sugar industry in Northern India, even though the Government of those provinces is not prepared to admit that the cultivation of sugarcane was sensibly affected. Sir Antony Macdonnell was satisfied that the foreign imports were causing serious injury to the sugar industry and to the agricultural labouring population of the cane-producing districts to such an extent that in his opinion the bounty system, which resulted in such injury, justified the action of the Government in seeking to remove this hindrance to the freedom of exchange. The Lieutenant-Governor gave his opinion with great reserve on certain points in reference to which his adviser, the Director of Agriculture, gave free expression to the view that there was a shrinkage in the area of cultivation and a decided stoppage over a large area of sugar refineries as the result of foreign competition.

The Government of Assam noticed that in that province the produce of cane, which was 22½ million pounds in 1881-82, decreased to 19½ millions in 1891, to 16½ millions in 1897-98, and that this decrease was attributable to the increased importation of refined sugar coming from the Bengal side, though the precise proportion of foreign imported sugar could not be ascertained.

The Secretary for the Berars, under the charge of the Resident of Hyderabad, wrote to say that though the area under sugarcane was insignificant in that province, still, such as it was, the figures showed a falling off from 5,315 to 3,159 acres. The wants of the population were previously supplied from the N.-W. Provinces, but of late years, the supplies came chiefly from the Bombay port, and were, therefore, foreign sugar from Mauritius and Europe.

The report from the Secretary to the Punjab Government remarks that though cane cultivation had not fallen off sensibly, it was not extending, as might have been expected in that province, in which irrigation works have been largely increased. The Secretary's report also observes that native sugar refineries were being closed, and that the imported sugar which before came from the N.-W. Provinces was now chiefly made up of foreign refined sugar.

The opinions of the Bengal and Madras Governments have been from the first favourable to the views supported by the Chambers of Commerce in these provinces, and it is not, therefore, necessary to refer to them at length. In both provinces the falling-off in area of sugarcane production has been noticed, and in the Bengal Presidency the closing of the sugar refineries, both native and European, was commented upon as being of a character to justify special action. It will thus be seen that, excepting Bombay, all the great provinces in the Empire were agreed in the view that the production of cane was more or less sensibly affected by reason of foreign imports, chiefly from Europe, and that, in consequence, the refining industry was more or less seriously threatened.

The opinion of the Bombay Government is thus in direct conflict with those of the other provinces, and the question naturally arises, how far the particular circumstances of this Presidency warranted this divergence of views? As far as the figures set forth in the statements appended to the report from the Secretary to the Bombay Government can be accepted, they would rather show that the reduction in the cane area was, if possible, still more to the prejudice of the Western Presidency than in most of the other provinces of India.

In the North-West Provinces and Oudh the average for the five years from 1884 to 1887 showed a total of 9,20,000 acres under cane. This figure rose gradually till 1895, when the total stood at 12,70,000 acres. The next two years of famine showed slight reductions, being respectively 4 and 9 per cent., but in 1898-99 the number rose again to 12,27,000 acres, which was about 3½ per cent. less than the highest figure before attained. Notwithstanding the recuperative power shown by the united provinces, Sir Antony Macdonnell and his advisers were not satisfied with the progress achieved.

In the Bengal Province, the extent of cane cultivation in 1892-93 was 10,71,000 acres, and it fell to 9,44,600 just before the famine, which showed a decline of about 12 per cent. During the famine years there was a further falling off to 8,39,800 in 1896-97.

In Assam the average of the five years, 1884-87, was stated to be 25,000 acres, which fell to 20,560 in 1896-97.

In the Central Provinces the average of five years, 1884-87, was 54,000 acres, and this went down to 40,765 in the year before the famine,

and during the famine there was a further falling off to 34,671 acres.

In Madras the five years' average, 1884-87, was 62,200 acres, and it fell to 58,591 in 1895 before the famine, and to 58,000 in the famine year. These figures showed a decline of about 6 per cent.

In the Punjab the five years' average, 1884-87, was 3,75,000. The figures rose as high as 3,98,000 in one or two years, but fell to 3,98,121 in 1897-98, which represented a decline of about 7 per cent.

Coming finally to Bombay, we find that the five years' average from 1884-87 was 82,000 acres in British territory, and about 43,000 acres in Native States, making a total of 1,25,000 acres. Confining our attention to the British figures only, we find that this average of 82,000 rose to 92,231 in 1888 for Bombay and Sind. During the next ten years this maximum limit was never reached, the highest figures in any of the intervening years being 82,000 and 83,000 acres. In the year preceding the famine the total was 74,477 acres. In the next two years, which were famine years, the figures fell to 69,553 and 56,817 acres. In other words, excluding the famine, the falling off in the British Districts was nearly 18,000 acres, i. e., about 20 per cent. If the famine years were included the falling off was nearly 40 per cent. Such a decline was not noticed in the figures for any of the other provinces. These figures dispose of the excuse about famine, of which so much has been made in certain quarters. There has been a decline in all provinces, even before the famine. The famine did not sensibly affect, except in some provinces, the further decline noticed above. A careful consideration of

these figures show that the circumstances of Bombay are, so far as cane production is concerned, both relatively and absolutely worse off than those in the other provinces of India, and the statement made in the official reports to the effect that the reduction might be due to famine, and further, that there has really been no check to the cultivation of cane, or the production of unrefined sugar, is not borne out by the statistics attached to the report.

The Deputy Director of Agricultura, on whose advice the final report was drawn up, indeed attempted to make out that the ten years from 1887 to 1897 showed variations expanding abnormally in three years, dropping abnormally in one year, and showing a moderate degree of variations in other years. This view of the matter would have been corrected if the figures for the other provinces had been studied simultaneously with those of Bombay. Absolute differences between province and province must be determined by special facilities, but relative differences over a long course of time, spreading over nearly fifteen years, cannot be merely described as occasional and due to seasonal variations. In the present case the operation of the last famine must be discounted equally in all the provinces, because the famine of 1896-97 was general throughout India, and was not confined to Bombay. The average falling off in cane production for the whole of India has been estimated at about 10 per cent. independently of the famine, the highest total being 31 lakhs of acres in 1891-92, and since then ranging between 27 and 29 lakhs during the next five years, excluding the famine. The falling off in this Presidency was nearly double the average shown

above, and it must be clear that this higher decline, excluding the famine, ought to be accounted for more satisfactorily than merely attributing it to ordinary variations.

This becomes more obvious still if we carry the review further back another five years, commencing with 1880, for the larger districts. It appears that sugarcane cultivation in this Presidency received a start soon after 1880, when irrigation facilities became largely available. In 1881-82, Ahmednagar District showed a total of 2,801 acres, and this figure rose to 5,558 in 1888, and in none of the subsequent years did the figure rise higher than this total of 1888. This was the case also with Dharwar, which started with a total of 3,791 acres in 1881, and rose to 6,317 in 1889-90, and in none of the subsequent years did the total rally to that figure again. Satara similarly showed a total of 8,336 in 1881, and it rose to 17,045 in 1888, which figure was never reached in any of the subsequent years. In the case of the Naik District the total in 1879-80 was 4,749 acres, and it rose to 10,915 in ten years, and since then the figure during the next ten years never reached this total. In the case of Poona, there was a little departure. Poona started with a total of 5,500 in 1881-82, and this figure rose to 13,395 in 1888. There were two exceptional years since then, when the figures rose to over 14 and 15 thousand, but in all the other years the total did not reach the figure for 1888. Taking a survey of the twenty-three Districts of this Presidency, the exception noticed above in regard to Poona applies in a slight way to Ahmedabad, Khandesh, Sholapore, Bijapore, Karwar, and Hyderabad, where one or two years

showed a departure from the total reached in 1888, but with these few exceptions, all the twenty-three districts showed a common feature in that there was a shrinkage during the last ten years everywhere, and some explanation should have been attempted for this rather remarkable state of things. The Director of Agriculture is in every sense the proper authority to speak on such a point, but unfortunately he passes it over, or attributes it to a mere variation incidental to large figures. It is a certainly a phenomenon, the full significance of which has not been realized by the department. The inference is obvious that for one reason or another there has been, quite independently of the famine, a noticeable decline in the sugarcane area of production in this Presidency not confined to one district or to one year, but generally and uniformly over a number of years throughout the Presidency, and that this uniformity of decline distinguishes this Presidency to a larger extent than most of the other large provinces. Whatever the cause—and only one cause is possible, *viz.*, the unprofitableness of the industry due to foreign competition—one thing must be accepted, *viz.*, that the decline was not due to famine, and that there has been a check to cane production of a very serious character, which should have attracted the notice of the authorities here long before the Government of India moved in the matter.

We have stated above that this decline is due to the unprofitableness of the sugarcane industry resulting from foreign competition. This position is also not admitted in the report, but the statements appended make this clear beyond doubt. Appendix B exhibits the Pre-

sidency imports and exports by rail, coast, and sea, and the balance of imports over exports for the past ten years. These figures do not include the indigenous production raised in the Presidency itself. Confining our attention to refined sugar only, it will be seen that the rail and coast traffic in imports bear a very small proportion to the sea imports, being only 3.3 and 1.5, or nearly 5 per cent., and the sea traffic is 95 per cent. Excluding rail and coast, the imports by sea, which were 95 per cent. of the whole, were on an average 19,38,079, or nearly 19½ lakhs of maunds. Deducting exports, chiefly by rail, which comes to about 4 lakhs, the net balance of imports is 17 lakhs maunds on an average of ten years. In 1888-89 the net balance of imports of refined sugar was 12 lakhs, and it rose in ten years to 22 lakhs maunds nearly in 1897, *ie.*, about 10 lakhs maunds in excess of the first year. As this presumably came by sea, we may take it to be foreign imports. The highest cane acreage figure was reached in 1888-89, when, as has been shown above, the total of cane acreage was for the British Districts 92,000. Excluding the famine years the reduction was shown to be 74,000 acres, and the actual reduction was 18,000 acres. This excess of nearly 10 lakhs maunds in the course of as many years represents the encroachment of foreign imports, which filled up the corresponding deficit in the course of domestic production in the same period, caused by the lower prices of foreign sugar imported from abroad. In other words, the decrease in cane production is, for the most part, met by the increase in foreign imports, and it may be safely assumed, therefore, that to the extent that

the domestic production is falling off, the imports from abroad are gaining ground. The assertion, therefore, that there has been no check on the production of unrefined sugar is not borne out by the facts stated above.

We hope thus to have shown that there has been a very serious decline in the area under cane cultivation, and in the production of unrefined sugar in the Bombay Presidency, whose place is being supplied by foreign imports, and that this falling off is not due to famine. The ground, therefore, of the statement made in the report of Mr. Muir-Mackenzie needs to be reconsidered, and such reconsideration will show that, as in the other provinces, the agricultural interests of Bombay have suffered to an extent as great as those of the other provinces. Here we must stop for the present, reserving for further consideration a still more unfortunate statement made by the Director of Agriculture in regard to the impossibility of effecting any improvement in the sugar industry of this Presidency.

INDIAN ECONOMICS.

FREEDOM VERSUS MONOPOLY.

THE SUGAR INDUSTRY AND LIQUOR EXCISE.

In the second article published in the *Times of India* of the 1st of June, the writer examined the position taken up in support of the plea against countervailing duties in Bombay, and attempted to show that there has been a decided falling off in sugarcane production during the last ten years, and in consequence a wholesale displacement of unrefined Indian sugar by the foreign imported article on the strength of its comparative cheapness. We promised to refer to a still more untenable position taken up by the Deputy Director of Agriculture as regards the impossibility of establishing an improved sugar industry on a large scale under any circumstances, at least in this part of the country.

In the fifth para. of the letter sent by Mr. Mollison, Deputy Director of Agriculture, through the Survey Commissioner and Director, it is stated that it is not possible to produce profitably from the Bombay sugarcane crop refined sugar of superior class, even if treacle or other by-products could be utilised in the most profitable manner possible, and he refers to the Poona factory at Mundhva as having proved an unprofitable undertaking, even when equipped with all modern appliances. Mr. Mollison observes that many reasons might be given for this result; but he refers to one conclusive reason in support of this position, and says that this conclusive reason is the alleged fact that with average rates for *gool* it is more

profitable to make *gool* than refined sugar. A greater misconception than this, both as a statement of fact, and as a reason adduced in support of it, cannot be easily imagined. The ordinary rates of *gool* when it parts from the rayat-producer to the trader, are seldom more than Rs. 12 to 15 per palla, according to quality, while the average price of refined sugar seldom ranges lower than Rs. 24 to 30 per palla. The difference is thus a 100 per cent, under ordinary conditions. The exceptional rates to which reference is made in the same para. towards the end, Rs. 27 and Rs. 23½ per palla, apply to Kolhapore sugar as compared with Mauritius sugar, and are said to be paid by some ultra-orthodox Hindus who prefer brown sugar made in the country to imported brown Mauritius sugar.

This confusion of *gool* and Kolhapore sugar, and of average with exceptional rates, vitiate the whole argument. The Deputy Director himself admits, and the table appended to the report shows it clearly, that the prices quoted for *gool* show great variations. The monsoon month rates are much the highest, and the rates of other seasons vary because of forced sales by cultivators. Confining attention to Poona, the average *gool* rates for twelve months were Rs. 4-8-2 in 1895, Rs. 5-5-0 in 1896, and Rs. 7-5-3 in 1897. The refined sugar rates for the same period in Poona were Rs. 9-14-3 for 1895, Rs. 10-12-3 for 1896, and Rs. 10-15-8 for 1897. On an average, therefore, the difference is nearly twice in the first two years and 50 per cent, in the third year. These figures are for Poona. Rates for refined sugar in the Bombay market are slightly lower than those in Poona, and as regards unrefined sugar, *gool*, the rates in

Bombay are higher than those in Poona. These differences do not support the position taken by the Director that with the average rates for *gool*, it is more profitable to make *gool* than refined sugar. It is unfortunate that the Customs Commissioner, Dr. Pollen, generally concurs in the report of his subordinate. There is, however one important difference in Dr. Pollen's view, which takes away the value of the opinion given by the Deputy Director in the fifth para. of his report about the impossibility of profitably producing refined sugar under any circumstances in this Presidency. Dr. Pollen admits that the sugar made at Poona seems to be able to hold its own against the imported article even at the present low prices, and Mr. Morrison, the Collector of Bombay, also says that the experiments made at Poona apparently gave satisfactory results, though they did not lead to any practical efforts in the direction of increase in production. Dr. Pollen falls into another mistake, though he corrects the mistake of Mr. Morrison. He thinks that there is not much demand up-country for the refined article, home-made or foreign, and that the cultivation of sugarcane will continue to flourish in this Presidency, and the foreign sugars will continue the fight for the possession of the refined sugar market only, without injuriously affecting the interest of the Indian cultivators in any way.

In our last article we showed how foreign sugar was driving out the Indian sugarcane and the native industry, by reason of its cheapness. The imports of foreign sugar, as set forth by the Collector of Bombay in his memorandum, show that the sugar imported rose from 16 lakhs cwts. to 46 lakhs cwts. in ten years, 1889 to 1898, and even

excluding the last two years of famine, the figure is 27 lakhs and more, whilst the domestic production has fallen off by an equal amount, as shown in our last paper.

With regard to the capacity of the Poona factory to develop the sugar-refining industry in this Presidency, we are, however, not left to choose between Dr. Pollen and his subordinates. No better authority on this particular subject can be referred to than Mr. Ozanne, who may be regarded as a specialist, and who was Director of Agriculture in Bombay for many years. In his annual report for 1884-85, Mr. Ozanne refers to the Poona factory as having exhibited an excellent sample of refined sugar. Mr. Ozanne says that about the time he wrote, "the price obtained for *gool* was almost prohibitively low, and that sugarcane will not be grown with profit," obviously unless the sugar industry was promoted with modern appliances. "With a brisk manufacture of sugar a large extension of cane cultivation is certain under Khadakwasla Canal, which runs close by the factory, and further, it will be in the interest of the manufacturer to seek to improve the cultivation of the cane crop." Mr. Ozanne thus nearly fifteen years ago discovered the true secret of the cause which has brought about the decline in the cane cultivation, and he also suggested the remedy by which this decline could be checked, and the sugar industry placed on a proper footing. Mr. Ozanne had his heart in the work of his department, and instead of imagining excuses for inaction, he felt full sympathy with the enterprise set up near Poona, with the support of the Government of the day. He himself went to see the works, and gave prizes for the excellent samples exhibited by the manufacturer, and approved by the Committee

of which he was a member. Mr. Ozanne went into the whole question, and gave it as his opinion that the improvement of sugar refineries on modern European principles was not only possible but a necessity, and that all that was wanted was that new enterprises started at great expense should be supported by the encouragement of certain facilities. These facilities were truly enjoyed in the Mauritius and in other European countries, when they were backed up not by bounties, but by special encouragement, which the sugar industry requires all over the world. These facilities pre-supposed that the sugar manufacturer should have, under proper control, the power of utilizing the non-crystalline portion left on his hands after the manufacture of sugar, to be utilized as a by-product for the production of rum. In other words, unless the sugar refiner is allowed to get rid of the spirit from the waste, and sell it near the works under the still-head system, no sugar factory can be worked.

This is the facility which under a certain misconception on the part of Government in the Excise Department, it has not seen its way yet to allow to the Indian manufacturer to the same extent that the sugar producers in other countries enjoy. We are not speaking without our book on this point. The owner of a sugar factory in the Madras Presidency, Mr. Minchin, hearing of the great abundance of cane-sugar production in the North-West Provinces, went all the way to Allahabad to obtain a concession from the local Government of that province, and even though Mr. Minchin was supported by his own (Madras) Government, and also by the Government of India, yet the local Government at Allahabad declined to make the concession

asked for, on the ground that it would interfere with the success of their Excise system. It is this excise monopoly which really comes in the way of the development of the sugar industry in many of the provinces in India. His Excellency the Viceroy, Lord Curzon, in the speech he made in Council, honestly laid, as far as he was concerned, stress on the importance of the Indian interests in this matter, and if we attach special importance to the policy of countervailing duties, it is because of the assurance we feel that, sooner or later, the necessity of subordinating the convenience of the excise revenue to the much larger interests involved in the development of the sugar industry on European principles will impress itself on the Government of India and the local Governments. As it is, for the convenience of collecting the Excise revenue, by means of District monopolies home and foreign importers who contribute nothing to the stability of the Empire, and who have no stake in the country, are placed on the same footing as resident like the owner of the Poona factory, or Mr. Munchin or the other producers of refined sugar at Kosipur or Shahajahanpur, who have risked their all in the well-being of the country, and who by the industries they promote, and the labour they might employ by thousands, would prove of great assistance in enabling the cultivators of land to find a ready market at their door, and multiply the revenues more materially by promoting sugar production than by facilitating the drunkenness of the people. The Poona factory, of which the official reports speak in such disparaging terms, has had a good record to show, which, besides the testimony borne by Mr. Ozanne, ought to have attracted the attention of the Agriculture Department. This factory has, notwith-

standing the failure of efforts made by its owner, to obtain certain concessions which did not in any way contravene the Excise law at work in Bombay, has still been able to bring his sugar into the market in Poona on several occasions when the low prices of *mol* favoured his enterprise. The Government and the Agricultural Department were apparently not in possession of the fact that in the Commissariat Department they were actually purchasing sugar from this same factory for some years for the use of the troops. Even this year the Commissary-General, Colonel Dobbs, bought some Rs. 50,000 worth of sugar from September, 1898, to April, 1899, at rates which were lower than those offered by the Cawnpore European factory and Messrs. Carew and Company. Colonel Dobbs, as head of his Department, has officially placed it on record that "a well-established and well-regulated sugar refinery appears to be greatly needed in this part of the country." "The Commissariat Department in Bombay has to arrange for the supply of sugar of country manufacture, and these contracts might be taken up by local manufacturers to the great convenience of the Department; and he expressed his satisfaction that the sugar factory might be placed in a position to be worked successfully as he considered it fully equipped to meet the requirements of the army." An official statement like this, based on actual trial, is of far more value than mere doctrinaire statements such as those we have referred to in the earlier part of this paper. There is not only room for one factory, but for many more, in Colonel Dobbs' opinion. Of course, the demands of the Commissariat must vary, and cannot be permanently relied upon all the year round. The bazaar private demand is similarly dependent

upon contingencies of low prices, which change with seasons. Sugar industry on a permanent scale cannot thrive unless it is made self-dependent by manufacturers being permitted not only to produce sugar from his crystalline materials, but also to utilise his non-crystalline by-products. This is the real difficulty in the way, and not the imaginary difficulties which Mr. Mollison and others have been led to exaggerate.

As regards the excise interest, to which so great importance is attached by the Revenue Department in some provinces it may be noted that in the case of some firms, such as Aska and Nellikuppam in the Madras Presidency, and the Shahajahanpur factory in the North-Western Provinces, great concessions have been made by their respective Governments. Mr. Michin himself is the owner of the Aska factory, and, though a sugar-refiner, he is so far favoured by the Madras Presidency authorities, that the liquor produced in his distillery is allowed to be sold in the Madras Presidency as foreign liquor under the Madras Abkari Act. At the Tariff rate of duty, it can be sold at any strength in the class of liquor shops denominated "taverns." Messrs. Parry and Sons, also sugar refiners, have no contracts, but they have a right to bid at the annual sales. The owners of the Rosa factory in the North-West Provinces have the privilege of being allowed to manufacture rum at Rs. 4 per gallon, and sell the same though the Excise rate is Rs. 6 per gallon. These favoured concessions show that after all the Excise difficulty raised in the interests of the monopoly of liquor farms is one which is not insuperable, if only the importance of the growth of sugar is fully realized by the Local and Supreme Governments.

The only concession made in this Presidency to the owner of the Poona factory is that he is allowed to have some out-of-the way district farm, which does not permit him to utilise his non-crystalline products in the making of rum to the same advantage as those possessed on the Madras side. A distant farm like that of Satara cannot give full occupation to the sugar manufacturer for his by-products, more especially when he has to transfer his goods from the place of his factory seventy miles to Satara. The manufacturer has spent a large sum of money in this business, and he cannot afford to lock up his whole capital for years and years together in the way he has been obliged to do. It is unfortunate that Government would not grant his prayer to be allowed to get the Poona District farm, which is likely to give full occupation to the making of rum, and selling the same to those who would like to drink what is stated to be a superior product. A concession like this would not come in the way of Abkari rules, and yet the future of this pioneer effort in the way of improving sugar industry in the Bombay Presidency really depends upon such a concession being made not only to one factory, but to many others which would spring up if only the necessary facilities are made available. In the sugar producing countries, such as Mauritius and the West Indies, no such obstacles exist. The Excise rules admit of an elastic management permitting the cane producers to dispose of their non-crystalline products to liquor makers with a freedom possessed in the case of other products. These countries enjoy this advantage over India, which has, in the interest of excise, been denied to our local sugar refiners except in the case of a

few individuals. Dr. Watt's article on sugar shows the whole history of this question for a period of nearly a hundred years, during which time repeated attempts have been made both by European and native refiners to secure the removal of this difficulty. Forty years ago Mr. Dickinson, a West Indian planter who settled at Junar, was permitted to make sugar and utilise the waste by making rum and selling it to Government for several years.

All expert opinion is on the same side. Mr. Ozanne suggested to Government that with a view to prevent the possible diversion of the factory to the production of rum in place of sugar, the Poona manufacturer might be tied down to produce a percentage outturn of sugar, and thus ensure that the outturn shall be as large a proportion of sugar as is reasonable. There is really no foundation for any such fear, for no sane person would destroy his saccharine treasure, which pays him better in order to extend the scope of the rum manufacture. Either this remedy or one or other of the concessions granted in Madras, or a local division of the Poona district farm, or granting the farm for a period to enable the industry to start under good auspices, should be adopted. Any of these arrangements would solve not only for Poona, but for the whole Presidency, this most important question, by reconciling the sugar refiner's interest with that of the monopoly Excise farmer. At the present, the Poona factory is a small concern. It is stated to be able to consume about $1\frac{1}{2}$ acres of sugarcane crop, yielding some 40 to 50 pallas per day during three or four months. This represents a very small portion of the sugarcane area near at hand—about 10,000 acres in the district and

about 2,000 acres in the taluka. The possibilities, however, of extending the industry are beyond all measure greater than its present small dimensions. Mere countervailing duties will not enable the sugar industry to thrive in this country. The only way to ensure the possibilities of the great future in store depends upon the realization of the great need of subordinating the liquor excise interest to the sugar production on a really useful scale, so as to make India self-dependent. This is our reason for dwelling at some length on this subject, and we hope that the attention of the Government of Lord Curzon and his advisers will be drawn to this matter. The Indian population is slowly being taught to despise its old crude country manufacture, which some people have not scrupled to characterise as "manure." White crystallized sugar must win the day, and it is to be hoped that Lord Curzon will leave his mark by helping this change during the term of his five years' career as Viceroy, from which the whole country is expecting to earn so many benefits.

INDIAN ECONOMICS.

F5591-2

The Best Indian Woods for the Manufacture of Matches and Match-boxes.

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IN Sweden, the most noted match-manufacturing country of the world, Aspen (*Populus tremula*, Linn) is the wood found best suited for matches and match-boxes, and pines occupy the second rank as regards the former. In India Aspen does not grow anywhere indigenously. The nearest approach to it in botanical relationship is made by a tree which is found in Káshmir and the Punjab Himalaya as also in countries west of that region such as Afghanistan and Baluchistan. But it is nowhere in great abundance and a great obstacle to increasing its stock is that it very seldom produces any flower or fruit. It can therefore reproduce itself naturally, chiefly by the shoots which spring from the roots or artificially by means of cuttings. The botanical name of this tree is *Populus alba* and the Kashmiris call it *Jangli Frast*. The wood of this tree is not wholly unknown even in distant Bengal for it is in small round boxes made of this wood that we see grapes sold in the cold weather by the men known to us as Kabulis.

Although this wood is eminently well suited to the purpose, its small supply will preclude its use anywhere outside the northern districts of the Punjab.

'Pines' is a term applied loosely in commercial parlance to a number of trees which, although coming under the same Natural Order, Coniferae, belong to very different Genera or

groups of it. None of the European pines, however, grow naturally in India; we have therefore to find their substitutes in the coniferous trees that are indigenous in our forests.

Before proceeding to select the most suitable woods it seems necessary to investigate briefly what characteristics should be sought for in such woods.

Both for the purpose of matches and match-boxes it is necessary that the wood should be easy to split and at the same time elastic and strong enough not to break in splitting or in bending to make the boxes; and for matches it is also necessary that it should take fire easily and should continue to burn steadily with a flame when ignited and that it should not emit an unpleasant smell in burning. It is also an essential point that the supply should be sufficient locally or be easily available in quantities where match factories are likely to be established.

To begin with the first characteristic, that of splitting with ease. This depends mainly on the structure of the wood. Avoiding anatomical and technical details, wood may be said to consist of fibres which run parallel to the axis of growth and which in dicotyledons (*ie* in plants other than of the nature of palms, bamboos or ferns) are held together by thin fibrous plates which lie in vertical planes radiating from the centre of the tree. Ease in splitting depends on the length and straightness of the vertical fibres and on the fineness, regularity and abundance of the vertical plates which are called *medullary plates*. These plates are best seen on a transverse section where they show as radiating lines, like rays from a luminous point, either continuous or broken, and are usually and more aptly called *medullary rays*. Knotty wood is more difficult to split than wood free from knots, for around knots the fibres get twisted and are more closely packed, and there is generally much want of uniformity of structure in their neighbourhood. Some trees naturally grow straight and more or less free from knots and it is preferably from among these that we have to make our selection. When trees are grown scientifically in forests

or plantations, they can be forced to grow straight and comparatively free from knots even though they would not do so in nature.

For the particular purpose of matches the wood should also be soft and light. A soft and light wood, provided the fibres are straight and elastic and the medullary rays fine, regular and numerous, splits with a smoother and cleaner surface than a heavy and hard wood. A little amount of strength and elasticity must be combined with softness, otherwise it would be impossible to obtain splinters of any required length, and the match-sticks would break in rubbing to ignite them. It is owing to want of strength that the refuse sticks of the jute plant known in Bengal as Pát-káti (পাট-কাটি) or Pan-kati (পাণ-কাটি), though very soft and light are unsuitable for lucifer matches, although they were excellent for the old-fashioned sulphur matches of two generations ago, for which they were very extensively used.

In modern factories in Sweden the wood is first turned on lathes against a broad blade which peels off from it a long sheet of wood of the thickness of a match. This sheet is then cut up and split by machinery into separate sticks of the size of matches. But whatever be the process, the quality of wood sought for will remain much the same.

The second desideratum, that of taking fire easily, is also considerably affected by the softness and lightness of wood, for a soft and light wood takes fire more easily and if perfectly dry also burns steadily when ignited. A straight-grained, soft and light wood has the additional advantage of drying quickly and thus becoming fit to burn well soon.

In the higher grades of lucifer matches the combustibility of the sticks is artificially augmented by impregnating them with a hydrocarbon like paraffin. Some woods like the pines are naturally resinous or oily. They can therefore to a certain extent dispense with the hydrocarbon bath. Matches of inferior quality are tipped with sulphur to make them burn well.

The third property, that of not giving an unpleasant smell in burning, in respect of our Indian woods, has not yet been sufficiently investigated. But it will be seen that it is of comparatively small importance except for the very highest grades of matches; for although sulphur-tipped friction matches give a strong pungent smell, they hold their own in the market, owing to their cheapness.

The question of supply is obviously of very great importance and is really a question of the geographical distribution of the species selected. I have already mentioned *Populus alba* which would be very suitable for the purpose, but which cannot be depended upon, as we cannot get enough of it from our forests and, as has already been said, there are serious obstacles to artificially increasing its stock.

In the description which I now proceed to give of the woods that seem to be suitable for matches and match-boxes, the above points have been kept in view as far as possible. I think it but proper to add that with the exception perhaps of the Conifers and the Poplars I possess no *certain* knowledge as to the actual suitability of any of the other woods mentioned. All that I have been able to do, during the short time allowed me for the paper, has been to go through the Wood Museum of the Imperial Forest College, Dehra Dun, which is admitted to be one of the finest in the world, and to closely examine those specimens which appeared to me most suitable. For the weights quoted as also for many other items of information I am indebted to the classic work of Mr. J. S. Gamble, M.A., F.L.S., F.R.S., C.I.E. (*Manual of Indian Timbers*).

1—*Magnolia Griffithii*, Hook F Vernacular *Bor. Gahori Sopa* (Assam) Wood soft, greyish white, weight 28 lbs. per cubic foot. Medullary rays fine, numerous, short. Habitat—moister parts of Assam including Cachar. Apparently not very abundant.

2—*Bombax malabaricum*, DC Vern. *Simul* (Bengal). The well-known Silk Cotton Tree. Wood very soft, greenish brown, containing a large percentage of phosphoric acid. Weight 17 to

32 lbs per cub ft. Medullary rays numerous. Habitat—throughout the plains of India, also Burma and Ceylon, generally affecting damp localities. Easy to grow both from seed and cuttings and very fast-growing.

3—*Ailanthus excelsa*, Roxb. Vern. *Maha-nim* (Uriya) *Ghor-karm* (Palamow). Wood white, soft. Weight 23 to 28 lbs per cub ft. Medullary rays numerous and close. Habitat—Chota-Nagpur, Northern Circars and the Coromandel Coast. Not very abundant but can be easily grown from seed and cuttings and is a remarkable fast-grower.

4—*Boswellia serrata*, Roxb. Vern. *Salai* (Bengal). Wood white, moderately hard. Weight 28 to 40 lbs per cub ft. Medullary rays, rather broad, very short, not very numerous. From point of structure this wood is not very suitable but it contains a gum-resin owing to which it gives an agreeable smell when burnt and matches made of it are likely to burn steadily and well. Habitat—dry hills from Raptana to Chota Nagpur, Orissa and Northern Circars usually quite abundant where it grows.

5—*Gomphandra axillaris*, Wall. Wood greyish white, soft. Weight 31 lbs per cub ft. Medullary rays broad. A small tree of Sylhet and the Malabar coast.

6—*Holigarna Beddomei*, Hook. f. Wood greyish white and soft. Weight 26 lbs per cub ft. Medullary rays fine and short, not very numerous. A large tree of the Western Ghats.

7—*Spondias mangifera*, Pers. Vern. *Amra* (Bengal). Wood greyish white and soft. Weight 20 to 30 lbs. Medullary rays—some fine and other broader, fairly numerous. Habitat—Sub-Himalayan forests, Assam, Eastern Bengal, Burma and the Deccan. Grows very fast and can be very easily propagated by cuttings.

8—*Sesbania grandiflora*, Pers. Vern. *Bak* or *Bak-phul* (Bengal). Wood soft and white, weighing about 30 lbs per cub ft. Medullary rays fine, numerous. It is not an indigenous forest tree but can be easily grown in Bengal and most other parts of India.

9.—*Erythrina suberosa*, Roxb. Vern. *Dholdhak* (Hind.). Wood very soft, whitish. Weight 17 to 20 lbs per c. ft. Medullary rays short and broad. Habitat—dry forests of India and Burma.

Other species of *Erythrina* of which *E. indica*, Lam., is well known in Bengal as *Palitamadar* occur in E Bengal and Burma and have wood very similar to the above..

10.—*Pithecolobium lobatum*, Benth. Vern. *Tanyin* (Burma) Wood grey, moderately hard. Weight 30 to 35 lbs. per c. ft. Medullary rays very fine and numerous. Habitat—tropical forests of Burma.

11.—*Gyrocarpus Jacquini*, Roxb. Vern. *Pitella* (Uriya). Wood grey, soft. Weight about 22 lbs. per c. ft. Medullary rays very short and moderately broad. Habitat—Orissa to N. Circars and the Deccan, also the Cocos Islands.

12.—*Tetrameles nudiflora*, R. Br. Vern. *Sandugaja*, (Bengal). Wood white, soft. Weight per c. ft. about 24 lbs. Medullary rays fine but clearly marked. Habitat—Darjeeling Terai and the Garo Hills: also Burma and the Western Coast. Much used for tea-boxes.

13.—*Anthocephalus Cadamba*, Mig. Vern. *Kadam* (Bengal). Wood whitish, somewhat hard, weighing about 40lbs per cub ft., often of an unpleasant smell. Medullary rays fine and numerous. Very common in E. Bengal and Assam and in the Darjeeling Terai. Also found in the forests of Pegu in Burma. Growth very fast.

14.—*Hymenodictyon Obovatum*, Wall. Vern. *Sirid* (Marhatti) Wood brownish grey, soft and smooth-grained, weighing about 28lbs per c. ft. Medullary rays some fine and close, others broad and distant. A large tree of the W. Ghats.

Very similar but having a somewhat harder wood is *Hymenodictyon excelsum*, Wall. Vern. *Bhalena* or *Bhaultan* (Hind), which is found in dry forests throughout India.

15.—*Cordia Myxa*, Linn. Vern. *Bahal* (Bengal); *Lassora* (Hind) Wood greyish, somewhat hard. Weight very variable,

the average being about 33 lbs per c. ft. Medullary rays short, moderately broad and fairly numerous. Habitat—India and Burma, mostly in damp forests and ravines up to 5,000 ft.

16—*Wightia gigantea*, Wall. Vern. *Bop.* (Lepcha). Wood white, very soft and porous. Weight 14 lbs per cubic ft. Medullary rays uniform, rather broad. Habitat—Eastern Himalaya and the hills of Assam and Burma.

This wood will probably be found too soft for the purpose and there may be some difficulty in securing a large supply

17—*Gmelina arborea*, Roxb Vern - *Gamar, Gambhari* (Bengal). Wood brownish white, soft and even-grained. Weight about 36 lbs per cub ft. Medullary rays short, moderately broad, and fairly numerous. Habitat—the moister regions of India and Burma

It has a fair demand as timber, especially in Bengal, and will probably be found too valuable to use for matches

18—*Trewia nudiflora*, Linn Vern. *Pithali* or *Pithuli Bhurkunda* (Bengal) Wood white and soft. Weight about 30 lbs per c ft. Medullary rays fine, numerous, uniform and closely packed. Habitat—Sub-Himalayan damp forests, also forests of Chittagong and Burma. Common about villages in some parts of Bengal.

19.—*Excæcoria Agallocha*, Linn. Vern *Genwa* (Bengal). Wood very soft and spongy. Average weight 25 lbs per c. ft. Medullary rays very numerous and extremely fine. Habitat—tidal forests of India, Burma and the Andamans; very common in the Sundarbans and extensively used in Calcutta for bedsteads and other kinds of cheap house furniture

20—*Broussonetia papyrifera*, Vent. The Paper Mulberry tree of Japan. Vern *Molaing* (Burma). Wood soft and greyish white, weight about 25 lbs per c. ft. Medullary rays rather broad and short but fairly numerous. Indigenous in the hills of Upper Burma and Martaban, but it can easily be grown in Central and Eastern Bengal to serve the double purpose

of supplying wood for matches and bark for an excellent paper stock. The growth is fast and the tree produces shoots copiously from stools and roots.

21—*Ficus hispida*, Linn. Vern. *Dumur* (Bengal). Wood ash colour, soft and somewhat mottled. Weight about 32 lbs per c. ft. Medullary rays some fine and others broad in long narrow plates. Habitat—Bengal, Assam and the Outer Himalayan forests up to 3,500 ft.

22—*Populus alba*, Linn. Vern. *Fangli Frast* (Kashmir); *Mal* (Punjab). Wood white or reddish white, soft, even-grained and elastic. Weight 28 to 44 lbs per c. ft. Medullary rays very fine, numerous and regular. Habitat—from the Punjab Himalaya westward through Kashmir to Afghanistan and Baluchistan. This tree has already been mentioned. It is undoubtedly one of the best woods for matches, especially for match-boxes.

23—*Populus ciliata*, Wall. Vern. *Bangikat* (Nepali); *Garpipal* (Kumaon). Wood brownish grey and soft. Weight 25 to 35 lbs per c. ft. Medullary rays fine, numerous and regular. Habitat—Himalaya from the Indus to Bhotan, 4,000 to 10,000 ft.

The wood of this tree may be found almost as good as that of the last preceding species for matches and match-boxes. For a factory established in Bengal a supply can be obtained from Darjeeling, where another species of the same Genus, called *Sungribong* by the Lepchas is also found, the wood of which is expected to be of the same quality.

The following trees belonging to the Natural Order Coniferae are commonly known as pines. Some of their nearest allies are very extensively used in Sweden and Germany. Containing resin to a large or small extent, they burn very well and are, owing to the extreme regularity of the structure of their wood, peculiarly well suited to the purpose.

24—*Pinus excelsa*, Wall. The Blue Pine. Vern. *Tongschi* (Bhutan); *Kail* (Jaunsar). Wood moderately hard, reddish white. Weight about 30 lbs per c. ft. Medullary rays fine and numerous but rather irregular. Habitat—Western Himalaya and Bhutan.

25—*Pinus longifolia*, Roxb. The Long-leaved Pine. Vern *Chir* (Hind), *Griet* (Lepcha). Wood moderately hard, reddish brown. Weight 35 to 45 lbs. Medullary rays as in the preceding species. Habitat—Outer Himalaya from Afghanistan to Bhutan.

26—*Picea Morinda*, Link. The Himalayan Spruce. Vern. *Rai* (Hind). Wood white, fairly, soft, weighing about 30 lbs per c. ft Medullary rays fine and very numerous. Common in the Himalaya, generally above 7,000 ft from Afghanistan to Bhutan.

27.—*Abies Pindrow*, Spach. The Himalayan Silver Fir. Vern. *Morinda* (Hind). Wood white and soft. Weight rather less than 30 lbs per cub ft Medullary rays very fine, very numerous and regular but rather short. Habitat—Outer Himalaya between 7,000 and 9,000 ft, westward from Nepal.

This, as well as the last preceding tree, will probably be found to be the best procurable in India for matches. For match boxes, however, it is feared that they will prove too brittle to stand the usual process of manufacture.

To the above list may be added thick-walled straight bamboos like *Bambusa Balcooa*, Roxb. and *Bambusa Tulda* Roxb. so common in Bengal. The inner soft tissue when sufficiently dry burns very well, and the internodes can be split into match sticks most easily, especially when green, without the help of any special machinery.

If match sticks are made out of bamboos, match boxes can also be made of the same material, preferably from the more hollow kinds. These boxes of course will be cylindrical instead of the usual rectangular shape. A long internode can be cut up into several pieces of the length of the matches. One of the open ends can be closed with a thin circular disk of any kind of wood to form the bottom, and the lid can be of another piece of bamboo internode plugged by another disk, as made to fit the other end of the tube,—somewhat like the wooden cases used in Homœopathic pharmacy. The mixture for the friction surface (phosphorus in the case of safety matches

and powdered glass and glue in the case of ordinary friction matches) may be applied on either end of the tube or on a flat surface which can be easily prepared for it on the side. The cylindrical box can be as easily covered with paper and labeled as the ordinary rectangular boxes, perhaps even more easily. The rough sketches given below will explain my idea.

Wooden disk for the lid.

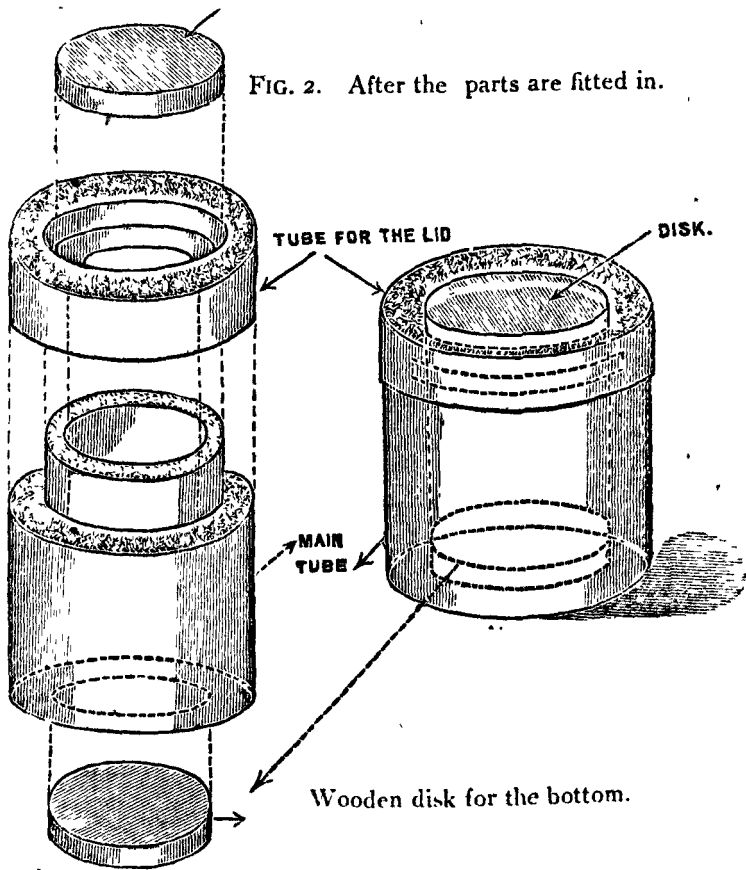


FIG. 1. Before the parts are fitted in.

It is recommended that if a match factory be established in Calcutta or its neighbourhood, trial should first be given to such local trees as *Simul* (No 2), *Amra* (No 7), *Genwa* (No 19) for matches, and to *Kadam* (No 13) and *Pithali* (No 18) for match-boxes. If these prove suitable, the expense of obtaining Firs and Poplars from the hills will be saved.

I may add in conclusion that if samples be required of woods that are not locally available, application should be made for them to the Imperial Forest Economist, Imperial Forest College and Research Institute, Dehra Dun, who can arrange to have them forwarded from the nearest source

THE SECOND INDIAN INDUSTRIAL CONFERENCE.

The Jute Crop of India.

BY N. N. BANERJEE, Esq., M.R.A.C., F.H.A.S., M.R.A.S.I.

Department of Agriculture, Bengal.

THE modern jute industry of Bengal may be said to have had its origin in the year 1828, when exportation to Europe commenced. Before this time considerable quantities of the fibre were undoubtedly produced, but the entire output was consumed locally. A footing having been once established in the European market, the value of the fibre was immediately recognized, and the expansion of the trade, has ever since, been constant and rapid.

In a recent article which appeared in the *Times* of London, jute was described as one of the great assets of the Empire, and most certainly it is a most valuable asset for it brings money to our Indian cultivators, to numerous Indian and European dealers, to merchants and ship owners, and to a host of manufacturers both in Calcutta and Dundee. The demand for jute, in spite of the remarkable expansion in its cultivation in recent years, and the rise of prices to an unprecedented height, still continues to be very keen, and consumption, at the present day is very near to outstripping production. Not only are old markets asking for increased supplies, but new ones are continually opening out. And jute fibre is further being put to an increasing number of uses every year.

The importance of jute in the sphere of commerce may be gauged from trade reports, which reveal the fact that the exports of raw and manufactured jute constitute one-fifth of India's total exports. Taking the two Provinces of Bengal and Eastern Bengal and Assam, from where practically all the jute of India comes, it may be noted that the outturn has risen

steadily from 65½ lakhs of bales (of 400 lbs. each) in 1900 *i.e.*, about 325 lakhs of maunds to over 85 lakhs of bales, *i.e.*, about 425 lakhs of maunds—the estimated outturn of the crop for the present year. The total consumption which includes exports, mill-consumption and country consumption, has also similarly risen from 65 lakhs of maunds in 1900 to 81 lakhs in 1905. The consumption this year, will no doubt show a further increase. Side by side, with an increase in production, the jute industry itself has developed enormously in this country; the number of looms at work having increased from 9,841 in 1896 to 23,884 in 1906, and the actual consumption of jute by the mills has doubled during the last ten years.

To pass on to the financial aspect of the jute trade, I do not think that I would be wrong in stating that prices also have doubled during the last ten years. During 1905-06, the average price per bale of 400 lbs. was Rs. 46 and no less a rate than Rs. 70 per bale is also reported to have been paid by purchasers during that year. What is believed to be the highest price on record is the phenomenal price of Rs. 85 per bale which was recently paid for a small parcel of Dacca jute of quite exceptional quality. The transactions of the jute market this year may be expected to disclose that about 37 crores of rupees are likely to change hands, as a result of the general cultivation of the jute crop in Bengal and Eastern Bengal and Assam and of its very limited cultivation in Cooch Bihar, Nepal, Madras, and Upper India.

It has been estimated, that jute agriculture brings in over 21 crores of rupees to the growers, and it may bring in as many crores more in another ten or twenty years, if there is the same expansion in its cultivation as there has been during the last decade. The increased payments to cultivators of jute, caused by the rise in price during recent years has amounted to several crores of rupees. They are making very large profits over the crop, and all Bengal *raiyats*, whether jute growers or cultivators of other crops, cannot therefore but be deeply concerned in its improved cultivation.

There is still ample room for the extension of its cultivation and there is decidedly a necessity for improving its quality. Complaints have been frequent of late regarding the deterioration of jute fibre, and it is for the cultivator to rise to the occasion and to remove this defect. Otherwise, the industry is likely to suffer in the near future. If the manufacturers of Europe and America do not get better stuff than what is being sent to them at present, they will surely turn their eyes to other markets than ours.

At present, the seller seems to be quite certain of a market for his fibre, even though it is of inferior quality and adulterated, but he should open his eyes to the fact that in Java, French Indo-China and West Africa, continuous and in some cases successful efforts are being made to introduce the cultivation of jute. Of course another solution of the dilemma presents itself in adopting other possible substitutes for jute, such as *San hemp* (*Crotalaria juncea*), *Patua* (*Hibiscus cannabinus*) Dhainche (*Sesbania aculeata*), American aloe (*Agave americana*), Murvi (*Sansevieria Zeylanica*) *Akanda* (*Calatropis gigantea*), Ramie or Rhea (Bohemia nevea), *Flax* (*Linum ussitalissum*),—but more is known of the capabilities of jute than of any of the other fibres. Herefore at the present time the cultivator may well be exhorted to look to his jute and jute alone.

There are various causes which lead to the degeneration of jute, such for example as the actual degeneration of the plants grown for fibre, the growth of the crop on unsuitable soils, the use of inferior seed, the cultivation of varieties of jute, which are unsuitable for the particular locality in which they are grown, the want of proper cultivation and of judicious manuring, carelessness in the preparation of fibre for the market and last but not least the fraudulent adulteration of the produce in order to increase its weight before bringing it into the market—a notorious and wide-spread malpractice, which is bringing a valuable staple into disrepute in foreign markets, and is damaging the common interests of the trade.

Some hints and suggestions are now added which will be

of help to these already employed in jute cultivation in turning out better crops. They also provide sufficient instructions to those who may feel disposed to take up the growth of jute as a fresh industry

The hints are supplied under various headings to admit of easy reference and study.

(a) *Botanical description, Vernacular names and varieties*—Jute belongs to the natural order *Liliaceæ* and to the *Genus corchorus*. The commercial fibre jute is obtained from the two species known as *Corchorus capsularis* and *Corchorus olitorius*. The former, which has rounded fruit pods can stand water logging and is very largely cultivated in Eastern and in parts of Northern Bengal. The latter, which bears long cylindrical pods does not thrive on low lands subject to floods. It is grown to a much more limited extent, being found chiefly on the higher lands towards the south and west. Both the above plants are annual. The flowers vary from a whitish yellow to a yellow colour. The capsules are five celled, but white *Capsularis* has no transverse partitions, *Olitorius* has numerous transverse partitions between the seeds. The tap root of *Capsularis* is thick, while that of *Olitorius* is long and tapering. Some of the varieties of each of the above two species have red stems and others green stems.

Experiments made by the Agricultural Department of Bengal tend to show that the green stemmed *Capsularis* is more prolific than the red stemmed, while quite the reverse is the case with *Olitorius*. There are various vernacular names by which the jute crop is known in Bengal. *e.g.*, *Pat*, *Koshta*, *nalita*, *jhounto*, *nalua*, *narcha* &c.

(b) *Area Sown*.—Before the Partition of Bengal, the forecasts of the Agricultural Department of the Province dealt with the jute crop grown in 27 districts. The area under jute in these districts, amounted to 3,144,600 acres. Thirteen of these districts having been transferred to the new Province of Eastern Bengal and Assam, there are at present only 14 jute growing districts left in the Province. They cover an area of 780,400 acres.

The 27 districts referred to above with the land under jute before the Partition were as follows :—

District.	Acres
Mymensingh	795,200
Rangpur	385,000
Purnea	269,000
Tippera	... 246,800
Dacca	210,100
Pabna	200,600
Bogra	135,000
Faridpur	.. 134,000
Rajshahi	128,000
Dinajpur	... 125,000
Jalpaiguri	.. 108,100
24 Parganas	89,900
Howrah	.. 51,000
Nadia	45,000
Jessore	.. 41,300
Murshidabad	40,800
Malda	... 31,600
Backergunge	18,000
Bhagalpur	... 17,900
Hooghly	... 15,800
Burdwan	14,500
Khulna	10,700
Midnapore	.. 10,500
Cuttack	10,200
Noakhali	.. 4,200
Balasore	4,200
Darjeeling	... 2,200

And the 14 jute districts now of Bengal Proper are,—Burdwan, Midnapore, Hooghly, Howrah, 24 Pgs., Nadia, Murshidabad, Jessore, Khulna, Bhagalpur, Purnea, Darjeeling, Cuttack and Balasore

The consolidated acreage of the crop given above for the two Provinces does not include the jute areas in Cooch Behar,

Nepal, Madras and Upper India, which showed the following outturn in 1905.

	Bales.
Cooch Behar	52,800
Nepal	64,302
From Upper India <i>via</i> E. I. Railway	26,269
From Stations outside Bengal Nagpur Railway	... 4,257

The cultivation of jute has commenced also in Bihar, which at present accounts for only a few thousand bales—(*The Agricultural Department of Bengal has done much to introduce the cultivation of the fibre in this part of the Province, and results attained that have been highly encouraging, and it is hoped that jute will become quite an important and profitable crop of Bihar.*)

(c) *Soil*.—Jute is a most accommodating crop, being capable of cultivation on almost any kind of soil. It is found growing on clayey homestead lands as well as on high loams, where autumn paddy is generally cultivated. It gives a good return on alluvial soils, and is cultivated also on low lands where water accumulates to a depth of 1 to 5 feet. It grows also on the salt-impregnated soil of the Sunderbans. It is most productive on a rich loam. *Laterite and gravelly soils are not suited to its cultivation.*

(d) *Climate*.—Sufficient moisture, without excessive rain, and a high temperature, *especially in the early part of the season*, are necessary for successful cultivation.

(e) *Rotation*.—As is the case with other field crops, cultivators do not follow any fixed rotation with jute. It has, however, been found that it does very well after pulse crops on uplands. It is often sown after *aus* paddy and grows well in rotation with the *aman* paddy and potatoes also. Jute is sometimes grown after jute without any intervening crop, *but this practice is to be condemned*. In some places, *San* hemp is grown as a preparatory crop, *and this rotation is recommended*.

(f) *Preparation of the Land*.—When the crop is cultivated

on low lands, which are liable to be submerged by early floods; the field should be ploughed early in the cold weather, so that it may be ready for sowing in March. *It is a bad practice to give the first ploughing just before sowing to February or March.* Altogether some five ploughings will be found sufficient, given at intervals of a week. Care should be taken to pulverise the land thoroughly, *as a deep and fine tilh is most essential for the proper growth of the crop.* At the final ploughing, care should be taken that all weeds are uprooted and removed.

(g) *Manuring.*—On lands, where silt is deposited during the rains, no manure is required for jute, but on other soils, cowdung may be used with advantage, as from experiments it *has been found to be the best and cheapest manure for this crop.* Manure experiments with jute at the Burdwan Experiment Station extending over a period of 12 years, have shown that cow-dung gives better results than such manures as castor cake, bonemeal, saltpetre and superphosphate. *Green manuring with San hemp or some other leguminous crop is also strongly recommended.*

(h) *Selection of Seed.*—As a rule, very little attention is paid by *raiya*s to the selection of good seed. This is to be much regretted. Ordinarily, a few plants are left to ripen in a corner or on the border of the field, and seed is taken from these for the following year's sowing. *The paramount importance of selecting the most vigorous and best developed plants for seed cannot be too strongly impressed upon cultivators.* The seed, when collected, requires to be *very carefully stored* for the next sowing. It should be *kept in airtight vessels.* In choosing seed, it is advisable to select a green stemmed *Capsularis* variety or a red stemmed *Olitorious* variety

From results obtained so far from the Experiments made at Burdwan, of the former *the Deswal of Serajganj, Baran of Mymensingh, Kakaiya Bombai of Serajgang and Amonia of Faridpur,* and of the latter the *Tosha of Pabna, Satnalla of Faridpur, and Halbilabi* varieties are worth the cultivator's attention

Jute seed may be indented for through District Agricultural Associations from the Agricultural Department, Bengal

(i) *Sowing*—As has been already stated, the sowing season generally extends from about the middle of March to the end of April. Later sowings are sometimes done. The land having been thoroughly tilled and cleaned of all weeds, the seed is broadcasted, generally at the rate of 1 to 1½ seers per Bengal *bigha*, i.e., 3 to 4½ seers per acre, though in some districts the quantity used varies from 2 to 4 seers per *bigha*. *Experiments are being conducted by our Agricultural Dept. to compare the effects of sowing seed thinly and thickly, but no conclusions have been yet arrived at, as to which system gives better results. It is a good plan to mix a little dry earth with the seed at the time of broadcasting.* The field should be gone over cross-wise by the sower, i.e., once from north to south and a second time from east to west. This ensures a more or less uniform distribution of the seed, *a point of much importance in the cultivation of the jute crop.* The harrow should invariably follow the sowing in order to cover the seed properly. *Drilling the seed with a drill in furrows 9 inches apart* has been recommended as better than the system of broadcasting, as hoeing is rendered easier afterwards. This system may also be tried.

(j) *After-treatment.*—In many parts of Bengal, no operation intervenes between the sowing and the weeding, *but it is a good plan to loosen the earth with a rake about 15 days after the sowing*, when the plants have established themselves in the soil. This is especially necessary on clayey lands, where rain and sunshine tend to cake the surface. *Thorough eradication of weeds is essential in the cultivation of jute.* This operation should be begun as soon as the plants are able to stand it, i.e., when they are about 6 inches to 9 inches high. The number of weedings required varies with local conditions. Two to four weedings should, as a rule, suffice.

The next operation is that of thinning the crop. *The regulation of the distance between the plants has an important*

Leaving on the outturn When the plants are too thickly crowded, they grow up weak; and when too far apart they throw out a large number of branches, and proportionally lose in height. From the spacing experiments which have been made at Burdwan, where the plants are thinned to keeping them apart at distances of 4", 6", 8", and 10", it has been found that the 4" thinning has given the highest yield of fibre of the best quality. Sowing in lines 4' apart has yielded nearly twice as much as where sown in lines 10" apart.

(k) *Harvesting*—The crop occupies the ground for a period of about four months. The time for harvesting depends on the date of sowing, and extends from the end of June to the beginning of October. The exact stage of growth, at which the plants should be cut, cannot yet be laid down definitely, as the subject is still under enquiry. If the fruit of the plant is allowed to get too ripe, the subsequent process of retting the plants for fibre is retarded and the fibre becomes coarse and rough, though it does not suffer in outturn or strength. If, on the other hand, the crop is cut too early, the fibre, though glossy, becomes weak, and the out-turn is somewhat reduced. *On the whole, opinion is in favour of harvesting when the fruit begins to form.* The plants should be cut with a sickle just a little above the ground. They should be tied in bundles and allowed to lie out thus in the fields for about two days, so that the leaves may wither and fall off. The leaves that remain on the stem should be shaken off before the plants are carried away to be retted, and at the same time the tops should be cut off with the sickle at the points where the plants bifurcate. The bundles should next be stacked preparatory to steeping.

(l) *Retting*.—After the bundles have been stacked on the fields for two or three days, they should be removed to be steeped (retted) in water, in which they should be allowed to remain till the fibre can be easily separated from the woody portion of the stalks. The immersion of the plants in water induces fermentation, by which the fibrous tissues are softened and loosened. The ordinary cultivator is much handicapped in

this operation. It is very essential for the production of fibre of good colour, *that steeping should be done in clear and sweet water*. The retting is delayed in running water, as the washing effect of the water interferes with due fermentation. A running stream is therefore not suitable for retting; but, if possible, the water should not be entirely stagnant. *The best results have been obtained in water that is just moving*. Steeped in muddy or dirty water, the fibre loses its lustre and assumes a greyish colour. Salt water delays the process.

The ordinary *raiya*t is content with steeping in the nearest pool and using the same pool for successive steepings. This undoubtedly leads to deterioration in the colour of the fibre. It cannot, therefore, be too strongly recommended to him that wherever practicable, *he should ret his fibre in clean water*.

The result will repay the extra labour involved. When steeping, the cultivators generally erect posts on either side of the immersed stems to keep them from floating away, then they place on the bundle the tops of the stems that have been cut off and the dried leaves of the plants, and finally so weight the bundles that they remain submerged. Sods and earth are sometimes used for this purpose; *but this is a bad plan*, as it tends to make the water muddy. *It is preferable to use logs of wood and weeds*. The plants generally take from ten days to a month to ret, the period depending upon the maturity of the plants, the temperature, the condition of the water, and the way in which the stems are immersed. After a week or a fortnight, the bundles should be examined in order to ascertain how far the retting has advanced, and the examination should continue from time to time till it is found that the fibre comes off easily. *Care must be taken that the stems are not allowed to remain too long under water*, as overretting produces a dirty dark colour and also weakens the fiber.

(m) *Separation and Washing of the Fibre*.—The stalks when ready for the separation of fibre are in some districts beaten against a platform till the pith sticks within are removed. *This process is not recommended*, as the pith often gets broken and

mixed up with the fibre, which itself gets knotted and has to be repicked. *It is a much better plan to strip the fibre by hand.*

The next process is that of washing the fibre. This is generally done by taking handfuls of fibre, swinging them round the head and dashing them against the water. *The separated fibre should always be washed in clean water.* This is a point often neglected by the cultivator, but it is quite possible for him to carry his separated fibre even to a distance, if necessary, and this he should be induced to do. When the washing is finished, the fibre should be left to dry in the sun for two or three days, after which it may be tied in bundles, when it is practically ready for sale.

(n) *Cost of Cultivation and Out-Turn.*—The cost of cultivation varies with the condition of the land, with the quantity of manure used and with the rate of labour, etc., but Rs. 35 to Rs. 40 per acre may be taken as a fair average cost. An out-turn of 15 munds may reasonably be expected from this outlay, and this at Rs. 7 per maund would give a return of Rs. 100 per acre. A careful cultivator may therefore reasonably calculate upon a sure net profit of about Rs. 50 per acre from the cultivation of this crop. With good seed and good cultivation, the profit can be raised to Rs. 100 per acre involving an out-lay of about Rs. 80 per acre.

(o) *Causes of Injury.*—Drought may be regarded as the greatest enemy of the jute crop. Floods and heavy rains just after the seed has been sown, or when the plants are still young and tender, are also detrimental to the crop. There are several insect pests which attack the crop, the worst being a hairy caterpillar, called in the vernacular *shuapaka*, which generally appears in very dry seasons and eats the leaves of the plants. Another common pest is the *uttaranga*, a cricket which burrows into the ground and destroys the young plants by cutting the roots. A small black weevil and a green semi-looping caterpillar are also specific pests of this crop. During drought, jute is also attacked by blight. *Any insect pest or fungoid disease should be reported to the Director of Agriculture Bengal.*

The following method of drenching the leaves with an insecticide may also be tried but it is a little expensive :—

Take 2 gallons kerosine oil ; $\frac{1}{2}$ lb bar soap and 1 gallon boiling water. Dissolve the soap in the boiling water, then add the kerosine oil, *and mix the whole thoroughly*. When completely mixed, 30 to 40 gallons of water may be added to dilute the mixture. This should be enough for about an acre of land. Drench the leaves of the plants by means of a syringe.

The following inexpensive method may also be tried :— Sew together sufficient strips of cloth to make a piece 14 ft. by 16 ft. Bring together the two ends and sew at the sides. This makes a flat bag. Strong cloth tags should then be sewn to the mouth of the bag on either side of the side seams and one foot from the seams. Bamboos, 2 feet long should then be fixed between the two pairs of tags 2 feet apart at each end of the bag, and the bag is then quite ready for use. On dry lands, the bag can be held by two men on either side and drawn over the plants (at an even height) to trap the caterpillars, which should then be destroyed by plunging them into kerosine oil and water (one part of kerosine oil to ten parts of water.) The bag must be rapidly drawn over the crop.

(p) *Fraudulent Adulteration.*—*Cultivators, sellers and purchasers of jute are earnestly exhorted in their own interests, to refrain from adulterating their jute with sand and water.* This practice has led to a most unwarantable deterioration of the fibre in recent years ; and merchants are loud in their complaints regarding the quality of the fibre now being put into the market. In September 1901, the Calcutta Baled Jute Association addressed the Director of Agriculture, Bengal on the subject of the deterioration of the quality of the fibre. This was followed in January 1902 by a communication to the same effect from the Dundee Jute Inspectors' Association to the Secretary of State for India. As a result, field experiments were started at the Burdwan Experiment Station in 1902, by the Bengal Agricultural Department under the guidance of the Inspector General of Agriculture, India. These experiments con-

tinue, and have up to this disclosed very instructive results some of which have been referred to in preceding paragraphs but still there exists fraudulent adulteration which impedes the efforts of the Agricultural Department in the matter of improvement of the fibre—repressive Legislation may be sought for, but unless the gravity of the situation is taken in by growers, sellers and purchasers, the quality of the fibre will stand where it is at present and in fact will become worse day by day and year by year. Soon after the commencement of field enquiry into the causes which tend to a deterioration of the crop, it was recognized by Government, that it was necessary to supplement and amplify field work by Laboratory experiments. This work, dealing more with the chemical and biological side of question was entrusted to an expert officer in the person of Mr. R. S. Finlow, B. Sc. F. C S—Mr. Finlow has given much thought and care to his Laboratory investigations and his work has come of much use to the Bengal Agricultural Department in framing a scheme of experimental trials with this crop.

As an outcome of all the activity displayed by the Agricultural Department as regards jute, it has been possible to enlist the co-operation of the Baled Jute Association whose representatives are annually appraising samples of jute grown at all experimental stations of this Province.

(g) *Commercial divisions races and marts.* The commercial divisions of jute tracts and the chief races of jute are—

<i>Commercial divisions of the jute tract.</i>	<i>Chief races of jute.</i>
1. Uttariya or Northern	{ <i>Heuti</i> (late) of Rangpur and Jalpaiguri. <i>Bhadiya</i> (early) of Rangpur and Jalpaiguri.
2. Serajganji or left bank (really right bank of the Brahmaputra)	{ <i>Kakaya Bombai</i> of Serajganj. <i>Deshi</i> of "
3. Narayanganji or right bank (really left bank of the river).	{ <i>Boran</i> or <i>Barapat</i> of Myensingh.

4. Deora or char land . . . *Sutpat* of Faridpur.
5. Deshi, *i.e.*, grown near Calcutta. { *Deshi nalpat* of Hooghly.

The *principal* markets for the sale of the fibre are Serajganj (Pabna) Narayanganj (Dacca) Madaripur (Faridpur) Chandpur (Tippera) Domar (Rangpur district) and Chitpur (near Calcutta)

(*r*) *Uses of the jute plant*—The jute plant is utilized in this country for many different purposes, besides being permanently used for the manufacture of its fibre. It is supposed to be a very good antidote to a noxious weed *bhadulia* which is very destructive to the rice crop, and *raiya*t>s often grow jute to eradicate this weed.

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

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

(*s*) *Jute growing classes* :—For the information of those who do not belong to this Province, it may be mentioned that the cultivation of jute in Bengal, is not confined to any particular class or caste of the rural population. All classes engage in it, irrespective of caste, whether they be Hindus or Mahamedans.

(*t*) *Concluding remarks*.—In conclusion, it may be mentioned here that two very careful forecasts of the estimated acreage

and out-turn of this crop are published every year by our Agricultural Department for the benefit of the mercantile community and of the public in general. And it is hoped that with all the attention given to its cultivation by Government, there will be an expansion in its area and a developement in the industry which has before it a future so commercially brilliant

THE SECOND INDIAN INDUSTRIAL CONFERENCE.

X9 (1741) 2

The Jute Crop of India.

BY N. N. BANERJEE, Esq, M R A C, F.H.A.S.; M R A S I

Department of Agriculture, Bengal.

THE modern jute industry of Bengal may be said to have had its origin in the year 1828, when exportation to Europe commenced. Before this time considerable quantities of the fibre were undoubtedly produced, but the entire output was consumed locally. A footing having been once established in the European market, the value of the fibre was immediately recognized, and the expansion of the trade, has ever since, been constant and rapid.

In a recent article which appeared in the *Times of London*, jute was described as one of the great assets of the Empire, and most certainly it is a most valuable asset for it brings money to our Indian cultivators, to numerous Indian and European dealers, to merchants and ship owners, and to a host of manufacturers both in Calcutta and Dundee. The demand for jute, in spite of the remarkable expansion in its cultivation in recent years, and the rise of prices to an unprecedented height, still continues to be very keen, and consumption, at the present day is very near to outstripping production. Not only are old markets asking for increased supplies, but new ones are continually opening out. And jute fibre is further being put to an increasing number of uses every year.

The importance of jute in the sphere of commerce may be gauged from trade reports, which reveal the fact that the exports of raw and manufactured jute constitute one-fifth of India's total exports. Taking the two Provinces of Bengal and Eastern Bengal and Assam, from where practically all the jute of India comes, it may be noted that the outturn has risen

steadily from 65½ lakhs of bales (of 400 lbs. each) in 1900 *i.e.*, about 325 lakhs of maunds to over 85 lakhs of bales, *i.e.*, about 425 lakhs of maunds—the estimated outturn of the crop for the present year. The total consumption which includes exports, mill-consumption and country consumption, has also similarly risen from 65 lakhs of maunds in 1900 to 81 lakhs in 1905. The consumption this year, will no doubt show a further increase Side by side, with an increase in production, the jute industry itself has developed enormously in this country; the number of looms at work having increased from 9,841 in 1896 to 23,884 in 1906, and the actual consumption of jute by the mills has doubled during the last ten years.

To pass on to the financial aspect of the jute trade, I do not think that I would be wrong in stating that prices also have doubled during the last ten years. During 1905-06, the average price per bale of 400 lbs. was Rs. 46 and no less a rate than Rs. 70 per bale is also reported to have been paid by purchasers during that year. What is believed to be the highest price on record is the phenomenal price of Rs. 85 per bale which was recently paid for a small parcel of Dacca jute of quite exceptional quality. The transactions of the jute market this year may be expected to disclose that about 37 crores of rupees are likely to change hands, as a result of the general cultivation of the jute crop in Bengal and Eastern Bengal and Assam and of its very limited cultivation in Cooch Bihar, Nepal, Mádras, and Upper India.

It has been estimated, that jute agriculture brings in over 21 crores of rupees to the growers, and it may bring in as many crores more in another ten or twenty years, if there is the same expansion in its cultivation as there has been during the last decade. The increased payments to cultivators of jute, caused by the rise in price during recent years has amounted to several crores of rupees. They are making very large profits over the crop, and all Bengal *raiyats*, whether jute growers or cultivators of other crops, cannot therefore but be deeply concerned in its improved cultivation.

There is still ample room for the extension of its cultivation and there is decidedly a necessity for improving its quality. Complaints have been frequent of late regarding the deterioration of jute fibre, and it is for the cultivator to rise to the occasion and to remove this defect. Otherwise, the industry is likely to suffer in the near future. If the manufacturers of Europe and America do not get better stuff than what is being sent to them at present, they will surely turn their eyes to other markets than ours.

At present, the seller seems to be quite certain of a market for his fibre, even though it is of inferior quality and adulterated, but he should open his eyes to the fact that in Java, French Indo-China and West Africa, continuous and in some cases successful efforts are being made to introduce the cultivation of jute. Of course another solution of the dilemma presents itself in adopting other possible substitutes for jute, such as *San hemp* (*Crotalaria juncea*), *Patua* (*Hibiscus cannabinus*) Dhainche (*Sesbana aculcata*), American aloe (*Agave americana*), Murvi (*Sansevieria Zeylanica*) *Akanda* (*Calatropis gigantea*), Ramie or Rhea (*Bohemia nevea*), *Flax* (*Linum ussitalisum*),—but more is known of the capabilities of jute than of any of the other fibres. Herefore at the present time the cultivator may well be exhorted to look to his jute and jute alone.

There are various causes which lead to the degeneration of jute, such for example as the actual degeneration of the plants grown for fibre, the growth of the crop on unsuitable soils, the use of inferior seed, the cultivation of varieties of jute, which are unsuitable for the particular locality in which they are grown, the want of proper cultivation and of judicious manuring, carelessness in the preparation of fibre for the market and last but not least the fraudulent adulteration of the produce in order to increase its weight before bringing it into the market—a notorious and wide-spread malpractice, which is bringing a valuable staple into disrepute in foreign markets, and is damaging the common interests of the trade.

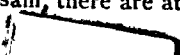
Some hints and suggestions are now added which will be

of help to these already employed in jute cultivation in turning out better crops. They also provide sufficient instructions to those who may feel disposed to take up the growth of jute as a fresh industry.

The hints are supplied under various headings to admit of easy reference and study.

(a) *Botanical description, Vernacular names and varieties*—Jute belongs to the natural order *Liliaceæ* and to the *Genus corchorus*. The commercial fibre jute is obtained from the two species known as *Corchorus capsularis* and *Corchorus olitorius*. The former, which has rounded fruit pods can stand water logging and is very largely cultivated in Eastern and in parts of Northern Bengal. The latter, which bears long cylindrical pods does not thrive on low lands subject to floods. It is grown to a much more limited extent, being found chiefly on the higher lands towards the south and west. Both the above plants are annual. The flowers vary from a whitish yellow to a yellow colour. The capsules are five celled, but white. *Capsularis* has no transverse partitions, *Olitorius* has numerous transverse partitions between the seeds. The tap root of *Capsularis* is thick, while that of *Olitorius* is long and tapering. Some of the varieties of each of the above two species have red stems and others green stems.

Experiments made by the Agricultural Department of Bengal tend to show that the green stemmed *Capsularis* is more prolific than the red stemmed, while quite the reverse is the case with *Olitorius*. There are various vernacular names by which the jute crop is known in Bengal. e.g., *Pat, Koshta, nalita, jhounto, nalia, narcha &c.*

(b) *Area Sown*.—Before the Partition of Bengal, the forecastes of the Agricultural Department of the Province dealt with the jute crop grown in 27 districts. The area under jute in these districts, amounted to 3,144,600 acres. Thirteen of these districts having been transferred to the new Province of Eastern Bengal and Assam, there are at present only 14 jute growing districts left in  They cover an area of 780,400 acres.

The 27 districts referred to above with the land under jute before the Partition were as follows .—

District.	Acres
Mymensingh	795,200
Rangpur	385,000
Purnea	269,000
Tippera	246,800
Dacca	210,100
Pabna	200,600
Bogra	135,000
Faridpur	134,000
Rajshahi	128,000
Dinajpur	125,000
Jalpaiguri	108,100
24 Parganas	89,900
Howrah	51,000
Nadia	45,000
Jessore	41,300
Murshidabad	40,800
Malda	31,600
Backergunge	18,000
Bhagalpur	17,900
Hooghly	15,800
Burdwan	14,500
Khulna	10,700
Midnapore	10,500
Cuttack	10,200
Noakhali	4,200
Balasore	4,200
Darjeeling	2,200

And the 14 jute districts now of Bengal Proper are,—Burdwan, Midnapore, Hooghly, Howrah, 24 Pgs., Nadia, Murshidabad, Jessore, Khulna, Bhagalpur, Purnea, Darjeeling, Cuttack and Balasore

The consolidated acreage of the crop given above for the two Provinces does not include the jute areas in Cooch Behar,

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The consolidated acreage of the crop given above for the two Provinces does not include the jute areas in Cooch Behar,

Nepal, Madras and Upper India, which showed the following outturn in 1905.

	Bales.
Cooch Behar . . .	52,800
Nepal	64,302
From Upper India via E. I. Railway . . .	26,259.
From Stations outside Bengal Nagpur Railway	4,257

The cultivation of jute has commenced also in Bihar, which at present accounts for only a few thousand bales—(*The Agricultural Department of Bengal has done much to introduce the cultivation of the fibre in this part of the Province, and results attained that have been highly encouraging, and it is hoped that jute will become quite an important and profitable crop of Bihar.*)

(c) *Soil*—Jute is a most accommodating crop, being capable of cultivation on almost any kind of soil. It is found growing on clayey homestead lands as well as on high loams, where autumn paddy is generally cultivated. It gives a good return on alluvial soils, and is cultivated also on low lands where water accumulates to a depth of 1 to 5 feet. It grows also on the salt-impregnated soil of the Sunderbans. It is most productive on a rich loam. *Laterite and gravelly soils are not suited to its cultivation.*

(d) *Climate*.—Sufficient moisture, without excessive rain, and a high temperature, *especially in the early part of the season*, are necessary for successful cultivation.

(e) *Rotation*.—As is the case with other field crops, cultivators do not follow any fixed rotation with jute. It has, however, been found that it does very well after pulse crops on uplands. It is often sown after *aus* paddy and grows well in rotation with the *aman* paddy and potatoes also. Jute is sometimes grown after jute without any intervening crop, *but this practice is to be condemned*. In some places, *San* hemp is grown as a preparatory crop, *and this rotation is recommended*.

(f) *Preparation of the Land*.—When the crop is cultivated

on low lands, which are liable to be submerged by early floods, the field should be ploughed early in the cold weather, so that it may be ready for sowing in March. *It is a bad practice to give the first ploughing just before sowing to February or March.* Altogether some five ploughings will be found sufficient, given at intervals of a week. Care should be taken to pulverise the land thoroughly, *as a deep and fine tilth is most essential for the proper growth of the crop.* At the final ploughing, care should be taken that all weeds are uprooted and removed.

(g) *Manuring.*—On lands, where silt is deposited during the rains, no manure is required for jute, but on other soils, cowdung may be used with advantage, as from experiments it *has been found to be the best and cheapest manure for this crop.* Manure experiments with jute at the Burdwan Experiment Station extending over a period of 12 years, have shown that cow-dung gives better results than such manures as castor cake, bonemeal, saltpetre and superphosphate. *Green manuring with San hemp or some other leguminous crop is also strongly recommended.*

(h) *Selection of Seed.*—As a rule, very little attention is paid by *rayats* to the selection of good seed. This is to be much regretted. Ordinarily, a few plants are left to ripen in a corner or on the border of the field, and seed is taken from these for the following year's sowing. *The paramount importance of selecting the most vigorous and best developed plants for seed cannot be too strongly impressed upon cultivators.* The seed, when collected, requires to be *very carefully stored* for the next sowing. It should be *kept in airtight vessels.* In choosing seed, it is advisable to select a green stemmed *Capsularis* variety or a red stemmed *Olivarius* variety.

From results obtained so far from the Experiments made at Burdwan, of the former *the Deswal of Serajganj, Baran of Mymensingh, Kakaiya Bombai of Serajgang and Amonia of Faridpur,* and of the latter the *Tosha of Pabna, Satnalla of Faridpur, and Halbilabi varieties* are worth the cultivator's attention.

Jute seed may be indented for through District Agricultural Associations from the Agricultural Department, Bengal.

(i) *Sowing*.—As has been already stated, the sowing season generally extends from about the middle of March to the end of April. Later sowings are sometimes done. The land having been thoroughly tilled and cleaned of all weeds, the seed is broadcasted, generally at the rate of 1 to 1½ seers per Bengal *bigha*, i.e., 3 to 4½ seers per acre, though in some districts the quantity used varies from 2 to 4 seers per *bigha*. *Experiments are being conducted by our Agricultural Dept. to compare the effects of sowing seed thinly and thickly, but no conclusions have been yet arrived at, as to which system gives better results. It is a good plan to mix a little dry earth with the seed at the time of broadcasting.* The field should be gone over cross-wise by the sower, i.e., once from north to south and a second time from east to west. This ensures a more or less uniform distribution of the seed, a *point of much importance in the cultivation of the jute crop*. The harrow should invariably follow the sowing in order to cover the seed properly. *Drilling the seed with a drill in furrows 9 inches apart* has been recommended as better than the system of broadcasting, as hoeing is rendered easier afterwards. This system may also be tried.

(j) *After-treatment*.—In many parts of Bengal, no operation intervenes between the sowing and the weeding, *but it is a good plan to loosen the earth with a rake about 15 days after the sowing*, when the plants have established themselves in the soil. This is especially necessary on clayey lands, where rain and sunshine tend to cake the surface. *Thorough eradication of weeds is essential in the cultivation of jute*. This operation should be begun as soon as the plants are able to stand it, i.e., when they are about 6 inches to 9 inches high. The number of weedings required varies with local conditions. Two to four weedings should, as a rule, suffice.

The next operation is that of thinning the crop. *The regulation of the distance between the plants has an important*

bearing on the outturn When the plants are too thickly crowded, they grow up weak; and when too far apart they throw out a large number of branches, and proportionally lose in height. From the spacing experiments which have been made at Burdwan, where the plants are thinned to keeping them apart at distances of 4", 6", 8", and 10", it has been found that the 4" thinning has given the highest yield of fibre of the best quality. Sowing in lines 4" apart has yielded nearly twice as much as where sown in lines 10" apart.

(k) *Harvesting*—The crop occupies the ground for a period of about four months. The time for harvesting depends on the date of sowing, and extends from the end of June to the beginning of October. The exact stage of growth, at which the plants should be cut, cannot yet be laid down definitely, as the subject is still under enquiry. If the fruit of the plant is allowed to get too ripe, the subsequent process of retting the plants for fibre is retarded and the fibre becomes coarse and rough, though it does not suffer in outturn or strength. If, on the other hand, the crop is cut too early, the fibre, though glossy, becomes weak, and the out-turn is somewhat reduced. *On the whole, opinion is in favour of harvesting when the fruit begins to form.* The plants should be cut with a sickle just a little above the ground. They should be tied in bundles and allowed to lie out thus in the fields for about two days, so that the leaves may wither and fall off. The leaves that remain on the stem should be shaken off before the plants are carried away to be retted, and at the same time the tops should be cut off with the sickle at the points where the plants bifurcate. The bundles should next be stacked preparatory to steeping.

(l) *Retting*.—After the bundles have been stacked on the fields for two or three days, they should be removed to be steeped (retted) in water, in which they should be allowed to remain till the fibre can be easily separated from the woody portion of the stalks. The immersion of the plants in water induces fermentation, by which the fibrous tissues are softened and loosened. The ordinary cultivator is much handicapped in

this operation. It is very essential for the production of fibre of good colour, *that steeping should be done in clear and sweet water*. The retting is delayed in running water, as the washing effect of the water interferes with due fermentation. A running stream is therefore not suitable for retting; but, if possible, the water should not be entirely stagnant. *The best results have been obtained in water that is just moving*. Steeped in muddy or dirty water, the fibre loses its lustre and assumes a greyish colour. Salt water delays the process.

The ordinary *raiyat* is content with steeping in the nearest pool and using the same pool for successive steepings. This undoubtedly leads to deterioration in the colour of the fibre. It cannot, therefore, be too strongly recommended to him that wherever practicable, *he should ret his fibre in clean water*.

The result will repay the extra labour involved. When steeping, the cultivators generally erect posts on either side of the immersed stems to keep them from floating away, then they place on the bundle the tops of the stems that have been cut off and the dried leaves of the plants, and finally so weight the bundles that they remain submerged. Sods and earth are sometimes used for this purpose; *but this is a bad plan*, as it tends to make the water muddy. *It is preferable to use logs of wood and weeds*. The plants generally take from ten days to a month to ret, the period depending upon the maturity of the plants, the temperature, the condition of the water, and the way in which the stems are immersed. After a week or a fortnight, the bundles should be examined in order to ascertain how far the retting has advanced, and the examination should continue from time to time till it is found that the fibre comes off easily. *Care must be taken that the stems are not allowed to remain too long under water*, as overretting produces a dirty dark colour and also weakens the fiber.

(m) *Separation and Washing of the Fibre*.—The stalks when ready for the separation of fibre are in some districts beaten against a platform till the pith sticks within are removed. *This process is not recommended*, as the pith often gets broken and

mixed up with the fibre, which itself gets knotted and has to be repicked. *It is a much better plan to strip the fibre by hand.*

The next process is that of washing the fibre. This is generally done by taking handfuls of fibre, swinging them round the head and dashing them against the water. *The separated fibre should always be washed in clean water.* This is a point often neglected by the cultivator, but it is quite possible for him to carry his separated fibre even to a distance, if necessary, and this he should be induced to do. When the washing is finished, the fibre should be left to dry in the sun for two or three days, after which it may be tied in bundles, when it is practically ready for sale.

(n) *Cost of Cultivation and Out-Turn.*—The cost of cultivation varies with the condition of the land, with the quantity of manure used and with the rate of labour, etc., but Rs. 35 to Rs. 40 per acre may be taken as a fair average cost. An out-turn of 15 munds may reasonably be expected from this outlay, and this at Rs. 7 per maund would give a return of Rs. 100 per acre. A careful cultivator may therefore reasonably calculate upon a sure net profit of about Rs. 50 per acre from the cultivation of this crop. With good seed and good cultivation, the profit can be raised to Rs. 100 per acre involving an out-lay of about Rs. 80 per acre.

(o) *Causes of Injury*—Drought may be regarded as the greatest enemy of the jute crop. Floods and heavy rains just after the seed has been sown, or when the plants are still young and tender, are also detrimental to the crop. There are several insect pests which attack the crop, the worst being a hairy caterpillar, called in the vernacular *shuapaka*, which generally appears in very dry seasons and eats the leaves of the plants. Another common pest is the *uttaranga*, a cricket which burrows into the ground and destroys the young plants by cutting the roots. A small black weevil and a green semi-looping caterpillar are also specific pests of this crop. During drought, jute is also attacked by blight. *Any insect pest or fungoid disease should be reported to the Director of Agriculture Bengal.*

The following method of drenching the leaves with an insecticide may also be tried but it is a little expensive :—

Take 2 gallons kerosine oil ; $\frac{1}{2}$ lb bar soap and 1 gallon boiling water. Dissolve the soap in the boiling water, then add the kerosine oil, *and mix the whole thoroughly*. When completely mixed, 30 to 40 gallons of water may be added to dilute the mixture. This should be enough for about an acre of land. Drench the leaves of the plants by means of a syringe.

The following inexpensive method may also be tried :— Sew together sufficient strips of cloth to make a piece 14 ft. by 16 ft. Bring together the two ends and sew at the sides. This makes a flat bag. Strong cloth tags should then be sewn to the mouth of the bag on either side of the side seams and one foot from the seams. Bamboos, 2 feet long should then be fixed between the two pairs of tags 2 feet apart at each end of the bag, and the bag is then quite ready for use. On dry lands, the bag can be held by two men on either side and drawn over the plants (at an even height) to trap the caterpillars, which should then be destroyed by plunging them into kerosine oil and water (one part of kerosine oil to ten parts of water.) The bag must be rapidly drawn over the crop.

(p) *Fraudulent Adulteration.*—*Cultivators, sellers and purchasers of jute are earnestly exhorted in their own interests, to refrain from adulterating their jute with sand and water.* This practice has led to a most unwarrantable deterioration of the fibre in recent years ; and merchants are loud in their complaints regarding the quality of the fibre now being put into the market. In September 1901, the Calcutta Baled Jute Association addressed the Director of Agriculture, Bengal on the subject of the deterioration of the quality of the fibre. This was followed in January 1902 by a communication to the same effect from the Dundee Jute Inspectors' Association to the Secretary of State for India. As a result, field experiments were started at the Burdwan Experiment Station in 1902, by the Bengal Agricultural Department under the guidance of the Inspector General of Agriculture, India. These experiments con-

tinue, and have up to this disclosed very instructive results some of which have been referred to in preceding paragraphs but still there exists fraudulent adulteration which impedes the efforts of the Agricultural Department in the matter of improvement of the fibre—repressive Legislation may be sought for, but unless the gravity of the situation is taken in by growers, sellers and purchasers, the quality of the fibre will stand where it is at present and in fact will become worse day by day and year by year. Soon after the commencement of field enquiry into the causes which tend to a deterioration of the crop, it was recognized by Government, that it was necessary to supplement and amplify field work by Laboratory experiments. This work, dealing more with the chemical and biological side of question was entrusted to an expert officer in the person of Mr. R. S. Finlow, B. Sc. F. C.S.—Mr. Finlow has given much thought and care to his Laboratory investigations and his work has come of much use to the Bengal Agricultural Department in framing a scheme of experimental trials with this crop.

As an outcome of all the activity displayed by the Agricultural Department as regards jute, it has been possible to enlist the co-operation of the Baled Jute Association whose representatives are annually appraising samples of jute grown at all experimental stations of this Province.

(g) *Commercial divisions races and markets.* The commercial divisions of jute tracts and the chief races of jute are—

<i>Commercial divisions of the jute tract.</i>	<i>Chief races of jute.</i>
1. Uttariya or Northern ...	{ <i>Heuti</i> (late) of Rangpur and Jalpaiguri. <i>Bhadiya</i> (early) of Rangpur and Jalpaiguri.
2. Serajganji or left bank (really right bank of the Brahmaputra)	{ <i>Kakaya Bombai</i> of Serajganj. <i>Deshi</i> of "
3. Narayanganji or right bank (really left bank of the river).	{ <i>Boran</i> or <i>Barapat</i> of My- mensingh.

4. Deora or char land *Sutpat* of Faridpur.
5. Deshi, *i.e.*, grown near Calcutta. { *Deshi nalpat* of Hooghly.

The *principal* markets for the sale of the fibre are Serajganj (Pabna) Narayanganj (Dacca) Madaripur (Faridpur) Chandpur (Tippera) Domar (Rangpur district) and Chitpur (near Calcutta).

(*r*) *Uses of the jute plant*—The jute plant is utilized in this country for many different purposes, besides being permanently used for the manufacture of its fibre. It is supposed to be a very good antidote to a noxious weed *bhadulia* which is very destructive to the rice crop, and *raiya*s often grow jute to eradicate this weed.

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

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

(*s*) *Jute growing classes* :—For the information of those who do not belong to this Province, it may be mentioned that the cultivation of jute in Bengal, is not confined to any particular class or caste of the rural population. All classes engage in it, irrespective of caste, whether they be Hindus or Mahamedans.

(*t*) *Concluding remarks*.—In conclusion, it may be mentioned here that two very careful forecasts of the estimated acreage

and out-turn of this crop are published every year by our Agricultural Department for the benefit of the mercantile community and of the public in general. And it is hoped that with all the attention given to its cultivation by Government, there will be an expansion in its area and a developement in the industry which has before it a future so commercially brilliant.

THE SECOND INDIAN INDUSTRIAL CONFERENCE

J452 2

Tobacco Culture & Cure.

BY SADDHA RAMASUBBIAH, Esq., MANDALAY.

The subject chosen is Tobacco, its cultivation and cure. Viewed from the medical point of view, the leaf has many injurious effects, all of which have been condemned in no unmeasured terms by the most competent qualified and up-to-date medical experts. Apart from its deleterious effects, the question is one of vital importance; when viewed from its economic aspect, on account of its far-reaching importance, it holds its own in the industrial line. 25 % of the whole population of the world consume it in some form or other in chewing, snuffing or smoking. At the present day, in England, legislation has been effected to prevent promiscuous smoking among boys under 18 years of age. This is only in accord with our right judgment and sound commonsense. Quite similar to this, is opium which has, up till now, been largely cultivated in India and exported solely to China. Already the Chinese nation has awakened to the necessity of passing legislation to exclude the introduction of opium whose baneful effects are only too well known to need any description from me. A like legislation has been passed in Japan. Judged from these circumstances, the cultivation of Tobacco is no longer justifiable on moral grounds. But pending any state interference with this affair, there is no reason why this paper should not be read and I am glad to be able to acknowledge with sincere thanks to the Secretaries of the Industrial Conference, who have been so good as to allow me in this great assembly of learned persons the permission given to me to place my views on such a momentous question as Tobacco.

The Botanical name is *Nicotiana Tobacam*. It is supposed to be the native of America though some assert to the contrary, that it was known in Asia long before America was discovered. It is, however, quite possible that this plant is indigenous both to America and Asia. There is however this much known that in America wild varieties of this plant are known while in Asia it is not so. From this, we almost conclude that it is indigenous to America. It happens, however, as far as India is concerned, this plant was brought into prominence in the reign of Akbar. The total area of tobacco cultivation in India is about 2,000,000 acres. In the Madras Presidency, this crop, at the present time, is found in all parts. The Coimbatore and Krishna Districts grow nearly half of tobacco produced. Trichinopoly and Dindigal that are famous for the cheroots and cigars produce very little tobacco. The area under tobacco cultivation there is not more than a small number of acres. The prominence which these places enjoy is not on account of the superiority of the produce of tobacco But on account of the superiority of its preparation. In Southern India the tobacco used in cheroots and cigars is chiefly produced in Coimbatore and Salem Districts. Burmese grow tobacco well but their curing is far from satisfactory. In Eurpre the tobacco is so satisfactorily prepared and cured as to equal the best of that of The West Indies.

Repeated efforts have been made by Government to improve tobacco culture, but unfortunately without success. In order to acclimatize the potato plant, experiments were persistently made in Europe for nearly 100 years and and after that time magnificent results were obtained. We should never judge from one or two experiments but we should perform many experiments before coming to any conclusion finally. If the Europeans were not satisfied with the first few experiments of a few years there would be no potato plant now growing in Europe and the Irish potato would be a thing unheard of.

It is a somewhat serious matter that one of the most serious famines ever known to Ireland in 1845 is attributed to the over-culture of potato. The fact was that the people to Ireland became so fond of potatoes (because that is their staple food) that they rejected corn crops and nearly the whole of the land was grown with potato. To non-enterprising people the temptation is so great as to cultivate the crop which produces a large quantity at a small outlay. The population deteriorated rapidly, livestock was almost altogether neglected and the whole country became almost entirely a potato garden. Many families at the time subsisted entirely on potato. This went on for some years until 1845 when the potato disease broke out and the entire crop was lost. Every plant was rotten by disease. They had no other crop to fall upon and the famine broke out over the whole of the country. This is a very good example of the bad policy of agriculturists to depend entirely upon one crop. We should have various kinds of crops and also of animals, so that if one is attacked by a disease the other may be saved. It very seldom or never happens that all kinds of crops and also of animals are attacked by a disease. There is a homely saying in English "Never place the eggs in one basket." We should never have only one crop; because if the disease attacks that crop, we are ruined. Had the efforts made by the Government for the improvement of the tobacco culture, been made in improving the agriculture in general, as they have opened their eyes now, there would have been far better results.

Good tobacco was produced in Southern India from the exotic seeds but the failure generally has been in the manufacture and the preparation of it for the market. The general complaint in Europe against the Indian tobacco is that it is either so mouldy as to be unfit for any use or so dry and brittle as to be fit only for making snuff. Good tobacco has been produced in the country where skill and enterprise have been used in selecting the soil, in applying the manure,

in curing etc. It is difficult to combine in one person all the qualities necessary for a producer and a curer. Tobacco has been sent from this country which has commanded a price 10 to 15% higher than the best tobacco produced in America. Madras exports a large quantity of tobacco worth £. 50,000 to Burma etc. It is worked up in Burma into celebrated cheroots sent back to Madras market with the name and sold at a high price.

For growing tobacco the climate should be warm and slightly moist (neither too wet nor too dry). It is the extremes of draught and moisture which are objectionable to tobacco. Where the rainfall is too heavy and sudden, the young plants are killed altogether. If, on the other hand, they occur when the plants come to maturity, the leaves are torn. Some of the best tobaccos produced in the Madras Presidency are raised on the islands of the Godavery called (Lanka) and is known as Lanka tobacco.

It has been proved again and again by analysis, that the best tobacco contains but very little nicotin and albumen while the bad tobacco which has bad smell and worse taste contains large quantities of these two ingredients. So well has this fact been established that we can at once determine the value of tobacco by the albumen and nicotin contained in it. The best American tobacco contains about 2% of nicotin while the bulk of the tobacco in Southern India contains about 3½ % of nicotin. The bad smell and pungent taste of tobacco are due to the bad curing and not to the tobacco itself.

An important constituent of tobacco is potash, generally found in the state of organic salts. As regards Potash the greater the quantity greater the value of tobacco. The whiteness or the permanency of the ash of cigar is due to the presence of Potash. The presence of salts of potash improves greatly, the bearing capability, the combustion being more regular and uniform throughout. In many Manilla cigars the ash is white and firm, while in the country cigars the ash is grey and drifting. The price of tobacco

varies greatly depending upon the peculiarities. However nice our tobacco may be, if it is deficient in Potash, it cannot be called a good tobacco. It is deemed of great importance in order to secure good tobacco, not to have too much lime in the soil, because the lime if present in large quantity in the soil, is more readily taken up by the plants than potash which is therefore left aside.

Some of the best tobaccos were produced on Nilgiris which are very deficient in lime. This tobacco yielded about 32% of Potash while those grown on the plain contained only $\frac{1}{2}$ or 30% of Potash. Many varieties of tobacco of Southern India were analysed and the result is they contain generally $3\frac{1}{2}$ % of nicotine and 8% of Potash. The tobacco grown on the foot of the Western Ghats in the Tinnevely, Madura, and Coimbatore districts contained about 32% of Potash. The richness of tobacco in Potash is due to soils of those places being washed down from the hills which are formed of felspar which is converted into Potash by decomposition.

For growing tobacco, Potash in the soil is essential, but the soil of Southern India is nearly altogether wanting in Potash, because the soil is cropped from time immemorial with different crops without any return to it and thus it is exhausted of Potash and other ingredients. In order to grow good tobacco, we must select the soil where there are granite rocks or where agriculture is not practised to a great extent. It is true that the best tobacco can be grown only on the best soils, but we can grow second class tobacco on an inferior soil by farming and good manuring. The better the soil, the better the results. As a rule, rich, friable, loamy sandy soil is best suited for its culture. Too much of clay is prejudicial, because we can not find in it fine tilth necessary for the culture. Too much lime is objectionable as it prevents potash from being absorbed by the plants. Too much sand is injurious because the land dries rapidly.

In selecting land for tobacco culture we should take care to select that piece of land that is well drained and also not too much exposed. If the field is too exposed the high wind tears the leaves and lessens their commercial value. The tobacco crop may be commenced either by sowing the seeds in nursery bed or direct in the field. In parts of the country where, it is grown without the aid of irrigation it is customary to sow the seeds at once in the field. However, in Southern India generally the universal practice is to sow the seeds. The nursery bed is prepared in the following manner.

The ground is first dug deep and thoroughly pulverised in the process, manure being at the same time thoroughly mixed with the soil, care being taken when fold yard manure is used to, use it in well decayed state. After this preparatory work, the land is divided into small beds. The width of these beds being regulated so that we can with ease reach the centre on either side. The length of the bed may be anything we like, but the width should not be more than 4 feet. A bed 4 feet wide and 9 feet long will yield seedling plants enough to plant one acre of ground. The surface of the beds should be slightly raised. There is a good plan practised in America to spread over the seedling beds a layer of brushwood and to set fire to it, in order to kill the eggs of insects on the surface of the ground and also to destroy the seeds of weeds.

As the insects are averse to ashes, this plan prevents or deters the depredation of them and their little maggots and grubs, when the plants are above ground. Another advantage is that these ashes contain potash and thus they contribute to the support of the plants. There is perhaps no seedling plant when young more liable to be injured by the heavy rain or the rays of the sun than the tobacco plant and hence it is of great importance to take measures to protect the young seedlings by some shade when coming out of the ground. In America, it is usual to erect a stake and to spread

a piece of calico cloth over it. The cost of the cloth is very small because only three square yards of cloth will be required, for the bed of seedlings sufficient to plant one acre. Light also penetrates through and keeps the plants in good healthy state. In some places they cover the beds with palmyra leaves etc. When palmyra leaves are used, light does not penetrate and therefore the plants suffer. The plan of using calico is far superior to that (adopted in India) of using palmyra leaves etc. The latter affords shelter to obnoxious insects and when they are removed, the growth of the plant is suddenly checked for a time by sudden exposure to severe light. During cloudy weather or at night the calico may be temporarily removed.

Coming again to the subject of preparing the nursery-beds :—After the burning of the brushwood on the nursery bed they are carefully raked over the bed so as to spread uniformly over the ground. The seed is next thrown very shallow in lines across the bed and then the whole surface of the bed settled down (beaten down) to give a little more consistency to the ashes. To raise plants for one acre of ground $\frac{2}{3}$ of an ounce of tobacco seed is quite sufficient.

It is difficult to distribute the seeds uniformly over the ground ; in order to obviate this difficulty a fair quantity of sand or ashes is mixed with the $\frac{2}{3}$ oz. of the tobacco seeds and then the mixture is sown uniformly over the lines in beds. The sand is sown with the seed in order to ensure an equal distribution of the seed over the ground when the seed is small.

Very small seeds depend entirely upon the soil for their nutrition, plants of very large sizes depend upon their seeds for nutriment in the beginning.

After the tobacco is sown the next operation is to water the beds but never to flood them. To secure the best results from the tobacco seeds we should take care to water the seedlings with a watering pan which have very fine perforations. If the weather is dry, the beds should be watered

every night by simply moistening the ground. When the plants are from 4 to 5 inches high they are fit for transplanting. It is very important that we should never allow the plants to crowd together. When the plants have germinated, if they are crowded we should remove those that are weak and leave those that are healthy. In transplanting the seedlings the land should be thoroughly prepared in the following manner.

The selected land for tobacco culture should be ploughed not less than eight times and should be furrowed with the plough at intervals of 6 feet from each other and this should be converted into an open trench with a depth of 9 inches. These trenches being completed, the land is ready for the reception of night-soil. The night-soil which we collect in the municipal and union towns is to be systematically placed in the open trenches, to the depth of three inches, and the soil on each side of the trench is to be raked in over the night-soil and a ridge made with the superfluous soil. This process of disposing of the night-soil is to be repeated till the entire series of trenches have been utilized when a second set of trenches should be opened between every two covered ones; when these have been similarly enriched with night soil, the area of land will have been fully manured. The land should be ploughed at right angles to the parallel series of manual trenches, so as to spread the manured soil over the land and then two or three ploughings would complete the object in view thoroughly.

When the time for transplanting the tobacco seedlings is at hand, manure each acre of land with burnt earth mixed with bone dust and lime. If the bone dust is not available apply sufficient quantity of the waste products of the manufacture of aerated waters. If we cannot get the above-mentioned measures, apply 10 cart loads of well cooked farm-yard manure with 10 cart loads of tank silt. In addition to this, sheep manure also can be used. For growing leaves any amount of manure can be used. For producing grain

crops care should be taken in the application of manure. After scattering the manure plough the land well. The land should be ridged having the ridge nearly two feet and a half apart. The seedlings should be planted on the ridges at a distance of from $2\frac{1}{2}$ to 3 feet. We should regulate the distance according to the variety we grow.

It is never wise to grow plants so close together that when they are grown they only dash each other when the strong winds blow. The best time of day to transplant is at 4 o'clock in the afternoon. Because they have the whole of remaining day and night for them to be established. If we have calico shade there is no difficulty on transplanting tobacco at any time. It suffers when it is exposed suddenly, By means of calico it can be gradually acclimatized. As regards planting it is a practice to use a piece of wood called "Dibble" to make holes for the plant. Bring the seedling plants to the field in a basket covered with plantain leaves. It is very important to have the roots in their natural position. To have that position the holes must be sufficiently large.

In India, we cannot grow tobacco without irrigation. As soon as the transplantation is over we must repeatedly irrigate. Watering once a week or ten days will do. There is some barbarous practice in Hyderabad etc., 7 lbs. of tobacco seeds are sown per acre broad cast.

When the tobacco plants have reached the height of 9 to 10 inches we should hoe the soil vigorously; partly, in view to loosen the soil and partly to remove the weeds. Weeds must be carefully removed. When the first hoeing begins it is customary to remove the leaves growing near the roots and then to earth up i.e. draw up the soil round the plants. From the day of the first hoeing until the tobacco is cut down, worms should be looked for in the fields. The value of the leaves depends mainly on their not being worm-eaten. Early in the mornings the worms are on the top of the leaves; when the sun becomes hot they creep underneath near the

roots. They should be carefully searched, for they hide themselves. We should also then remove all the suckers and side-stems. It is much better to pinch them off than to cut them. As soon as the flower buds appear we should nip off the heart of the plant leaving 10 to 14 leaves according to the strength of the plant i.e. the top of the plants which checks the upward growth. The process is called topping. The object of removing the suckers, the flower buds and tops is that all the energy of the plant may be spent in the development of the leaves. The first result of topping is that the leaves become thicker, heavier and richer.

This is three month's crop. The nipping or topping process should not be applied to plants kept for seeds. As regards the harvesting of the crop the first evidence of its reaching the maturity is stickiness or gumminess over the leaves. The next is the appearance of yellow patches on the leaves. It is desirable never to cut the leaves too early. In climates like Southern India we can keep the tobacco plants longer on the ground than in other countries where we cannot trust the weather having frequent showers now and then. The gumminess is very important at the time of curing and therefore the plants are cut where there is most gummy matter. By a shower of rain the gumminess is washed but it is returned in 3 or 4 days. Therefore when the gumminess is washed off by a shower, we should wait before cutting the plants until the gumminess is restored.

There are two ways of harvesting: one is to cut down the plant and the other is to gather the leaves separately. Therefore advantages as well as disadvantages attend both the plants. We know that the leaves of the lower portion are older than the upper leaves. So if we wait to allow the upper leaves to mature thoroughly the lower leaves get more than matured. For these it is better to cut the whole plant and separate the leaves at the time of curing; by this, much labour and danger are saved. Take a knife and holding the top of the plants between the fingers of the left hand run it

through the stalk from the top to within two inches of the base. The plant is then cut off above the root. The process of gathering the leaves first is convenient when labour is abundant and the crop is over a small area. Then we gather the leaves that are fit for gathering and leave the others till they mature and in this way the tobacco leaves do not require sorting. When the leaves are gathered separately we require a larger area of drying sheds. Tobacco is a crop liable to be injured by small green flies. An application of a mixture of soot and ashes would have a very good effect.

In India, tobacco is cured by what is called the rapid fermentation process almost amounting to putrefaction. In England, it is cured by what is called the natural process which is slower than that practised here. In this country, the temperature is allowed to rise as much as 200°, while in Europe the temperature is 98° to 100°. In America they adopt a slow natural process which is also by heat. They have tobacco curing houses where the windows may be closed and the temperature reduced or raised by means of pipes. They do not depend upon the outside atmospheric temperature. They perform by this contrivance in 3 or 4 days what is done in India in 3 or 4 months. There, if the tobacco is moist, they give dry air, and if hot, cold air and so on. Though the practice of tobacco curing differs much in some particulars in many parts of this country yet they all subject the tobacco to a high temperature.

In harvesting, the general plan adopted here is to cut the crop always at 4 o'clock in the afternoon and to allow the plant to wither (to fade) until the next morning. On the following morning the plants are collected together in rows placed up-side down with stems upward and covered over with straw. In the evening the straw is removed and the plants are again spread on the ground care being taken not to keep them too close together. This is done for 4 days. The tobacco is now carried to the house where it is hung for 4 days. The tobacco is now carried to the house where it is hung in rows

either in the house or in the shady veranda for 30 days by which time the stems and midribs are quite dry and the leaves are then gathered off the stems. The leaves are then tied in bundles of 25 each, when all the tobacco has been made in bundles, a platform is prepared in a corner of the shed; it usually raised about six inches from the ground (Split bamboos resting on logs will answer well for the purpose). On this platform the bundles are piled up in a stock of nearly 64 cubic feet. The stock is then covered on all sides with straw or leaves and the whole is pressed down by heavy logs of wood. In this stock the fermentation begins. Frequently in dry weather to facilitate the fermentation the ryot makes a decoction of the tobacco stems and mixes Jaggery with it. The solution thus made is sprinkled over the leaves; if the fermentation process is carried too rapidly combustion follows. In order to have uniform heat the ryot turns the heap round and round every ten or fifteen days. By so doing he brings the outside plants to the centre and the centre one outside. This fermentation is highly objectionable. It ruins the tobacco altogether. By it all the aromatic properties are dissipated and tarry, sticky, and pungent compounds are left behind. In this country, the fermentation is not kept under control and is carried too far. Our great object in curing is to remove the albumen and nicotin. The practice for curing varies greatly according to the climate and soil.

The following is the practice of harvesting and curing tobacco which should be adopted here. The plants should be cut down when the majority of the leaves are ripe. If the climate is a reliable one, we should not be in too great a hurry to cut down the crop. We should never cut down the plants when wet with dew or rain and never until the gummy matter is restored. We should cut down the plants bodily at 3 or 4 inches above ground. If the topping or suckering process has been properly performed the leaves will be properly matured and will be injured and thick. It is generally wise in a hot climate to cut down the plants in

the evening at 4 o'clock. If any of the plants are inferior, we should leave them on the ground to mature. The general practice is to cut down the plant at night and leave them in the furrows all night taking care not to crush them. In the following morning we may take them to the drying sheds, the plants may either be strung on ropes or we may tie the plants in pairs and hung them across on bamboos. The bamboo will answer better than stringing as the string or rope breaks. The plants may be hung from end to end 6 inches space at every end for coolies remove them. The bamboos are generally 7 feet in length. It is sometimes the practice when the climate is not so hot to leave the plants on the ground for 3 or 4 days. This practice is not so advisable when the temperature is great. The first great object in tobacco curing is to get rid of the large quantity of moisture the plants contain.

The bamboos are hung across the sheds parallel to 16 inches apart from each other. The plants are left hung for 8 or 10 days. By this time the stalks are beginning partly to dry. While the plants are hanging in the sheds, it is very wise to keep off the hot winds. When the heat is excessive it is occasionally necessary to sprinkle water on the floor. The sudden exposure to sun is highly injurious; for it makes the tobacco thin and papery. We should dry them gradually in shade. When the plants are dried in the shade we should first collect them in square stock or heap over straw spread on the ground and cover the heap with straw to put out the wind. After putting straw some weights should be placed over it. As the fermentation proceeds, we should increase the weights. Let it remain thus for a fortnight, then open the heap and thrust the arm in the middle. If the tobacco is hot, break up the heap and make it up again: after this every 8 or 10 days thrust the arm in the heap and when it is hot break it down and make it up again. Continue this until the heat subsides. The bigger the heap, the quicker does the tobacco ferment. When no more heat appears in the heap

the tobacco is cured. The fermentation process is preliminary to putrefaction. We should never allow the temperature to exceed 100° F. in the centre of the heap. If the temperature is found greater we should turn immediately the heap upside down. If the fermentation is too rapid to be controlled on account of the much moisture remaining in the plants we should rehang them on to the bamboos, but not for a long time; because the exposure of the plants at the time of curing dissipates the volatile oil contained in it and destroys the fragrance.

Sometimes it is the practice to tie the plants into bunches of 6 to 8 before building up in the stack to moderate the cost of labour. In the curing process we should have great precaution. As the fermentation process goes on we should increase the temperature to 120° F. and not more than that. The most valuable constituents of tobacco to which is due its fragrance is dissipated by high temperature. When fermentation goes on, we should turn up the heap to secure a uniform heat by bringing the central bunches outside and the outside bunches inward. The object of this turning is first to keep down the temperature and next to secure the uniform temperature. If we allow the temperature to rise above 100° we get the black sticky, tarry leaf of nascent odour instead of that of brown golden colour.

The curing operation requires not less than a month. During this period it becomes generally necessary to hang the plants 3 or 4 times. The tobacco undergoes during this time several important chemical changes. The albuminoids are broken up and dissipated which evolve and carry with them a certain quantity of nicotin. Generally, a third of nicotin is said to be thus carried away. There is a great uncertainty about the chemical changes going on at the time of fermentation. Even in the case of nicotin there is a great uncertainty.

After the lapse of one month we must first ascertain whether tobacco is properly cured or not. The simplest

method is to stretch the tobacco leaf ; if it stretches without breaking and if the colour of the leaf is uniform throughout and its odour aromatic then we must suppose them to have been well cured. If the tobacco is badly cured, we have yellow or different coloured patches over the leaf ; the leaf breaks when stretched and the odour is pungent. To retain the aroma, we should not expose the plants too early. After the tobacco is cured we should strip off the leaves from the plants in moist dull days. If done on a dry day the tobacco will break and will be fit for snuff only. When the days are hot we should do it at night. We should then sort the leaves in three qualities and tie in bundles of 25 each. After this we should stock the bundles in a square heap and cover the whole heap with gunny cloths or any water proof cloth to keep off the wind. If the leaves are very dry it is the practice to sprinkle a solution of jaggery and tobacco stalks on them. By this process, the tobacco leaves become soft and pliable.

Americans have adopted a system by which they can cure tobacco within 48 hours and in a very small space. To be successful in tobacco-growing we should improve both the culture and its cure. If one of them is bad we have the same bad result as when both are bad. To secure the uniform result on a large scale we should cure the tobacco in large quantity. If grown and cured in small quantities the quality varies and there is wholesale purchase of it. There must be a class of men who will only cure the tobacco and a class to cultivate. This practice is adopted almost universally in Europe. There the tobacco curing is monopolized by Government.

Tobacco is a paying crop. An ordinary crop is six hundred pounds of cured tobacco per acre. 100 lbs of tobacco is on the average sold for Rs 10. The expenditure of labour of curing is very great. But fortunately it so happens that the tobacco culture and curing are performed at a time when there is little Agri : work going on.

There are many tobacco growing Companies at Manilla, Havanah, Sumatra, Java, etc in the Far East which have for years been paying on an average 30 % dividend per annum. For the last quarter of a century in order to acclimatise the tobacco seedlings in the nursery beds Americans used a few yards of calico covering over the nursery bed. Now as they have acquired advanced scientific knowledge in agriculture, they invented a cloth called cheese cloth or tobacco shade cloth. Hundreds of acres of tobacco is grown under the shade of this cloth in America, West Indies etc.

There is a remarkable difference between tobacco grown under cloth and in open space. Tobacco cultivators in America cover the top of the frame work over the field by the said cloth and close the sides of the fields also in the form of walls. This, the entire area, is enveloped by this cloth. This cloth is made up of hard twisted yarn of superior cotton. Thus these plants are protected from strong wind and rain. The crops grow quickly under the shade of this cloth and the shade of this cloth makes the leaves very superior in quality. This cloth can be used for four consecutive crops for covering purposes.

At Virudupatti and Sivakasi in the Tinnevelly District of the Madras Presidency, the Shanars a very intelligent class of people produce the best tobacco. They get 75 to 100 Rs net income on the prouce of an acre of tobacco. If these cultivators follow the improved system of tobacco growing under tobacco shade cloth they will get the best quality which will fetch higher prices in the market. Indians copy western habits, such as dressing, smoking etc. but they do not care to master and copy their business habits.

The trade of cigars is a profitable one because 25 % of the population in the world use tobacco leaves in the shape of cigars, snuff etc,

THE SECOND INDIAN INDUSTRIAL CONFERENCE

Tobacco Culture & Cure.

BY SADDHA RAMASUBBIAH, Esq., MANDALAY.

The subject chosen is Tobacco, its cultivation and cure. Viewed from the medical point of view, the leaf has many injurious effects, all of which have been condemned in no unmeasured terms by the most competent qualified and up-to-date medical experts. Apart from its deleterious effects, the question is one of vital importance; when viewed from its economic aspect, on account of its far-reaching importance, it holds its own in the industrial line. 25 % of the whole population of the world consume it in some form or other in chewing, snuffing or smoking. At the present day, in England, legislation has been effected to prevent promiscuous smoking among boys under 18 years of age. This is only in accord with our right judgment and sound commonsense. Quite similar to this, is opium which has, up till now, been largely cultivated in India and exported solely to China. Already the Chinese nation has awakened to the necessity of passing legislation to exclude the introduction of opium whose baneful effects are only too well known to need any description from me. A like legislation has been passed in Japan. Judged from these circumstances, the cultivation of Tobacco is no longer justifiable on moral grounds. But pending any state interference with this affair, there is no reason why this paper should not be read and I am glad to be able to acknowledge with sincere thanks to the Secretaries of the Industrial Conference who have been so good as to allow me in this great assembly of learned persons the permission given to me to place my views on such a momentous question as Tobacco.

The Botanical name is *Nicotiana Tobacam*. It is supposed to be the native of America though some assert to the contrary, that it was known in Asia long before America was discovered. It is, however, quite possible that this plant is indigenous both to America and Asia. There is however this much known that in America wild varieties of this plant are known while in Asia it is not so. From this, we almost conclude that it is indigenous to America. It happens, however, as far as India is concerned, this plant was brought into prominence in the reign of Akbar. The total area of tobacco cultivation in India is about 2,000,000 acres. In the Madras Presidency, this crop, at the present time, is found in all parts. The Coimbatore and Krishna Districts grow nearly half of tobacco produced. Trichinopoly and Dindigal that are famous for the cheroots and cigars produce very little tobacco. The area under tobacco cultivation there is not more than a small number of acres. The prominence which these places enjoy is not on account of the superiority of the produce of tobacco But on account of the superiority of its preparation. In Southern India the tobacco used in cheroots and cigars is chiefly produced in Coimbatore and Salem Districts. Burmese grow tobacco well but their curing is far from satisfactory. In Europe the tobacco is so satisfactorily prepared and cured as to equal the best of that of The West Indies.

Repeated efforts have been made by Government to improve tobacco culture, but unfortunately without success. In order to acclimatize the potato plant, experiments were persistently made in Europe for nearly 100 years and after that time magnificent results were obtained. We should never judge from one or two experiments but we should perform many experiments before coming to any conclusion finally. If the Europeans were not satisfied with the first few experiments of a few years there would be no potato plant now growing in Europe and the Irish potato would be a thing unheard of.

It is a somewhat serious matter that one of the most serious famines ever known to Ireland in 1845 is attributed to the over-culture of potato. The fact was that the people to Ireland became so fond of potatoes (because that is their staple food) that they rejected corn crops and nearly the whole of the land was grown with potato. To non-enterprising people the temptation is so great as to cultivate the crop which produces a large quantity at a small outlay. The population deteriorated rapidly, livestock was almost altogether neglected and the whole country became almost entirely a potato garden. Many families at the time subsisted entirely on potato. This went on for some years until 1845 when the potato disease broke out and the entire crop was lost. Every plant was rotten by disease. They had no other crop to fall upon and the famine broke out over the whole of the country. This is a very good example of the bad policy of agriculturists to depend entirely upon one crop. We should have various kinds of crops and also of animals, so that if one is attacked by a disease the other may be saved. It very seldom or never happens that all kinds of crops and also of animals are attacked by a disease. There is a homely saying in English "Never place the eggs in one basket." We should never have only one crop; because if the disease attacks that crop, we are ruined. Had the efforts made by the Government for the improvement of the tobacco culture, been made in improving the agriculture in general, as they have opened their eyes now, there would have been far better results.

Good tobacco was produced in Southern India from the exotic seeds but the failure generally has been in the manufacture and the preparation of it for the market. The general complaint in Europe against the Indian tobacco is that it is either so mouldy as to be unfit for any use or so dry and brittle as to be fit only for making snuff. Good tobacco has been produced in the country where skill and enterprise have been used in selecting the soil, in applying the manure,

in curing etc. It is difficult to combine in one person all the qualities necessary for a producer and a curer. Tobacco has been sent from this country which has commanded a price 10 to 15% higher than the best tobacco produced in America. Madras exports a large quantity of tobacco worth £. 50,000 to Burma etc. It is worked up in Burma into celebrated cheroots sent back to Madras market with the name and sold at a high price.

For growing tobacco the climate should be warm and slightly moist (neither too wet nor too dry). It is the extremes of draught and moisture which are objectionable to tobacco. Where the rainfall is too heavy and sudden, the young plants are killed altogether. If, on the other hand, they occur when the plants come to maturity, the leaves are torn. Some of the best tobaccos produced in the Madras Presidency are raised on the islands of the Godavery called (Lanka) and is known as Lanka tobacco.

It has been proved again and again by analysis, that the best tobacco contains but very little nicotin and albumen, while the bad tobacco which has bad smell and worse taste contains large quantities of these two ingredients. So well has this fact been established that we can at once determine the value of tobacco by the albumen and nicotin contained in it. The best American tobacco contains about 2% of nicotin while the bulk of the tobacco in Southern India contains about 3½% of nicotin. The bad smell and pungent taste of tobacco are due to the bad curing and not to the tobacco itself.

An important constituent of tobacco is potash, generally found in the state of organic salts. As regards Potash the greater the quantity greater the value of tobacco. The whiteness or the permanency of the ash of cigar is due to the presence of Potash. The presence of salts of potash improves greatly, the bearing capability, the combustion being more regular and uniform throughout. In many Manila cigars the ash is white and firm, while in the country cigars the ash is grey and drifting. The price of tobacco

varies greatly depending upon the peculiarities. However nice our tobacco may be, if it is deficient in Potash, it cannot be called a good tobacco. It is deemed of great importance in order to secure good tobacco, not to have too much lime in the soil, because the lime if present in large quantity in the soil, is more readily taken up by the plants than potash which is therefore left aside.

Some of the best tobaccos were produced on Nilgiris which are very deficient in lime. This tobacco yielded about 32% of Potash while those grown on the plain contained only $\frac{1}{2}$ or 30% of Potash. Many varieties of tobacco of Southern India were analysed and the result is they contain generally $3\frac{1}{2}$ % of nicotin and 8% of Potash. The tobacco grown on the foot of the Western Ghats in the Tinnevely, Madura, and Coimbatore districts contained about 32% of Potash. The richness of tobacco in Potash is due to soils of those places being washed down from the hills which are formed of feldspar which is converted into Potash by decomposition.

For growing tobacco, Potash in the soil is essential, but the soil of Southern India is nearly altogether wanting in Potash, because the soil is cropped from time immemorial with different crops without any return to it and thus it is exhausted of Potash and other ingredients. In order to grow good tobacco, we must select the soil where there are granite rocks or where agriculture is not practised to a great extent. It is true that the best tobacco can be grown only on the best soils, but we can grow second class tobacco on an inferior soil by farming and good manuring. The better the soil, the better the results. As a rule, rich, friable, loamy sandy soil is best suited for its culture. Too much of clay is prejudicial, because we can not find in it fine tilth necessary for the culture. Too much lime is objectionable as it prevents potash from being absorbed by the plants. Too much sand is injurious because the land dries rapidly.

In selecting land for tobacco culture we should take care to select that piece of land that is well drained and also not too much exposed. If the field is too exposed the high wind tears the leaves and lessens their commercial value. The tobacco crop may be commenced either by sowing the seeds in nursery bed or direct in the field. In parts of the country where, it is grown without the aid of irrigation it is customary to sow the seeds at once in the field. However, in Southern India generally the universal practice is to sow the seeds. The nursery bed is prepared in the following manner.

The ground is first dug deep and thoroughly pulverised in the process, manure being at the same time thoroughly mixed with the soil, care being taken when fold yard manure is used to, use it in well decayed state. After this preparatory work, the land is divided into small beds. The width of these beds being regulated so that we can with ease reach the centre on either side. The length of the bed may be anything we like, but the width should not be more than 4 feet. A bed 4 feet wide and 9 feet long will yield seedling plants enough to plant one acre of ground. The surface of the beds should be slightly raised. There is a good plan practised in America to spread over the seedling beds a layer of brushwood and to set fire to it, in order to kill the eggs of insects on the surface of the ground and also to destroy the seeds of weeds.

As the insects are averse to ashes, this plan prevents or deters the depredation of them and their little maggots and grubs, when the plants are above ground. Another advantage is that these ashes contain potash and thus they contribute to the support of the plants. There is perhaps no seedling plant when young more liable to be injured by the heavy rain or the rays of the sun than the tobacco plant and hence it is of great importance to take measures to protect the young seedlings by some shade when coming out of the ground. In America, it is usual to erect a stake and to spread

a piece of calico cloth over it. The cost of the cloth is very small because only three square yards of cloth will be required, for the bed of seedlings sufficient to plant one acre. Light also penetrates through and keeps the plants in good, healthy state. In some places they cover the beds with palmyra leaves etc. When palmyra leaves are used, light does not penetrate and therefore the plants suffer. The plan of using calico is far superior to that (adopted in India) of using palmyra leaves etc. The latter affords shelter to obnoxious insects and when they are removed, the growth of the plant is suddenly checked for a time by sudden exposure to severe light. During cloudy weather or at night the calico may be temporarily removed.

Coming again to the subject of preparing the nursery-beds:—After the burning of the brushwood on the nursery bed they are carefully raked over the bed so as to spread uniformly over the ground. The seed is next thrown very shallow in lines across the bed and then the whole surface of the bed settled down (beaten down) to give a little more consistency to the ashes. To raise plants for one acre of ground $\frac{3}{4}$ of an ounce of tobacco seed is quite sufficient.

It is difficult to distribute the seeds uniformly over the ground; in order to obviate this difficulty a fair quantity of sand or ashes is mixed with the $\frac{3}{4}$ oz. of the tobacco seeds and then the mixture is sown uniformly over the lines in beds. The sand is sown with the seed in order to ensure an equal distribution of the seed over the ground when the seed is small.

Very small seeds depend entirely upon the soil for their nutrition, plants of very large sizes depend upon their seeds for nutriment in the beginning.

After the tobacco is sown the next operation is to water the beds but never to flood them. To secure the best results from the tobacco seeds we should take care to water the seedlings with a watering pan which have very fine perforations. If the weather is dry, the beds should be watered

every night by simply moistening the ground. When the plants are from 4 to 5 inches high they are fit for transplanting. It is very important that we should never allow the plants to crowd together. When the plants have germinated, if they are crowded we should remove those that are weak and leave those that are healthy. In transplanting the seedlings the land should be thoroughly prepared in the following manner.

The selected land for tobacco culture should be ploughed not less than eight times and should be furrowed with the plough at intervals of 6 feet from each other and this should be converted into an open trench with a depth of 9 inches. These trenches being completed, the land is ready for the reception of night-soil. The night-soil which we collect in the municipal and union towns is to be systematically placed in the open trenches, to the depth of three inches, and the soil on each side of the trench is to be raked in over the night-soil and a ridge made with the superfluous soil. This process of disposing of the night-soil is to be repeated till the entire series of trenches have been utilized when a second set of trenches should be opened between every two covered ones; when these have been similarly enriched with night soil, the area of land will have been fully manured. The land should be ploughed at right angles to the parallel series of manual trenches, so as to spread the manured soil over the land and then two or three ploughings would complete the object in view thoroughly.

When the time for transplanting the tobacco seedlings is at hand, manure each acre of land with burnt earth mixed with bone dust and lime. If the bone dust is not available apply sufficient quantity of the waste products of the manufacture of aerated waters. If we cannot get the above-mentioned measures, apply 10 cart loads of well cooked farm-yard manure with 10 cart loads of tank silt. In addition to this, sheep manure also can be used. For growing leaves any amount of manure can be used. For producing grain

crops care should be taken in the application of manure. After scattering the manure plough the land well. The land should be ridged having the ridge nearly two feet and a half apart. The seedlings should be planted on the ridges at a distance of from $2\frac{1}{2}$ to 3 feet. We should regulate the distance according to the variety we grow.

It is never wise to grow plants so close together that when they are grown they only dash each other when the strong winds blow. The best time of day to transplant is at 4 o'clock in the afternoon. Because they have the whole of remaining day and night for them to be established. If we have calico shade there is no difficulty on transplanting tobacco at any time. It suffers when it is exposed suddenly. By means of calico it can be gradually acclimatized. As regards planting it is a practice to use a piece of wood called "Dibble" to make holes for the plant. Bring the seedling plants to the field in a basket covered with plantain leaves. It is very important to have the roots in their natural position. To have that position the holes must be sufficiently large.

In India, we cannot grow tobacco without irrigation. As soon as the transplantation is over we must repeatedly irrigate. Watering once a week or ten days will do. There is some barbarous practice in Hyderabad etc., 7 lbs. of tobacco seeds are sown per acre broad cast.

When the tobacco plants have reached the height of 9 to 10 inches we should hoe the soil vigorously; partly, in view to loosen the soil and partly to remove the weeds. Weeds must be carefully removed. When the first hoeing begins it is customary to remove the leaves growing near the roots and then to earth up i.e. draw up the soil round the plants. From the day of the first hoeing until the tobacco is cut down, worms should be looked for in the fields. The value of the leaves depends mainly on their not being worm-eaten. Early in the mornings the worms are on the top of the leaves; when the sun becomes hot they creep underneath near the

roots. They should be carefully searched, for they hide themselves. We should also then remove all the suckers and side-stems. It is much better to pinch them off than to cut them. As soon as the flower buds appear we should nip off the heart of the plant leaving 10 to 14 leaves according to the strength of the plant i.e. the top of the plants which checks the upward growth. The process is called topping. The object of removing the suckers, the flower buds and tops is that all the energy of the plant may be spent in the development of the leaves. The first result of topping is that the leaves become thicker, heavier and richer.

This is three month's crop. The nipping or topping process should not be applied to plants kept for seeds. As regards the harvesting of the crop the first evidence of its reaching the maturity is stickiness or gumminess over the leaves. The next is the appearance of yellow patches on the leaves. It is desirable never to cut the leaves too early. In climates like Southern India we can keep the tobacco plants longer on the ground than in other countries where we cannot trust the weather having frequent showers now and then. The gumminess is very important at the time of curing and therefore the plants are cut where there is most gummy matter. By a shower of rain the gumminess is washed but it is returned in 3 or 4 days. Therefore when the gumminess is washed off by a shower, we should wait before cutting the plants until the gumminess is restored.

There are two ways of harvesting: one is to cut down the plant and the other is to gather the leaves separately. Therefore advantages as well as disadvantages attend both the plants. We know that the leaves of the lower portion are older than the upper leaves. So if we wait to allow the upper leaves to mature thoroughly the lower leaves get more than matured. For these it is better to cut the whole plant and separate the leaves at the time of curing; by this, much labour and danger are saved. Take a knife and holding the top of the plants between the fingers of the left hand it

through the stalk from the top to within two inches of the base. The plant is then cut off above the root. The process of gathering the leaves first is convenient when labour is abundant and the crop is over a small area. Then we gather the leaves that are fit for gathering and leave the others till they mature and in this way the tobacco leaves do not require sorting. When the leaves are gathered separately we require a larger area of drying sheds. Tobacco is a crop liable to be injured by small green flies. An application of a mixture of soot and ashes would have a very good effect.

In India, tobacco is cured by what is called the rapid fermentation process almost amounting to putrefaction. In England, it is cured by what is called the natural process which is slower than that practised here. In this country, the temperature is allowed to rise as much as 200°, while in Europe the temperature is 98° to 100°. In America they adopt a slow natural process which is also by heat. They have tobacco curing houses where the windows may be closed and the temperature reduced or raised by means of pipes. They do not depend upon the outside atmospheric temperature. They perform by this contrivance in 3 or 4 days what is done in India in 3 or 4 months. There, if the tobacco is moist, they give dry air, and if hot, cold air and so on. Though the practice of tobacco curing differs much in some particulars in many parts of this country yet they all subject the tobacco to a high temperature.

In harvesting, the general plan adopted here is to cut the crop always at 4 o'clock in the afternoon and to allow the plant to wither (to fade) until the next morning. On the following morning the plants are collected together in rows & placed up-side down with stems upward and covered over with straw. In the evening the straw is removed and the plants are again spread on the ground care being taken not to keep them too close together. This is done for 4 days. The tobacco is now carried to the house where it is hung for 4 days. The tobacco is now carried to the house where it is hung in rows

either in the house or in the shady veranda for 30 days by which time the stems and midribs are quite dry and the leaves are then gathered off the stems. The leaves are then tied in bundles of 25 each, when all the tobacco has been made in bundles, a platform is prepared in a corner of the shed; it usually raised about six inches from the ground (Split bamboos resting on logs will answer well for the purpose). On this platform the bundles are piled up in a stock of nearly 64 cubic feet. The stock is then covered on all sides with straw or leaves and the whole is pressed down by heavy logs of wood. In this stock the fermentation begins. Frequently in dry weather to facilitate the fermentation the ryot makes a decoction of the tobacco stems and mixes Jaggery with it. The solution thus made is sprinkled over the leaves; if the fermentation process is carried too rapidly combustion follows. In order to have uniform heat the ryot turns the heap round and round every ten or fifteen days. By so doing he brings the outside plants to the centre and the centre one outside. This fermentation is highly objectionable. It ruins the tobacco altogether. By it all the aromatic properties are dissipated and tarry, sticky, and pungent compounds are left behind. In this country, the fermentation is not kept under control and is carried too far. Our great object in curing is to remove the albumen and nicotin. The practice for curing varies greatly according to the climate and soil.

The following is the practice of harvesting and curing tobacco which should be adopted here. The plants should be cut down when the majority of the leaves are ripe. If the climate is a reliable one, we should not be in too great a hurry to cut down the crop. We should never cut down the plants when wet with dew or rain and never until the gummy matter is restored. We should cut down the plants bodily at 3 or 4 inches above ground. If the topping or suckering process has been properly performed the leaves will be properly matured and will be injured and thick. It is generally wise in a hot climate to cut down the plants in

the evening at 4 o'clock. If any of the plants are inferior, we should leave them on the ground to mature. The general practice is to cut down the plant at night and leave them in the furrows all night taking care not to crush them. In the following morning we may take them to the drying sheds, the plants may either be strung on ropes or we may tie the plants in pairs and hung them across on bamboos. The bamboo will answer better than stringing as the string or rope breaks. The plants may be hung from end to end 6 inches space at every end for coolies remove them. The bamboos are generally 7 feet in length. It is sometimes the practice when the climate is not so hot to leave the plants on the ground for 3 or 4 days. This practice is not so advisable when the temperature is great. The first great object in tobacco curing is to get rid of the large quantity of moisture the plants contain.

The bamboos are hung across the sheds parallel to 16 inches apart from each other. The plants are left hung for 8 or 10 days. By this time the stalks are beginning partly to dry. While the plants are hanging in the sheds, it is very wise to keep off the hot winds. When the heat is excessive it is occasionally necessary to sprinkle water on the floor. The sudden exposure to sun is highly injurious; for it makes the tobacco thin and papery. We should dry them gradually in shade. When the plants are dried in the shade we should first collect them in square stock or heap over straw spread on the ground and cover the heap with straw to put out the wind. After putting straw some weights should be placed over it. As the fermentation proceeds, we should increase the weights. Let it remain thus for a fortnight, then open the heap and thrust the arm in the middle. If the tobacco is hot, break up the heap and make it up again: after this every 8 or 10 days thrust the arm in the heap and when it is hot break it down and make it up again. Continue this until the heat subsides. The bigger the heap, the quicker does the tobacco ferment. When no more heat appears in the heap

the tobacco is cured. The fermentation process is preliminary to putrefaction. We should never allow the temperature to exceed 100° F. in the centre of the heap. If the temperature is found greater we should turn immediately the heap upside down. if the fermentation is too rapid to be controlled on account of the much moisture remaining in the plants we should rehang them on to the bamboos, but not for a long time; because the exposure of the plants at the time of curing dissipates the volatile oil contained in it and distroys the fragrance.

Sometimes it is the practice to tie the plants into bunches of 6 to 8 before building up in the stack to moderate the cost of labour. In the curing processs we should have great precaution. As the fermentation process goes on we should increase the temperature to 120° F. and not more than that. The most valuable constituents of tobacco to which is due its fragrance is dissipated by high temperature. When fermentation goes on, we should turn up the heap to secure a uniform heat by bringing the central bunches outside and the outside bunches inward. The object of this turning is first to keep down the temperature and next to secure the uniform temperature. If we allow the temperature to rise above 100° we get the black sticky, tarry leaf of nascent odour instead of that of brown golden colour.

The curing operation requires not less than a month. During this period it becomes generally necessary to hang the plants 3 or 4 times. The tobacco undergoes during this time several important chemical changes. The albuminoids are broken up and dissipated which evolve and carry with them a certain quantity of nicotin. Generally, a third of nocotin is said to be thus carried away. There is a great uncertainty about the chemical changes going on at the time of fermentation. Even in the case of nicotin there is a great uncertainty.

After the lapse of one month we must first ascertain whether tobacco is properly cured or, not... The simplest

method is to stretch the tobacco leaf, if it stretches without breaking and if the colour of the leaf is uniform throughout and its odour aromatic then we must suppose them to have been well cured. If the tobacco is badly cured, we have yellow or different coloured patches over the leaf; the leaf breaks when stretched and the odour is pungent. To retain the aroma, we should not expose the plants too early. After the tobacco is cured we should strip off the leaves from the plants in moist dull days. If done on a dry day the tobacco will break and will be fit for snuff only. When the days are hot we should do it at night. We should then sort the leaves in three qualities and tie in bundles of 25 each. After this we should stock the bundles in a square heap and cover the whole heap with gunny cloths or any water proof cloth to keep off the wind. If the leaves are very dry it is the practice to sprinkle a solution of jaggery and tobacco stalks on them. By this process, the tobacco leaves become soft and pliable.

Americans have adopted a system by which they can cure tobacco within 48 hours and in a very small space. To be successful in tobacco-growing we should improve both the culture and its cure. If one of them is bad we have the same bad result as when both are bad. To secure the uniform result on a large scale we should cure the tobacco in large quantity. If grown and cured in small quantities the quality varies and there is wholesale purchase of it. There must be a class of men who will only cure the tobacco and a class to cultivate. This practice is adopted almost universally in Europe. There the tobacco curing is monopolized by Government.

Tobacco is a paying crop. An ordinary crop is six hundred pounds of cured tobacco per acre. 100 lbs of tobacco is on the average sold for Rs 10. The expenditure of labour of curing is very great. But fortunately it so happens that the tobacco culture and curing are performed at a time when there is little Agri : work going on.

There are many tobacco growing Companies at Manilla, Havanah, Sumatra, Java, etc in the Far East which have for years been paying on an average 30 % dividend per annum. For the last quarter of a century in order to acclimatise the tobacco seedlings in the nursery beds Americans used a few yards of calico covering over the nursery bed. Now as they have acquired advanced scientific knowledge in agriculture, they invented a cloth called cheese cloth or tobacco shade cloth. Hundreds of acres of tobacco is grown under the shade of this cloth in America, West Indies etc.

There is a remarkable difference between tobacco grown under cloth and in open space. Tobacco cultivators in America cover the top of the frame work over the field by the said cloth and close the sides of the fields also in the form of walls. This, the entire area, is enveloped by this cloth. This cloth is made up of hard twisted yarn of superior cotton, Thus these plants are protected from strong wind and rain. The crops grow quickly under the shade of this cloth and the shade of this cloth makes the leaves very superior in quality. This cloth can be used for four consecutive crops for covering purposes.

At Virudupatti and Sivakasi in the Tinnevelly District of the Madras Presidency, the Shanars a very intelligent class of people produce the best tobacco. They get 75 to 100 Rs net income on the prouce of an acre of tobacco. If these cultivators follow the improved system of tobacco growing under tobacco shade cloth they will get the best quality which will fetch higher prices in the market. Indians copy western habits, such as dressing, smoking etc. but they do not care to master and copy their business habits.

The trade of cigars is a profitable one because 25 % of the population in the world use tobacco leaves in the shape of cigars, snuff etc,

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Tobacco Culture & Cure.

BY SADDHA RAMASUBBIAH, Esq., MANDALAY.

The subject chosen is Tobacco, its cultivation and cure. Viewed from the medical point of view, the leaf has many injurious effects, all of which have been condemned in no unmeasured terms by the most competent qualified and up-to-date medical experts. Apart from its deleterious effects, the question is one of vital importance; when viewed from its economic aspect, on account of its far-reaching importance, it holds its own in the industrial line. 25 % of the whole population of the world consume it in some form or other in chewing, snuffing or smoking. At the present day, in England, legislation has been effected to prevent promiscuous smoking among boys under 18 years of age. This is only in accord with our right judgment and sound commonsense. Quite similar to this, is opium which has, up till now, been largely cultivated in India and exported solely to China. Already the Chinese nation has awakened to the necessity of passing legislation to exclude the introduction of opium whose baneful effects are only too well known to need any description from me. A like legislation has been passed in Japan. Judged from these circumstances, the cultivation of Tobacco is no longer justifiable on moral grounds. But pending any state interference with this affair, there is no reason why this paper should not be read and I am glad to be able to acknowledge with sincere thanks to the Secretaries of the Industrial Conference who have been so good as to allow me in this great assembly of learned persons the permission given to me to place my views on such a momentous question as Tobacco.

The Botanical name is *Nicotiana Tobacam*. It is supposed to be the native of America though some assert to the contrary, that it was known in Asia long before America was discovered. It is, however, quite possible that this plant is indigenous both to America and Asia. There is however this much known that in America wild varieties of this plant are known while in Asia it is not so. From this, we almost conclude that it is indigenous to America. It happens, however, as far as India is concerned, this plant was brought into prominence in the reign of Akbar. The total area of tobacco cultivation in India is about 2,000,000 acres. In the Madras Presidency, this crop, at the present time, is found in all parts. The Coimbatore and Krishna Districts grow nearly half of tobacco produced. Trichinopoly and Dindigal that are famous for the cheroots and cigars produce very little tobacco. The area under tobacco cultivation there is not more than a small number of acres. The prominence which these places enjoy is not on account of the superiority of the produce of tobacco But on account of the superiority of its preparation. In Southern India the tobacco used in cheroots and cigars is chiefly produced in Coimbatore and Salem Districts. Burmese grow tobacco well but their curing is far from satisfactory. In Eurpre the tobacco is so satisfactorily prepared and cured as to equal the best of that of The West Indies.

Repeated efforts have been made by Government to improve tobacco culture, but unfortunately without success. In order to acclimatize the potato plant, experiments were persistently made in Europe for nearly 100 years and after that time magnificent results were obtained. We should never judge from one or two experiments but we should perform many experiments before coming to any conclusion finally. If the Europeans were not satisfied with the first few experiments of a few years there would be no potato plant now growing in Europe and the Irish potato would be a thing unheard of.

It is a somewhat serious matter that one of the most serious famines ever known to Ireland in 1845 is attributed to the over-culture of potato. The fact was that the people to Ireland became so fond of potatoes (because that is their staple food) that they rejected corn crops and nearly the whole of the land was grown with potato. To non-enterprising people the temptation is so great as to cultivate the crop which produces a large quantity at a small outlay. The population deteriorated rapidly, livestock was almost altogether neglected and the whole country became almost entirely a potato garden. Many families at the time subsisted entirely on potato. This went on for some years until 1845 when the potato disease broke out and the entire crop was lost. Every plant was rotten by disease. They had no other crop to fall upon and the famine broke out over the whole of the country. This is a very good example of the bad policy of agriculturists to depend entirely upon one crop. We should have various kinds of crops and also of animals, so that if one is attacked by a disease the other may be saved. It very seldom or never happens that all kinds of crops and also of animals are attacked by a disease. There is a homely saying in English "Never place the eggs in one basket." We should never have only one crop; because if the disease attacks that crop, we are ruined. Had the efforts made by the Government for the improvement of the tobacco culture, been made in improving the agriculture in general, as they have opened their eyes now, there would have been far better results.

Good tobacco was produced in Southern India from the exotic seeds but the failure generally has been in the manufacture and the preparation of it for the market. The general complaint in Europe against the Indian tobacco is that it is either so mouldy as to be unfit for any use or so dry and brittle as to be fit only for making snuff. Good tobacco has been produced in the country where skill and enterprise have been used in selecting the soil, in applying the manure,

in curing etc. It is difficult to combine in one person all the qualities necessary for a producer and a curer. Tobacco has been sent from this country which has commanded a price 10 to 15% higher than the best tobacco produced in America. Madras exports a large quantity of tobacco worth £. 50,000 to Burma etc. It is worked up in Burma into celebrated cheroots sent back to Madras market with the name and sold at a high price.

For growing tobacco the climate should be warm and slightly moist (neither too wet nor too dry). It is the extremes of draught and moisture which are objectionable to tobacco. Where the rainfall is too heavy and sudden, the young plants are killed altogether. If, on the other hand, they occur when the plants come to maturity, the leaves are torn. Some of the best tobaccos produced in the Madras Presidency are raised on the islands of the Godavery called (Lanka) and is known as Lanka tobacco.

It has been proved again and again by analysis, that the best tobacco contains but very little nicotin and albumen while the bad tobacco which has bad smell and worse taste contains large quantities of these two ingredients. So well has this fact been established that we can at once determine the value of tobacco by the albumen and nicotin contained in it. The best American tobacco contains about 2% of nicotin while the bulk of the tobacco in Southern India contains about 3½% of nicotin. The bad smell and pungent taste of tobacco are due to the bad curing and not to the tobacco itself.

An important constituent of tobacco is potash, generally found in the state of organic salts. As regards Potash the greater the quantity greater the value of tobacco. The whiteness or the permanency of the ash of cigar is due to the presence of Potash. The presence of salts of potash improves greatly, the bearing capability, the combustion being more regular and uniform throughout. In many Manilla cigars the ash is white and firm, while in the country cigars the ash is grey and drifting. The price of tobacco

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Some of the best tobaccos were produced on Nilgiris which are very deficient in lime. This tobacco yielded about 32% of Potash while those grown on the plain contained only $\frac{1}{2}$ or 30% of Potash. Many varieties of tobacco of Southern India were analysed and the result is they contain generally $3\frac{1}{2}$ % of nicotin and 8% of Potash. The tobacco grown on the foot of the Western Ghats in the Tinnevely, Madura, and Coimbatore districts contained about 32% of Potash. The richness of tobacco in Potash is due to soils of those places being washed down from the hills which are formed of feldspar which is converted into Potash by decomposition.

For growing tobacco, Potash in the soil is essential, but the soil of Southern India is nearly altogether wanting in Potash, because the soil is cropped from time immemorial with different crops without any return to it and thus it is exhausted of Potash and other ingredients. In order to grow good tobacco, we must select the soil where there are granite rocks or where agriculture is not practised to a great extent. It is true that the best tobacco can be grown only on the best soils, but we can grow second class tobacco on an inferior soil by farming and good manuring. The better the soil, the better the results. As a rule, rich, friable, loamy sandy soil is best suited for its culture. Too much of clay is prejudicial, because we can not find in it fine tilth necessary for the culture. Too much lime is objectionable as it prevents potash from being absorbed by the plants. Too much sand is injurious because the land dries rapidly.

In selecting land for tobacco culture we should take care to select that piece of land that is well drained and also not too much exposed. If the field is too exposed the high wind tears the leaves and lessens their commercial value. The tobacco crop may be commenced either by sowing the seeds in nursery bed or direct in the field. In parts of the country where, it is grown without the aid of irrigation it is customary to sow the seeds at once in the field. However, in Southern India generally the universal practice is to sow the seeds. The nursery bed is prepared in the following manner.

The ground is first dug deep and thoroughly pulverised in the process manure being at the same time thoroughly mixed with the soil, care being taken when fold yard manure is used to, use it in well decayed state. After this preparatory work, the land is divided into small beds. The width of these beds being regulated so that we can with ease reach the centre on either side. The length of the bed may be anything we like, but the width should not be more than 4 feet. A bed 4 feet wide and 9 feet long will yield seedling plants enough to plant one acre of ground. The surface of the beds should be slightly raised. There is a good plan practised in America to spread over the seedling beds a layer of brushwood and to set fire to it, in order to kill the eggs of insects on the surface of the ground and also to destroy the seeds of weeds.

As the insects are averse to ashes, this plan prevents or deters the depredation of them and their little maggots and grubs, when the plants are above ground. Another advantage is that these ashes contain potash and thus they contribute to the support of the plants. There is perhaps no seedling plant when young more liable to be injured by the heavy rain or the rays of the sun than the tobacco plant and hence it is of great importance to take measures to protect the young seedlings by some shade when coming out of the ground. In America, it is usual to erect a stake and to spread

a piece of calico cloth over it. The cost of the cloth is very small because only three square yards of cloth will be required, for the bed of seedlings sufficient to plant one acre. Light also penetrates through and keeps the plants in good, healthy state. In some places they cover the beds with palmyra leaves etc. When palmyra leaves are used, light does not penetrate and therefore the plants suffer. The plan of using calico is far superior to that (adopted in India) of using palmyra leaves etc. The latter affords shelter to obnoxious insects and when they are removed, the growth of the plant is suddenly checked for a time by sudden exposure to severe light. During cloudy weather or at night the calico may be temporarily removed.

Coming again to the subject of preparing the nursery-beds:—After the burning of the brushwood on the nursery bed they are carefully raked over the bed so as to spread uniformly over the ground. The seed is next thrown very shallow in lines across the bed and then the whole surface of the bed settled down (beaten down) to give a little more consistency to the ashes. To raise plants for one acre of ground $\frac{3}{4}$ of an ounce of tobacco seed is quite sufficient.

It is difficult to distribute the seeds uniformly over the ground; in order to obviate this difficulty a fair quantity of sand or ashes is mixed with the $\frac{3}{4}$ oz. of the tobacco seeds and then the mixture is sown uniformly over the lines in beds. The sand is sown with the seed in order to ensure an equal distribution of the seed over the ground when the seed is small.

Very small seeds depend entirely upon the soil for their nutrition, plants of very large sizes depend upon their seeds for nutriment in the beginning.

After the tobacco is sown the next operation is to water the beds but never to flood them. To secure the best results from the tobacco seeds we should take care to water the seedlings with a watering pan which have very fine perforations. If the weather is dry, the beds should be watered

every night by simply moistening the ground. When the plants are from 4 to 5 inches high they are fit for transplanting. It is very important that we should never allow the plants to crowd together. When the plants have germinated, if they are crowded we should remove those that are weak and leave those that are healthy. In transplanting the seedlings the land should be thoroughly prepared in the following manner.

The selected land for tobacco culture should be ploughed not less than eight times and should be furrowed with the plough at intervals of 6 feet from each other and this should be converted into an open trench with a depth of 9 inches. These trenches being completed, the land is ready for the reception of night-soil. The night-soil which we collect in the municipal and union towns is to be systematically placed in the open trenches, to the depth of three inches, and the soil on each side of the trench is to be raked in over the night-soil and a ridge made with the superfluous soil. This process of disposing of the night-soil is to be repeated till the entire series of trenches have been utilized when a second set of trenches should be opened between every two covered ones; when these have been similarly enriched with night soil, the area of land will have been fully manured. The land should be ploughed at right angles to the parallel series of manual trenches, so as to spread the manured soil over the land and then two or three ploughings would complete the object in view thoroughly.

When the time for transplanting the tobacco seedlings is at hand, manure each acre of land with burnt earth mixed with bone dust and lime. If the bone dust is not available apply sufficient quantity of the waste products of the manufacture of aerated waters. If we cannot get the above-mentioned measures, apply 10 cart loads of well cooked farm-yard manure with 10 cart loads of tank silt. In addition to this, sheep manure also can be used. For growing leaves any amount of manure can be used. For producing grain

crops care should be taken in the application of manure. After soattering the manure plough the land well. The land should be ridged having the ridge nearly two feet and a half apart. The seedlings should be planted on the ridges at a distance of from 2½ to 3 feet. We should regulate the distance according to the variety we grow.

It is never wise to grow plants so close together that when they are grown they only dash each other when the strong winds blow. The best time of day to transplant is at 4 o'clock in the afternoon. Because they have the whole of remaining day and night for them to be established. If we have calico shade there is no difficulty on transplanting tobacco at any time. It suffers when it is exposed suddenly. By means of calico it can be gradually acclimatized. As regards planting it is a practice to use a piece of wood called "Dibble" to make holes for the plant. Bring the seedling plants to the field in a basket covered with plantain leaves. It is very important to have the roots in their natural position. To have that position the holes must be sufficiently large.

In India, we cannot grow tobacco without irrigation. As soon as the transplantation is over we must repeatedly irrigate. Watering once a week or ten days will do. There is some barbarous practice in Hyderabad etc., 7 lbs. of tobacco seeds are sown per acre broad cast.

When the tobacco plants have reached the height of 9 to 10 inches we should hoe the soil vigorously; partly, in view to loosen the soil and partly to remove the weeds. Weeds must be carefully removed. When the first hoeing begins it is customary to remove the leaves growing near the roots and then to earth up i.e. draw up the soil round the plants. From the day of the first hoeing until the tobacco is cut down, worms should be looked for in the fields. The value of the leaves depends mainly on their not being worm-eaten. Early in the mornings the worms are on the top of the leaves; when the sun becomes hot they creep underneath near the

roots. They should be carefully searched, for they hide themselves. We should also then remove all the suckers and side-stems. It is much better to pinch them off than to cut them. As soon as the flower buds appear we should nip off the heart of the plant leaving 10 to 14 leaves according to the strength of the plant i.e. the top of the plants which checks the upward growth. The process is called topping. The object of removing the suckers, the flower buds and tops is that all the energy of the plant may be spent in the development of the leaves. The first result of topping is that the leaves become thicker, heavier and richer.

This is three month's crop. The nipping or topping process should not be applied to plants kept for seeds. As regards the harvesting of the crop the first evidence of its reaching the maturity is stickiness or gumminess over the leaves. The next is the appearance of yellow patches on the leaves. It is desirable never to cut the leaves too early. In climates like Southern India we can keep the tobacco plants longer on the ground than in other countries where we cannot trust the weather having frequent showers now and then. The gumminess is very important at the time of curing and therefore the plants are cut where there is most gummy matter. By a shower of rain the gumminess is washed but it is returned in 3 or 4 days. Therefore when the gumminess is washed off by a shower, we should wait before cutting the plants until the gumminess is restored.

There are two ways of harvesting: one is to cut down the plant and the other is to gather the leaves separately. Therefore advantages as well as disadvantages attend both the plants. We know that the leaves of the lower portion are older than the upper leaves. So if we wait to allow the upper leaves to mature thoroughly the lower leaves get more than matured. For these it is better to cut the whole plant and separate the leaves at the time of curing; by this, much labour and danger are saved. Take a knife and holding the top of the plants between the fingers of the left hand run it

through the stalk from the top to within two inches of the base. The plant is then cut off above the root. The process of gathering the leaves first is convenient when labour is abundant and the crop is over a small area. Then we gather the leaves that are fit for gathering and leave the others till they mature and in this way the tobacco leaves do not require sorting. When the leaves are gathered separately we require a larger area of drying sheds. Tobacco is a crop liable to be injured by small green flies. An application of a mixture of soot and ashes would have a very good effect.

In India, tobacco is cured by what is called the rapid fermentation process almost amounting to putrefaction. In England, it is cured by what is called the natural process which is slower than that practised here. In this country, the temperature is allowed to rise as much as 200°, while in Europe the temperature is 98° to 100°. In America they adopt a slow natural process which is also by heat. They have tobacco curing houses where the windows may be closed and the temperature reduced or raised by means of pipes. They do not depend upon the outside atmospheric temperature. They perform by this contrivance in 3 or 4 days what is done in India in 3 or 4 months. There, if the tobacco is moist, they give dry air, and if hot, cold air and so on. Though the practice of tobacco curing differs much in some particulars in many parts of this country yet they all subject the tobacco to a high temperature.

In harvesting, the general plan adopted here is to cut the crop always at 4 o'clock in the afternoon and to allow the plant to wither (to fade) until the next morning. On the following morning the plants are collected together in rows placed up-side down with stems upward and covered over with straw. In the evening the straw is removed and the plants are again spread on the ground care being taken not to keep them too close together. This is done for 4 days. The tobacco is now carried to the house where it is hung for 4 days. The tobacco is now carried to the house where it is hung in rows

either in the house or in the shady veranda for 30 days by which time the stems and midribs are quite dry and the leaves are then gathered off the stems. The leaves are then tied in bundles of 25 each, when all the tobacco has been made in bundles, a platform is prepared in a corner of the shed; it usually raised about six inches from the ground (Split bamboos resting on logs will answer well for the purpose). On this platform the bundles are piled up in a stock of nearly 64 cubic feet. The stock is then covered on all sides with straw or leaves and the whole is pressed down by heavy logs of wood. In this stock the fermentation begins. Frequently in dry weather to facilitate the fermentation the ryot makes a decoction of the tobacco stems and mixes Jaggery with it. The solution thus made is sprinkled over the leaves; if the fermentation process is carried too rapidly combustion follows. In order to have uniform heat the ryot turns the heap round and round every ten or fifteen days. By so doing he brings the outside plants to the centre and the centre one outside. This fermentation is highly objectionable. It ruins the tobacco altogether. By it all the aromatic properties are dissipated and tarry, sticky, and pungent compounds are left behind. In this country, the fermentation is not kept under control and is carried too far. Our great object in curing is to remove the albumen and nicotin. The practice for curing varies greatly according to the climate and soil.

The following is the practice of harvesting and curing tobacco which should be adopted here. The plants should be cut down when the majority of the leaves are ripe. If the climate is a reliable one, we should not be in too great a hurry to cut down the crop. We should never cut down the plants when wet with dew or rain and never until the gummy matter is restored. We should cut down the plants bodily at 3 or 4 inches above ground. If the topping or suckering process has been properly performed the leaves will be properly matured and will be injured and thick. It is generally wise in a hot climate to cut down the plants in

the evening at 4 o'clock. If any of the plants are inferior, we should leave them on the ground to mature. The general practice is to cut down the plant at night and leave them in the furrows all night taking care not to crush them. In the following morning we may take them to the drying sheds, the plants may either be strung on ropes or we may tie the plants in pairs and hung them across on bamboos. The bamboo will answer better than stringing as the string or rope breaks. The plants may be hung from end to end 6 inches space at every end for coolies remove them. The bamboos are generally 7 feet in length. It is sometimes the practice when the climate is not so hot to leave the plants on the ground for 3 or 4 days. This practice is not so advisable when the temperature is great. The first great object in tobacco curing is to get rid of the large quantity of moisture the plants contain.

The bamboos are hung across the sheds parallel to 16 inches apart from each other. The plants are left hung for 8 or 10 days. By this time the stalks are beginning partly to dry. While the plants are hanging in the sheds, it is very wise to keep off the hot winds. When the heat is excessive it is occasionally necessary to sprinkle water on the floor. The sudden exposure to sun is highly injurious, for it makes the tobacco thin and papery. We should dry them gradually in shade. When the plants are dried in the shade we should first collect them in square stock or heap over straw spread on the ground and cover the heap with straw to put out the wind. After putting straw some weights should be placed over it. As the fermentation proceeds, we should increase the weights. Let it remain thus for a fortnight, then open the heap and thrust the arm in the middle. If the tobacco is hot, break up the heap and make it up again : after this every 8 or 10 days thrust the arm in the heap and when it is hot break it down and make it up again. Continue this until the heat subsides. The bigger the heap, the quicker does the tobacco ferment. When no more heat appears in the heap

the tobacco is cured. The fermentation process is preliminary to putrefaction. We should never allow the temperature to exceed 100° F. in the centre of the heap. If the temperature is found greater we should turn immediately the heap upside down, if the fermentation is too rapid to be controlled on account of the much moisture remaining in the plants we should rehang them on to the bamboos, but not for a long time; because the exposure of the plants at the time of curing dissipates the volatile oil contained in it and destroys the fragrance.

Sometimes it is the practice to tie the plants into bunches of 6 to 8 before building up in the stack to moderate the cost of labour. In the curing process we should have great precaution. As the fermentation process goes on we should increase the temperature to 120° F. and not more than that. The most valuable constituents of tobacco to which is due its fragrance is dissipated by high temperature. When fermentation goes on, we should turn up the heap to secure a uniform heat by bringing the central bunches outside and the outside bunches inward. The object of this turning is first to keep down the temperature and next to secure the uniform temperature. If we allow the temperature to rise above 100° we get the black sticky, tarry leaf of nascent odour instead of that of brown golden colour.

The curing operation requires not less than a month. During this period it becomes generally necessary to hang the plants 3 or 4 times. The tobacco undergoes during this time several important chemical changes. The albuminoids are broken up and dissipated which evolve and carry with them a certain quantity of nicotin. Generally, a third of nicotin is said to be thus carried away. There is a great uncertainty about the chemical changes going on at the time of fermentation. Even in the case of nicotin there is a great uncertainty.

After the lapse of one month we must first ascertain whether tobacco is properly cured or not. The simplest

method is to stretch the tobacco leaf ; if it stretches without breaking and if the colour of the leaf is uniform throughout and its odour aromatic then we must suppose them to have been well cured. If the tobacco is badly cured, we have yellow or different coloured patches over the leaf ; the leaf breaks when stretched and the odour is pungent. To retain the aroma, we should not expose the plants too early. After the tobacco is cured we should strip off the leaves from the plants in moist dull days. If done on a dry day the tobacco will break and will be fit for snuff only. When the days are hot we should do it at night. We should then sort the leaves in three qualities and tie in bundles of 25 each. After this we should stock the bundles in a square heap and cover the whole heap with gunny cloths or any water proof cloth to keep off the wind. If the leaves are very dry it is the practice to sprinkle a solution of jaggery and tobacco stalks on them. By this process, the tobacco leaves become soft and pliable.

Americans have adopted a system by which they can cure tobacco within 48 hours and in a very small space. To be successful in tobacco-growing we should improve both the culture and its cure. If one of them is bad we have the same bad result as when both are bad. To secure the uniform result on a large scale we should cure the tobacco in large quantity. If grown and cured in small quantities the quality varies and there is wholesale purchase of it. There must be a class of men who will only cure the tobacco and a class to cultivate. This practice is adopted almost universally in Europe. There the tobacco curing is monopolized by Government.

Tobacco is a paying crop. An ordinary crop is six hundred pounds of cured tobacco per acre. 100 lbs of tobacco is on the average sold for Rs 10. The expenditure of labour of curing is very great. But fortunately it so happens that the tobacco culture and curing are performed at a time when there is little Agri : work going on.

There are many tobacco growing Companies at Manilla, Havanah, Sumatra, Java, etc in the Far East which have for years been paying on an average 30 % dividend per annum. For the last quarter of a century in order to acclimatise the tobacco seedlings in the nursery beds Americans used a few yards of calico covering over the nursery bed. Now as they have acquired advanced scientific knowledge in agriculture, they invented a cloth called cheese cloth or tobacco shade cloth. Hundreds of acres of tobacco is grown under the shade of this cloth in America, West Indies etc.

There is a remarkable difference between tobacco grown under cloth and in open space. Tobacco cultivators in America cover the top of the frame work over the field by the said cloth and close the sides of the fields also in the form of walls. This, the entire area, is enveloped by this cloth. This cloth is made up of hard twisted yarn of superior cotton, Thus these plants are protected from strong wind and rain. The crops grow quickly under the shade of this cloth and the shade of this cloth makes the leaves very superior in quality. This cloth can be used for four consecutive crops for covering purposes.

At Virudupatti and Sivakasi in the Tinnevelly District of the Madras Presidency, the Shanars a very intelligent class of people produce the best tobacco. They get 75 to 100 Rs net income on the prouce of an acre of tobacco. If these cultivators follow the improved system of tobacco growing under tobacco shade cloth they will get the best quality which will fetch higher prices in the market. Indians copy western habits, such as dressing, smoking etc. but they do not care to master and copy their business habits.

The trade of cigars is a profitable one because 25 % of the population in the world use tobacco leaves in the shape of cigars, snuff etc,

THE SECOND INDIAN INDUSTRIAL CONFERENCE.

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P 35 — Spare copy of no.
M75P

“Plantain Fibre.”

BY J N BANERJEE Esq.

Calcutta.

THE object of the present note is to draw attention to the common plantain as a latent source of an immense quantity of fibre which has hitherto been practically wasted and which might be turned to account by the Indians, to furnish some information about the extractor, the mode of extracting fibre, its out-turn per bigha, its value and the costs of extracting it, &c

The existence of fibre in the common plantain has probably been known in India from ancient times and its value and utility have been brought prominently to public notice at intervals from time to time. At the time of the temporary suspension of the supplies of Russian hemp to the English market by the occurrence of the Crimean War, the Government instituted an enquiry as to the different kinds and relative values of fibers obtainable in India. The information obtained was interesting and valuable at that time. The main reasons for not making use of the fibre contained in the stems of the common plantain (1) general ignorance of its existence; (2) the comparative abundance of other species of fibre yielding plants which can be easily and profitably grown by the people and with whose fibres and with the means of extracting them they have long been familiar; and (3) the want of some simple, but efficient machine or appliance, suited to their means for extracting the fibre.

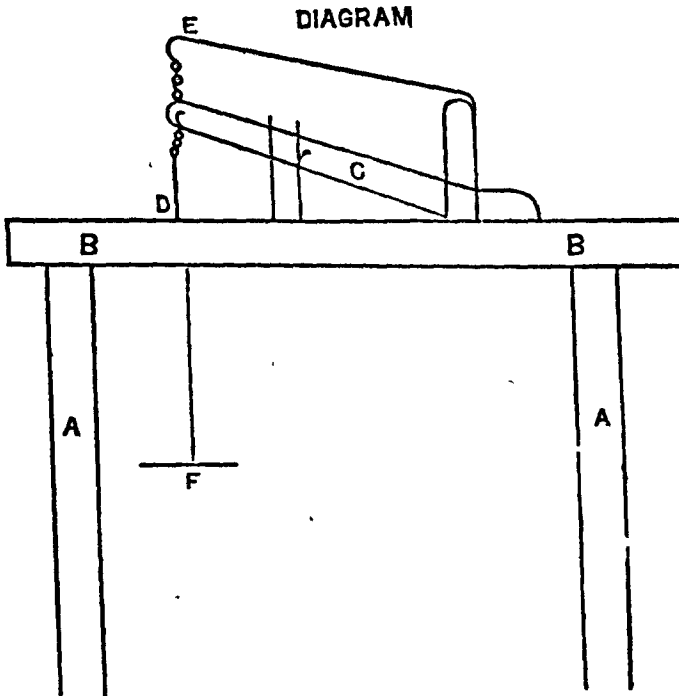
My experiments have shown that an average plantain stem cut for fruit would give about $\frac{1}{4}$ of a seer of the clean lustrous, long stapled and commercially valued fibre. An adult with a week's experience can work about 8 stems a day, a boy, being

given to assist him in tearing the sheaths into longitudinal pieces of $\frac{1}{4}$ inch width and in collecting the broken fibre and in drying them, and these in the sun the fibre extracted. The adult's wages being put down at four annas and the boy's at one-half an anna one will get in a day seven seers of fibre, for five and a half annas. Even taking the out turn as per experiment granting that especial men are to be engaged for fibre extracting works, the charges of extracting one ton of fibre from plantain stems as they are cut for fruits amount to $\text{₹s } 2.240 \times 5\frac{1}{2} \text{ as } \times 14 \text{ ₹s}$ or $\text{Rs } 55$ a ton. Add to this $\text{Rs } 40$ for freight, trader's commission, insurance, baling, cooly and cartage, &c., the total comes to $\text{Rs. } 95$ or in round figures it reaches to London at $\text{Rs } 100$. Compare this with the quotation received recently from the London Chamber of Commerce even taking the value at only the lowest price, *vis* $\text{Rs. } 35$ a ton, there is a net profit of 35×16 or $\text{Rs. } 560$ less $\text{Rs } 100$ or $\text{Rs. } 460$ for a ton of fibre.

On a bigha of plantain in these parts of Bengal are grown about 400 plants; so the out turn per bigha will be about 9 maunds, which would draw a clear income of $\text{Rs. } 150$. The profit to the agriculturist owner will not be all the $\text{Rs. } 150$; it may be put down at least $\text{Rs. } 25$ a bigha as this means conversion into money of fruit cut stems thrown away to rot on the ground. I venture to say it is opening a new source of agricultural wealth. There is no special expense to be incurred for fibre industry. Remember that the said income of $\text{Rs. } 150$ per bigha of plantain is over and above the value of fruits and leaves obtained from the plantain stems which may be at least 2 annas a stem and at a minimum net income of $\text{Rs } 25$ in a bigha, plantain fruit being 18 months crop, the annual income per bigha from both plantain fruits and fibre is $\text{Rs. } 150 + \text{Rs. } 100 \times 1\frac{1}{2}$ year or $\text{Rs. } 250$ or $\text{Rs. } 166$ per year (a bunch of fruit is sold from 8 annas to over 12 annas), from a trader's point of view. There is an easier method of presently starting industry. Rather than waiting for 18 months for the growth of plantain tree, the numberless stems available from places scattered here and there over several villages may be utilised if they can train

their men or labourers to extract the fibre of each stem as it is cut for fruits. This may be store for sale to the agent of the Central Factory when he may turn up every now and then at their villages for purchasing the available fibre. And there they can make a net profit of at least Rs 25 per bigha over and above the income from fruits and leaves. Let them therefore induce all plantain owners to take to the extracting of fibre after the stems are cut. I have arranged to supply the cheapest machine for extracting fibre at Rs 15 each. This can be seen at the Industrial Exhibition.

The machine is strong and simple in construction, portable and efficient to easily extracting the fibre of plantain scaths. The fibre extracted is so strong that a fine rope may be made out of it equal to aloë or manilla hemp, and when dyed in different colours, it may be manufactured into different kinds of beautiful heavy goods such as carpets, rugs, window screens and good many useful articles.



A Two posts fixed on the ground to support the horizontal beam *B*. *C* The links to obtain the required pressure of the blade of the knife on the fibre. If the spring *E*. becomes weak attach the knife to the spring by the shorter link *D*. *F*. a piece of cord tied to the end of the handle of the knife passing through the hole in the horizontal beam. The other end of the cord is tied to a pedal

“How to manipulate.”

The plantain stem should be cut soon after the tree has borne fruit when it is 18 months old. Each length should be split into strips of $1\frac{1}{2}$ broad. The length may be cleaned on the same day as the stems are cut down and about an hour after stripping. The inner portion yield a better fibre than the outer and should be collected separately. The strips are placed inner side upper most under the open knife, the foot being on the pedal. Keep hold of about 7" of the end of the strips and with both hands draw the strips steadily, after taking the foot off the pedal, first under the gugged portion of the blade and then under the blunt edges.

This should be done 2 or 3 times and then a few times outside the upper most. After the cleaning of one end is finished the other end should be cleaned similarly. Then the fibre will be thoroughly dry in a short time. Sunlight should not be visible between the knife and sole plate, and any wearing out of these parts should be detected and rectified.

Planters, Zamindars and especially the villagers who have plantains growing on their estates and in their gardens might with the aid of this machine, very easily and without much expense obtain all the fibre necessary to make cord and ropes for their own requirements

$\frac{R}{P}$ 35 M75 P.2

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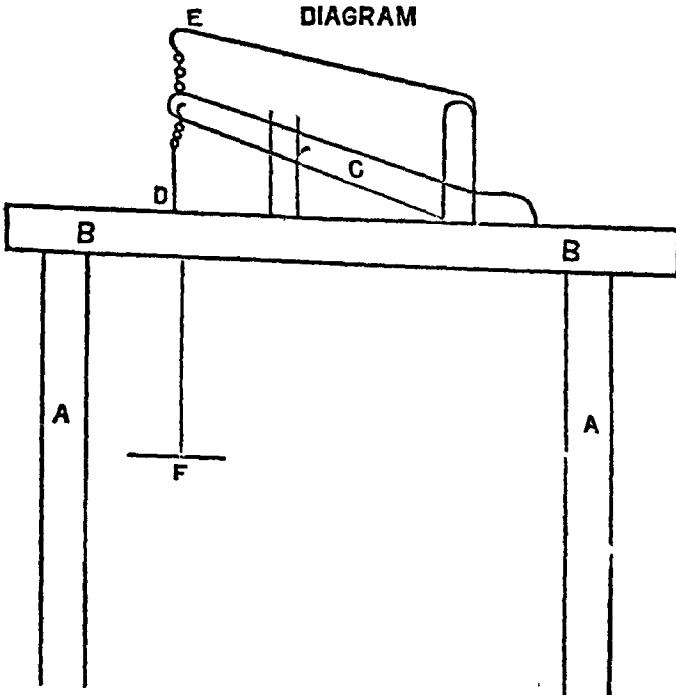
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A Two posts fixed on the ground to support the horizontal beam *B. C.* The links to obtain the required pressure of the blade of the knife on the fibre. If the spring *E.* becomes weak attach the knife to the spring by the shorter link *D. F.* a piece of cord tied to the end of the handle of the knife passing through the hole in the horizontal beam. The other end of the cord is tied to a pedal.

“How to manipulate.”

The plantain stem should be cut soon after the tree has borne fruit when it is 18 months old. Each length should be split into strips of $1\frac{1}{2}$ broad. The length may be cleaned on the same day as the stems are cut down and about an hour after stripping. The inner portion yield a better fibre than the outer and should be collected separately. The strips are placed innerside upper most under the open knife, the foot being on the pedal. Keep hold of about 7" of the end of the strips and with both hands draw the strips steadily, after taking the foot off the pedal, first under the gugged portion of the blade and then under the blunt edges.

This should be done 2 or 3 times and then a few times outside the upper most. After the cleaning of one end is finished the other end should be cleaned similarly. Then the fibre will be thoroughly dry in a short time. Sunlight should not be visible between the knife and sole plate, and any wearing out of these parts should be detected and rectified.

Planters, Zamindars and especially the villagers who have plantains growing on their estates and in their gardens might with the aid of this machine, very easily and without much expense obtain all the fibre necessary to make cord and ropes for their own requirements.

6

Report of an inquiry

INTO THE

Agricultural Situation

IN

Matar Taluka

OF THE

DISTRICT OF KAIRA.

BY

Messrs Devadhar, Thakkar & Joshi.

Members, Servants of India Society,

BOMBAY.

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REPORT OF AN INQUIRY
INTO THE
AGRICULTURAL SITUATION IN MATAR TALUKA
OF THE DISTRICT OF KAIRA.

Nature of the Inquiry.

At the instance of a few friends in Bombay interested in the well-being of the agriculturists in Gujarat, we undertook a somewhat detailed and an independent inquiry into the condition of the agriculturists in general and the poorer section thereof in particular, in the Kaira District as a result of the considerable failure of the last Kharif crop.

Two sides to the Inquiry.

2. For the purpose of this inquiry on which we started on the 24th of January 1918, it was felt very necessary to obtain as much useful and reliable information as possible in the matter of the alleged failure of the Kharif crop from the people and also from the officers of Government. We were, therefore, advised to secure as much co-operation from Government officials as may be necessary and even some sort of guidance at their hands, if available, in our work. So a kind friend in Bombay introduced us to the Hon'ble Mr. Pratt, the Commissioner, N. D. in order that we may explain to him the nature of our mission and request him to advise his subordinates to place at our disposal as much information pertinent to our inquiry, as we would require.

Interviews with Officials.

3. We met Mr. Pratt in Ahmedabad on the 26th inst. and after a general talk about our mission and the situation, he assured us of such help as we would need in our work and also of sympathetic consideration of the proposals that would be framed by us at different stages of our inquiry. After securing this assurance from the Commissioner we proceeded at once to Mehemdabad to meet Mr. V. K. Namjoshi, the then Ag. Collector of the District, as advised by the Commissioner, before starting on our inquiry into the villages to gather as much useful and reliable information as was possible under the circumstances, from the cultivators themselves, as regards the yield of the major portion of the truly Kharif crop such as (1) Bajri, (3) Bavto, (3) Kodra, (4) Rice and (5) Kathols which it must be remembered, had already been cut from the fields. The other factors of this inquiry consisted of forming for ourselves from visits to fields and the inspection of the standing crops our own estimates of the so-called Rabi crops—such as (1) Tuver, (2) Divela, (Castor seed), (3) Tobacco (4) Cotton—still standing though sown in the monsoons—and the purely winter crops like (1) Wheat and (2) gram, (3) Variali which thrive on either well-water or the moisture in the soil.

Suspensions already granted.

4 Before we left Bombay, Government had declared their intention of granting suspensions in 104 villages out of about 245 which constitute the three Talukas of Mehemdabad, Nadiad, and Kapadwanj out of the seven Talukas into which this district of Kaira has been subdivided. Thus there remained four Talukas of Matar, Thasra, Anand, and Borsad in which need for granting any measure of suspension, under the rules, was not recognized by the Government officials. We did not want to cover the ground already covered; moreover, we were few and the time we had at our disposal was rather very limited; so we naturally desired to confine our inquiry to one or two Talukas where it was required and where it may lead to some useful results.

Need for Inquiry in Matar and Thasra.

5. Our discussions with friends in Bombay on this subject led us to believe that we might leave out of account for the present the two Talukas of Anand and Borsad which were described to us as containing a comparatively large number of big land-lords. Thus there remained two Talukas Matar and Thasra. Friends described them as being as bad as, if not worse than, the above-mentioned three Talukas in certain villages of which suspension had been already granted by Government. We were, therefore, advised to begin our inquiry in Matar Taluka. Accordingly after meeting Mr Pratt and Mr Namjoshi, both of whom were good enough to make it possible for us to get the necessary facilities in our work, and after discussing with them the outline of our inquiry chalked out by us with a view to getting the benefit of their suggestion, if any, for its improvement, we began our work in the Taluka of Matar.

Local Conditions.

6. This is certainly not the place to give a detailed description of the local conditions, pertinent to our inquiry, as seen to prevail in this tract at the present moment. A brief mention, however, of the (1) soils, (2) seasons, (3) crops, (4) the cultivators and (5) a few disquieting factors, will not be out of place for the purpose of this brief report. Broadly speaking, there are two kinds of soils in this district; one is called *Goradu* or "light soil which varies in quality from the loose grain yellow sand of the fields near the Sabarmati and the Mahi to a rich light brown mould... .." It is sandy and may come nearer the alluvial soil of the U. P.; the other which is called *Kyari* or *Kali* (it may be so termed from its blackish colour) is hard like clay, and is nearly similar to the black soil of some of the Deccan districts, specially the southern districts. The land in this District is very fertile but it is heavily assessed. Then, there two main seasons for crops which are roughly divided into two, called the *Kharif* and *Rabi*.

Seasons.

7. The history of the last monsoons was very painful. In the beginning the rains were delayed. Then there was a good rainfall and people were expecting a good normal crop. But the rains in the month of October proved a great blow. The showers in the first fortnight of October, were unnecessary and useless, and a good deal of damage was done on that account. Then there was a much desired break for a week and people had cut their crops and kept them drying in the fields. Then all of a sudden very heavy showers poured down for three or four successive days from the 22nd to the 25th of October doing considerable damage to the crops that were drying in the fields. This rendered the poor people quite helpless without an adequate supply of the staple food for four to five months. Again, this year rats much in excess of the last year's, have appeared in some fields and have done some damage and the recent crop report for this Taluka has recognized this fact. People say—but opinions differ—that this year's cold is in excess of the last year's, and that has produced a dread into their mind of impending frost. But it has only proved a dread. Thank God, the time is past and the grounds for this fear have totally disappeared. It seems that people have very little savings left with them because we have noticed people who gladly purchased Post Office Five-Year Cash Certificates thronging to post offices and trying to withdraw their small amounts. When asked they said that they did, so because they had no money to pay the land revenue. Excessive rains of the last autumn, however, have produced indirectly one good result. It has enabled the land to keep plenty of moisture for such Rabi crops as need it for their growth.

The Kharif or Autumn Crop.

8. The Kharif consists principally in this tract of (1) Bajri, (2) Cathol (pulses), (3) Bavto, (4) Rice, (5) Kodra, (6) Juwar, (7) Tur, (8) Divela (Castor seed), (9) Tobacco, (10) Cotton and a few minor crops. Some of these are mixture crops i. e. two of the above mentioned crops are

sown together; for instance Bavto and Tur or Divela; Kodra or Bajri and Tur. But Tur and Divela on a fairly large scale form Kharif crops by themselves sown in autumn and harvested before the pure Rabi crops are reaped. The Rabi crop consists of winter Tur, winter Divela, wheat, gram, and Barley which are sown during the winter. A great portion of the cultivable area in a village is generally under Kharif and a comparatively small portion is under the Rabi. Taking the Taluka as a whole the Kharif crop occupies sixty per cent of the area and the Rabi, forty per cent. The Goradu Land is mostly used for the inferior Kharif crops. It is the Kyari land that yields rice and valuable Rabi crops.

Crops.

9. Rice is an important crop in this Taluka and is used generally by the agriculturists that produce it and by the better class people; Bajri and Juwar (to some extent) are used by people belonging to poor middle class; and Bavto and Kodra form the staple food of the poorest section of the rural population. Though owing to excessive rains fodder was spoiled a great deal during the last autumn these crops yield, in ordinary years, a good supply of fodder for the cattle; but the additional good supply comes from Juwar or *Sundha*, which unlike in the Deccan, is raised here more as a fodder crop than as a cereal crop. Moreover, grass is grown separately by a prudent and large agriculturist for his cattle on a piece of land set apart for it. The land as a rule is very fertile and such lean years as the present one used to be rare before the great famine of 1900 A. D. There used to be an old saying in this part that there can be no famine in the tract lying between the two great rivers—the Mahi and the Sabarmati.

The Cultivator.

10. The Patidar is a very clever, industrious, and enterprising cultivator, but the same cannot be said of the Dharala and other cultivating classes whose holdings are, in a majority of cases small, scattered, and, therefore,

uneconomic. The Dharala as a class is lazy and indifferent about his land and supplements his poor income from lands by wages earned. Even then he does not lead a moderately comfortable, or happy life. though his condition is slightly improved of late. We have come to the conclusion that even in ordinary years the life of a poor agriculturist is almost a negation of sound economic factors such as industry, cheap and organized credit, thrift and use of knowledge of modern implements. Life in villages, moreover, is every day becoming costly; for instance, a poor man's piece of cloth costs him at the present moment Rs. 2-8-0 for which he used to pay only Re. 1; plague has so much disturbed the life of the villages in this district that village after village is affected and people have wholly deserted them in many cases. At the top of this has come the failure of the Kharif crop, which is largely admitted in regard to Bajri even by Government officials and to a lesser extent with regard to Bavto and Kodra; Kathols are recognized to have failed completely.

Tour in Villages.

11 We selected for our inquiry about half a dozen villages in each of the three circles into which the 81 or 82 villages that constitute the Matar Taluka are grouped for administrative purposes. We had to be content with the small number, because it was not possible for us to go over the whole area. A few typical villages, the conditions in which were believed to be almost similar to those in several others in that locality, were taken up and were observed as closely as we could manage to do in order to draw general conclusions therefrom, as applying to the whole area. In this we acted on the principle of going from the particular to the general. The first thing that was ascertained was the extent of the failure of the Kharif and secondly the anna valuation of the standing Rabi crop. 18 villages were thus visited in the course of ten days, during which period, information relating to about 20 more adjoining villages was gathered from the inhabitants of the latter.

The Method of Inquiry.

12. The detailed method of investigation that was adopted by us after much discussion with friends and Government officials may be briefly described as follows:— We started with the anna valuation of all villages in the Taluka supplied to us by the Mamalatdar; we had talks with the village officials; we then went over in each village with as many friends as could be inspected in the course of three to four hours; after inquiring into the yield of Kharif, which had been cut already as mentioned above, and after the inspection of the standing crops in company with the Mukhi and a few land-holders of the village, we engaged ourselves into discussion with agriculturists that naturally came to us to tell the tale of their woes; we made inquiries about the valuation of the crops of the village as a whole as well as of a few typical holdings—large and small; we put questions to them as to what they would do if Government did not take into account their version of the very poor outturn of the Kharif. As our attention was drawn to the special difficulties under which the small land-holder laboured we made it a point to look specially into his condition and for that purpose localities inhabited by poorer section of the village population such as Dharalas, Dheds, Vagharis, Mohomedans and others were visited; we also went into the houses of a few members of these castes and tried to find out the stock of grain they had in their houses; we further endeavoured to ascertain the condition of their cattle and to know what quantity of fodder they had in store for it.

Whole village as a unit of crop valuation.

13. In our opinion, the task of valuing the crop of the whole village, and not of a few Khatedars or land-holders, is attended by a number of difficulties. In the first place it is, and cannot be better than, what is called an “*eye-estimate*” formed by village officials and made in a “rough and ready method.” There is neither arithmetic nor science nor even a few crop experiments to guide the valuation. Again there is no standard laid down to determine what is called a

"normal" crop "which is represented by 12 annas" It is possible to be accurate in calculation of about half a dozen fields, but this is not the mode of calculation required. It must be for the whole area comprising the village and not for a few individual or isolated fields in it. This is called the anna valuation for the crops of the whole village—the village being recognized as the admissible unit for valuation. When the crop is 12 annas it is said to be normal; when it is below 6 and above 4 annas in a village, Government, "as a matter of grace," suspend half the land revenue for the year to be collected in the following year; when it is below 4 annas *i. e.* less than one-third of the normal, the whole assessment is suspended.

No Individual Relief.

14 It may thus happen that the yield of the whole village may be "normal" and still there may be a dozen or more cultivators who may not have got any thing out of their fields in that year, but under the present rules no relief could be granted to the unfortunate people. In short, it is either the whole village or no one that could get relief under the rules for suspension. Again in estimating the anna valuation for any particular year, the estimates of the Kharif and the Rabi crops, the latter being in their infancy, are pooled together to determine the average yield of the crops of the whole village for the year for the purpose of the land revenue which is paid in two instalments.

Anna Valuation a Guess Work.

15 This valuation is prepared by village officers for the whole village. It will be thus seen, and that is admitted also, that it is more or less a result of guess work and a large factor of uncertainty enters into this calculation. It is not based, nor is it feasible to base it, upon the knowledge of the actual yield of crops, both Kharif and Rabi. If, therefore, it may be properly contended that the official estimates are somewhat put higher, it can be rightly pointed out that the estimates given by the people regarding the yield of their crops are generally under-rated. This is of course, not

peculiar to India ; it is believed to be common to all countries in the world. It is this position that makes the work of the investigator rather difficult. He has to wade, therefore, through a mass of oral evidence more or less of a conflicting nature and arrive at the truth as best as he could. In spite of these difficulties, we had to go on with our work trying our best to make as near an approach to truth as possible. A mention is made of this fact in this report because we know that it is very difficult to dogmatize about the situation under the peculiar circumstances of the case.

Individual Inquiry Banned.

16 It is freely recognized by Government officials that a number of cultivators may be found in villages in whose case it may be a very great hardship to pay the land revenue ; rules cannot take any cognizance of such cases as these come under the category of what is styled "*individual inquiry*" and which for very sound reasons has been abandoned long ago. There is some provision for a "local calamity" as distinguished from a "general calamity" and the rules leave out of account cases of small cultivators who may be considered to be really deserving of some kind of relief or sympathy.

Small Cultivator and the Revenue Officer.

17. Small cultivators are generally very poor, ignorant and bad agriculturists and consequently as a rule their holdings are uneconomic ; the revenue officer is not disposed to sympathise with him in his miserable plight. The fault on the part of such a cultivator is, in his opinion, that he is too much attached to his land which he is unable to make paying so as to bear the burden of his whole family. The revenue officer will be glad, therefore, if such an uneconomic holder were to leave his land permanently and be a whole-time labourer and thus promote the industrialism of the country. Such a proposition may be economically sound in theory if the land be unduly burdened. But so long as economics, in India particularly, is not wholly divested of sentiment which is a great factor influencing the rural life, means will have to be found by Government to meet the

situation created by the existence of such a class in our rural economy. To teach him sound economic laws on such occasions as lean years, would be equal to first teaching a man lying on a sick bed the need for obeying laws for health, hygiene, and sanitation. It is sympathy which will please him and help him too. This point may be illustrated by a few facts relating to a village, with over 1200 people, which we visited. The number of land-holders or Khatedars in it is about 570 and the total assessment thereof comes to about Rs. 9,400. It was found that in that village there were about 310 Khatedars, including 135 residing in neighbouring villages, paying land revenue of less than 10 each. It need not be supposed that all the 310 khatedars out of 575 are in need of special consideration; but it is presumed that a majority of them are in such need. It is just possible that this number may include even a few good and rich cultivators having small patches. But we take this limit of Rs. 10 of land assessment as the dividing line between the better class cultivator and the poorer class cultivator. These 310 small khatedars pay an aggregate revenue of nearly Rs. 1140 out of the total of Rs. 9,740 for the whole village. This represents only 12 per cent of the total revenue. In a lean year like the present one this class, in our opinion, is bound to be hit hard and thus it stands in need of some relief or tangible sympathy. Revenue officers do not seem disposed to help such agriculturists in the belief that it would be going back to the abandoned theory of individual inquiry but it is difficult to see how this numerous *class of persons* and not individuals, could be easily brushed aside by being termed *individuals*. It is in the interest of agriculture that this class of persons should not be driven further into indebtedness and no price will be too great to prevent him from running into further debt. In such a case, Government should err more on the side of leniency rather than on the side of strict adherence to rules.

The Lost Kharif and the Standing Rabi.

18. The basis of our first and principal recommendation which is mentined hereafter may be briefly explained with

the help of a few figures given below. The whole of the cultivable area in the Taluka divides itself roughly into two groups, the Kharif and the Rabi. The first area is under the cereals and the fodder crop, and may be put down as Kharif area, the crops on which are harvested before the winter sets in. This comprises Bajri about 10%, Kodra about 9%, Bavto about 4%, Rice about 13%, Juwar about 9% and Grass about 15%. The above Kharif area makes 60% of the total cultivable area of the Taluka. It includes Juwar or Soondhia which is raised more for fodder than for its cereal; grass area may include some fallow land; these two latter together make up 24% of the Kharif area, which may be taken to show that it is mainly for fodder and this must have at the most enabled the agriculturist to feed his cattle and maintain it. The chief cereal Bajri has been admitted to have been very considerably damaged and the Bavto and Kodra to have been partially damaged by the excessive rains of October last along with Bajri. Kathols have been completely ruined by rats. Grass and Juwar, though a part of the latter may have been sold, could not have put into the pocket of the agriculturist much money after his having stored enough to feed his cattle, which he dearly loves and which is his great agricultural asset. It is feared that fodder supply will be short later on during the last summer days. It will be clearly seen as to why we took the above described damage of the Kharif crop as the basis of our first and foremost recommendation, for the postponement of collection till towards the end of March by which time the Rabi or the standing crops become ripe. These are as follows:—

(1) Cotton 16 per cent; (2) Castor seed 2 per cent; (3) Tobacco 1 per cent; (4) Tur 2 per cent, (5) Wheat and gram (purely Rabi crops) 10 per cent and (6) miscellaneous crops 9 per cent; these crops which are standing roughly give a total of 40 per cent of the cultivable area for the whole Taluka. Instead of taking 50 per cent of the Kharif area in a village as the basis of recommendation for the postponement of the collection, even if the basis of an area of 25 per cent or more of the (standing) Rabi crop in that village be

substituted it will not make much, difference in the result sought.

The Kharif anna Valuation.

19. We feel justified in making the above recommendation by taking our stand on another ground viz. the mean of the anna valuations arrived at with the help of official figures and the popular estimates. The official figures relating to the yield of Bajri, Kodra, Bavto, Rice, Juwar and Grass work out an average of $6\frac{1}{2}$ annas; while the popular estimates of the same crops point out to an average of slightly more than annas three or say three and a half. The mean of these two valuations is 5 annas. If it be contended that it would be difficult to be absolutely certain about the accuracy of the above figure viz 5 annas as showing the true position and if that be so, no suspensions could be granted under the rules, it may as well be contended that there is a great element of doubt even in the official calculation. We, therefore, plead that the benefit of doubt should, in our opinion, be given to the poor cultivator. That is how we have come to support strongly the recommendation which the people themselves have suggested as a measure of relief which they very much need and which we are sure will be much widely appreciated. When people gather their Rabi crop they will be in a better position to pay the whole year's assessment though it may be hard with some of them to pay both the instalments out of the proceeds of the Rabi which is less than normal.

No Hasty Conclusions Drawn.

20. During the time we were engaged in this work of investigation we had to exercise a deal of restraint in not publishing our information and impressions in bits; that would have led us to draw wrong or hasty conclusions. When we had finished our brief inquiry about Matar Taluka we met in Bombay on the 9th inst. to settle the outline of our recommendations or proposals. We had the privilege of placing our view of the situation and what we considered necessary under the circumstances before His Excellency Lord Willingdon the Governor of Bombay in the course of

an interview which His Excellency was pleased to grant us on the 9th inst. We had the further benefit of a discussion on the same subject with the Hon'ble Mr. Carmichael, the Revenue Member on the same day. His Excellency after giving us a very patient and sympathetic hearing desired us to place all our ideas on the subject of our inquiry before the Hon'ble Mr. Pratt, the Commissioner, N. D., in the form of a note putting down therein our proposals in a definite form. His Excellency assured us that Mr. Pratt would consider them not only with sympathy but with generosity too, and of his own accord kindly gave us a note to him accordingly. Mr. Carmichael who heard the details of our proposals patiently was good enough to advise us to meet Mr. Ghosal who had just then taken charge of the District and to discuss these with him also. He offered to write a letter to him on the subject.

Our Note to the Commissioner

21. This inquiry had led us to believe that though there is no famine or acute distress in this Taluka at present there are strong grounds for showing real and tangible sympathy with the condition of the people, whose anxiety and trouble caused by the failure of the last Kharif have been considerably aggravated as described above by additional disturbing and unfortunate factors such as (1) the high prices, (2) the prevalence of plague in villages, and (3) the dread that rats and frost might cause damage to the standing crop which is generally admitted to be fairly good even by the agriculturists themselves. They, therefore, ask for a general postponement of the collection of Government dues, which they recognize it is their duty to pay, till the standing crops are harvested in good condition. We, therefore, came to the conclusion that the agriculturists in Matar Taluka deserve to be helped in a sympathetic way as indicated in our proposals. We, therefore, prepared a note which was more or less a summary of this report and in which were embodied the definite recommendations we ventured to make on the basis of the

information collected and the impressions formed in the course of our tour in the villages.

Recommendations.

22. The following are the recommendations made by us:

(a) *Postponement of the collection of Government dues.*

It is generally agreed that all Kharif crops, except rice which we do not consider to be unusually good, have substantially failed or yielded a very poor outturn and on that account the agriculturists are very eager to get some concession of the nature of postponement. We, therefore, propose the postponement of the collection of Government dues in such villages as contain more than 50 per cent. of the total cultivable area sown with Kharif crops viz. Juwar, Bajri, Bavto, Kodra, Rice and Grass, till the Rabi crop is harvested in 'good condition *i.e.* about the end of March next. The number of such villages lies between 50 and 60 in the Matar Taluka.

(b) *Half suspension of assessment.*

Our observation of the Rabi crops, coupled with the general impression formed about the failure of the Kharif, has led us to think that the anna valuation is put somewhat higher than we would feel inclined to do. We, therefore, recommend the villages mentioned in the following list, for half suspension of land revenue.

List of villages recommended for half suspension of Land Revenue.

1. Damri.	12. Kunjra.
2. Vavdi.	13. Punaj.
3. Piparia.	14. Bamangam.
4. Kathoda.	15. Bhalada.
5. Sayala.	16. Mehelaj.
6. Shekhpur.	17. Shiholdi.
7. Chanor.	18. Asamli.
8. Shetra.	19. Chikhalia.
9. Dharoda.	20. Radhvanaj.
10. Sandhana.	21. Moraj.
11. Hejravad.	22. Alindra.

(c) *Full suspension to small khatedars paying land revenue below Rs. 10.*

In order to stop further indebtedness of small agriculturists we strongly feel, that even though their holdings be uneconomic, they stand in need of special help at this time. Our recommendation, therefore, is that all Khatedars paying less than Rs 10 as land assessment should be granted full suspension in the whole Taluka.

(d) *Remission for over-flooded areas.*

Under the "local calamities" section, a small area (less than 10 per cent) in seven out of the ten Kalambandhi villages have been granted remission on account of over-flooding of the Khari River. But in our opinion the actual area affected by over-flooding is much larger. We therefore, recommend that (1) the acreage for remission should be so revised as to include areas which have been considerably damaged, and (2) the *kimayat* rate should be remitted in the case of all other over-flooded lands in the same tract.

(e) *Financial accommodation on easy terms.*

As it is particularly desired to stop further indebtedness of agriculturists, we recommend that efforts should be made by the public to start co-operative credit societies with the help of Government and the Co-operative Department to afford to indigent agriculturists facilities for securing necessary financial help to meet their requirements till the next year's crop is harvested. This is a matter in which the Government and the public can work hand in hand, we recommend, therefore, that Government should advance as initial capital as much money as would be deposited by the public, the limit for Government contribution being one lac of rupees.

Discussion on the Note.

23. This note was submitted to the Hon'ble Mr. Pratt on the 12th inst. and after a little discussion he called us for further discussion the next day when he expected the Collector Mr. Ghosal also to be present. When, therefore, our

recommendations were taken up for discussion by Mr. Pratt on the 13th inst. there were also present Mr. J. Ghosal, the Collector, Mr. Kerr who is to take charge of the District very soon, and Mr. M. K. Gandhi. The proposals were taken up one by one for discussion which may be briefly summarised in the following terms:—Our first proposal was accepted with a slight modification. It was accepted in the case of those villages in which the standing crops or Rabi was 25 per cent or more of the total cultivable area in the village, it being argued that in the case of villages in which there was a negligible proportion of Rabi, postponement was useless. After some searching examination of the second recommendation we were told that the Collector agreed to carefully go into the cases of all villages recommended for half suspension. The third recommendation for granting full suspension to that class of cultivators that paid land assessment of less than Rs. 10. was rejected as being contrary to the spirit of the rules and also as one of doubtful utility. As regards the fourth proposal Mr. Pratt desired us to make more specific mention of the areas affected quoting as he said "Chapter and Verse" of fields damaged by the floods. But Mr. Ghosal has undertaken to look into the matter himself and after ascertaining more fully the whole of the area that was affected by the overflowing of the canal, he would do all that would be necessary. He has in the meanwhile asked us to inform the people who have suffered to approach him and bring before him the full evidence of the damage that is complained of. We have accordingly informed the people of the seven Kalambandhi villages in the belief that the necessary help will be forthcoming from the officials concerned. Regarding the last recommendation about the establishment of Co-operative Credit Societies, it was thought that the matter may be taken up at a later date as it, in no way, concerned the present issue. It was a good proposal and no fault need be found with it.

Assurance of Sympathy.

24. This, in short, summarises the discussion that we had with the officials concerned in the matter regarding our

recommendations and it is difficult to say whether it was quite satisfactory. It was not, however, wholly disappointing. We have been assured that every sympathy will be shown to the poor cultivators in their difficulties and no coercive measures will be resorted to except under exceptional circumstances. And we hope and trust that everything under the circumstances will be done to justify His Excellency's assurance of sympathy and even generosity being shown to the cultivator who has suffered.

Inquiry in Thasra.

25. Thus after finishing our work in Matar Taluka and discussing our recommendations with the officials, as previously arranged we have now come down to Thasra where we have begun our inquiry on almost the same lines. We now understand that Mr. M. K. Gandhi, finding that the evidence collected so far was not quite adequate to meet the official test, has himself undertaken to collect evidence and, therefore, has come down to Nadiad with a number of friends from Ahmedabad representing the Gujarat Sabha. We are told that it may not be necessary, therefore, for us to go on with our inquiry at this stage now. In that case we may stop it in the belief that the officials will do all that is needful in the light of the evidence collected by us more or less with their kind help.

THASRA, KAIRA.

18th February, 1918.

G. K. Devadhar.

N. M. Joshi.

A. Y. Thakkar.

Members, Servants of India
Society, Bombay.



MJ381.2

Rice Manufacture.

BY HENRY H. GHOSH, Esq., CALCUTTA

THE conditioning, husking and cleaning of paddy or 'the manufacture of rice' as it is briefly termed in America being associated in this country with the cultivation of paddy has so far received very little attention. But in America, Burma and Siam it is worked as a manufacturing industry which is the more correct system as the processes relating thereto are quite distinct from the agricultural operations connected with paddy. This system of separating the agriculture and manufacture of a great produce has been adopted in India with regard to wheat and there are sufficient grounds for introducing it in the case of paddy. The manufacture of rice in this country is an extensive industry. The value of rice produced here far exceeds the value of all the other agricultural produce of India put together. At the opening of the Pusa Institute, the Revenue and Agricultural Member Sir Denzil Ibbetson said that he calculated the total value of the agricultural produce of India to be £349 millions and the "Agricultural Statistics of India" shows that about 29 million tons of rice valued @ £190 millions are annually prepared in this country. The preparation of rice is therefore the most valuable manufacturing industry in India, and if the statistics of other great manufactures were examined, I should not be surprised if it turned out to be the most valuable manufacturing industry in the world. This enormous industry is, however, being conducted at present on the most primitive methods which are extremely slow, laborious and expensive, to persist in which would not be sound economy. Apart from the question of reducing the cost of production and thereby lowering the price of the staple food of this country, when you consider the vast

amount of time and labour wasted on this industry which may be more profitably employed in others—of which the cultivation and manufacture of cotton may be named—you will agree with me that our industrial economics is still in a very backward condition and urgently needs a proper adjustment. Public attention has already been drawn to this manufacture by 'the Statesman' newspaper. Considering the vastness of the industry and the bright vista of economic possibilities it opens up before us, I think this subject commends itself to our very serious consideration. Having manufactured rice for a few years in this province, I think I am able to form some idea of the improvements that may be made in this industry.

The indigenous method of rice preparation in which the pounder (*dhaki*) or the mortar and pestle (*hath-masuli*) plays an important part is too well-known to need description. The method, apart from being extremely crude, tedious and expensive does not yield a clean produce, free from impurities. The average cost of preparation by this method is 6½ as. per maund of rice considering the low value of agricultural labour in this country. This cost increases to about 7 as. for boiled (*ushna*) rice and decreases to about 6 as. for unboiled or sun-dried (*alloh* or *attob*) rice. The working time required by one person to prepare a maund of boiled rice by this method is about 21 hours. This is made up as follows—1 hour for paddy-clearing, ½ hour for putting into and taking out of water the paddy (the soaking which occupies about 24 hours requiring no attention) 2 hours for boiling and 1½ hour for drying it (although the paddy remains in the sun for about 5 hours) one person working all this time. The husking and cleaning of the paddy in the Dhaki is always done by two persons who would together take about 8 hours. For purpose of calculation this would be equivalent to 16 hours for one person, making up a total of 21 working hours. Similarly, a maund of unboiled rice would take about 1 hour for clearing, 1 hour for drying and 16 hours for husking and cleaning, making up a total of 18 working hours. Calculating the value of the

labour @ 3 as. per day of 9 working hours, the cost of 21 hours' labour would be 7 as. and of 18 hours' 6 as. being respectively the cost of preparing boiled and unboiled rice. This average cost of 6½ as. also coincides with the rate paid to hired-workers for rice preparation in certain parts of Bengal which is generally 6 as. per maund of rice, the worker retaining the half a maund of husk which may be valued at half an anna

Before going further into this subject, it may be mentioned that the cost of rice manufacture varies mostly with the quality of rice wanted whether boiled or unboiled polished or unpolished, but that it also varies slightly with the quality of paddy used. In coarse paddy, the cost is somewhat lower than in fine paddy. The aforesaid cost is for medium qualities only. It may also be observed that a maund of medium quality Bengal paddy would yield about 26 seers of rice, 13 seers of husk (*thoosh*) and 1 seer of meal (*kuro*); and that the yield of rice increases slightly in coarse paddy and diminishes somewhat in fine paddy.

It would not be possible for me to state within the limits of this paper the principles upon which rice is manufactured in America and Burma, but I shall here describe in the briefest outline a fairly efficient and economic system by which rice manufacturing may be initiated in this country. This system is very similar in most of its processes to either the Rangoon or the American system and I may add that I have attained rather satisfactory results from it.

CONDITIONING

The separation of refraction.—However much Bengal paddy is fanned at the time of purchase there is always a certain percentage of refraction in it such as balls of mud, bits of stick and straw which have to be separated from the grain. When unboiled rice is wanted this is done by a 'circular-motion separator' as in Rangoon. This separator consists of a set of sieves circulating in one plane and requires very little power to drive. When boiled rice is wanted the separation or refraction is effected by specific gravity in the soaking process.

The soaking process—Previous to being boiled, paddy is soaked in fresh water for about 24 hours which softens the husk and clears it of all admixture. The balls of mud dissolve in the water, the paddy sinks to the bottom of the vat and the bits of stick and straw float up which are then easily removed.

The boiling operation—The paddy is then partially boiled which renders the rice wholesome from the consumer's point of view and facilitates the husking process from the manufacturer's stand point as we shall presently see. Par-boiling is done over fire in the indigenous method but I have found that when effected by steam, the operation becomes infinitely quicker, far less laborious and more easy to regulate. This is done in a boiling apparatus where steam is introduced by means of a connecting pipe. No water is needed and decidedly better results are obtained.

The drying process.—Whether for boiled or unboiled rice, paddy is dried in the sun by the indigenous system to facilitate the husking operation. How boiling and drying helps the husking is easily explained. Boiling inflates and drying contracts the body of the grain, the resultant of these two actions is to partially release the husk. Drying alone has this effect to a very slight extent. Unboiled paddy takes about 3 hours and boiled paddy about 5 hours to dry in the sun but the grain must be stirred now and again.

I may now say that the question of drying boiled paddy has always weighed heavily on the minds of those acquainted with this industry and interested in its development. In this country there is a very extensive consumption of boiled rice, the unboiled rice being used by very poor people who find it more sustaining. In Burma also both kinds are prepared, perhaps more of the latter as her exports are of this sort. But in America only unboiled rice is manufactured. This difference of quality is due in a great measure to the various purposes for which the rice of these countries is required. Indian rice is used exclusively for food, Burma rice for food, distillation and starch, and American rice for food and confectionery. But

I fear that the difficulty of drying has been greatly exaggerated in this country. Because by the indigenous method even unboiled paddy is dried in the sun before being husked, an erroneous idea prevails among some of us that this process would be needed for this paddy if husked in the machine. But such would not be the case, for both in Rangoon and America unboiled paddy is husked in the mills without any previous process of drying; and various qualities of Bengal paddy, unboiled and without any special drying, have been husked very satisfactorily in the Engelberg and Cowie's Hullers. Of course, it is always understood that well-matured and naturally dried paddy is to be put into the husking machine. The only question with us, therefore, is the drying of boiled paddy. This can always be conducted under a tropical sun to a limited extent. I have myself dried boiled paddy regularly in the sun on a large platform which I am told is also done at the Coconada Rice Mills. Daily a hundred or two hundred maunds of grain can be conveniently dried in this manner if there is sufficient ground for the purpose. But the treatment of larger quantities in this way would become rather cumbrous. Attempts have therefore been made to dry boiled paddy artificially both here and in Burma, but none with any satisfactory result. Hot air has been always used in the process and though the drying has been somewhat successful, the colour of the rice has never been as clear and white as that of the sun-dried grain. But there is no reason why we should give up hope in this matter when tea and particularly wheat, about the colour of which consumers are very fastidious, are now being artificially dried. Indeed, I believe it is Gibb's Wheat Dryer that has showed the best results with paddy up to now and it is quite possible that Messrs. Thos. Robinson and Son Ltd. of Rochdale, makers of the celebrated Mallinson's Wheat Dryer will be able to present a perfect Paddy-Dryer if they find a market for it. I may here mention that Mr. Rakhal Dass Khan, Rice huller maker of Sulkea, has recently supplied to a Chetlah miller a Paddy-Dryer which dries boiled paddy with a certain amount of success.

But it does not treat more than about 40 mds. of grain in 8 hours, four coolies working at it. As it stands, therefore, his process is no better nor cheaper than the sun-drying process.

After treatment in the aforesaid manner, the paddy is brought to a condition fit to be husked. There are several machines on the market for preparing rice. In England, rice mill machinery are constructed by Messrs. Hind and Lund, Messrs. William R Dell and Son, of London, and other makers. In Germany, F H. Schulze, of Hamburg, manufactures rice plants, notably a polishing machine which is called his 'Pearler'. It is, however, noteworthy that some of the best rice-milling machines come from America and Burma.

HUSKING.

The principle by which paddy is husked in the indigenous method, and which is followed up in all husking machines, is the application of friction and pressure. On a small scale the most complete and satisfactory husking machine is the well-known Engelberg Huller No 2 which husks about 60 mds. of medium Bengal paddy in 8 hours. The price of the huller is Rs 700. Mr. Rakhai Dass Khan of Sulkea has also constructed a Rice Huller which I believe is giving satisfaction to a Chetlah miller. I am told that it husks about 40 mds. of paddy in 8 hours and costs only Rs 300. The cost of replacing wearable parts in this machine is little compared to the expense of changing the blade and screen in the Engelberg. Khan's Huller is therefore well worth a trial. As for the hullers constructed by the late Jogodiswar Ghatak, I regret I am unable to say anything in their favour. But the husking machine that has so far given the best results with Bengal paddy is Cowie's Huller made in Rangoon. The machine entails the erection of a plant (with double fan, elevator and direct-acting sift) which cannot be done with a small capital. The outturn of this Huller, made in different sizes, ranges from 100 to 200 mds. daily of brown rice.

CLEANING.

When paddy is husked it is technically called 'brown rice' owing to the brown coating below the husk which now appears. The removal of this coating is called the cleaning process in which there is more friction applied than pressure.

A good cleaner for a small mill has not yet been put on the market. Engelberg Huller No 1 is about the only machine that serves the purpose if the skin in its lower cylinder is replaced whenever it wears out. Unless this is done the rice gets slightly discoloured. The White Rice Cone made in Rangoon is, however, an excellent cleaner, the product from it satisfying the most exacting market. It has a large capacity but is an expensive machine.

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Rice cleaning and polishing, which is a portion of the industry here advocated, is not new to the country. This system of rice milling entirely for the export trade has been carried on for several years at Ramkristopur and Chetlah near Calcutta, and the complete manufacture of rice is now conducted by a handful of millers scattered about in North Western India and the Madras Presidency. But the only reason I can attribute to the slow growth of the industry is that, unlike the other countries, boiled rice is largely consumed here and the difficulty of paddy drying has always loomed very large in the minds of those that have from time to time been enquiring about it. Had they been reasonable in their apprehensions, the problem of drying might have been solved ere this. I have often tried to correct false notions regarding this industry but my endeavours have been futile.

By the system above stated the cost of rice preparation per maund would be approximately 2 as. 6 p. for unboiled, and 3 as. for boiled rice, unpolished, such as would be needed for home consumption. Rangoon millers reckon an average of 3 as. as the cost of preparing polished rice. If a system of artificial drying is introduced, the cost of boiled rice should be reduced by 6 pies approximately. It will therefore be evident that by the introduction of the Rangoon and American systems of manufacture, the price of the greatest staple food of our country will be reduced by about four annas on the maund and an enormous quantity of labour will be set free for more profitable industries.

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amount of time and labour wasted on this industry which may be more profitably employed in others—of which the cultivation and manufacture of cotton may be named—you will agree with me that our industrial economics is still in a very backward condition and urgently needs a proper adjustment. Public attention has already been drawn to this manufacture by 'the Statesman' newspaper. Considering the vastness of the industry and the bright vista of economic possibilities it opens up before us, I think this subject commends itself to our very serious consideration. Having manufactured rice for a few years in this province, I think I am able to form some idea of the improvements that may be made in this industry.

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THE SECOND INDIAN INDUSTRIAL CONFERENCE

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I may now say that the question of drying boiled paddy has always weighed heavily on the minds of those acquainted with this industry and interested in its development. In this country there is a very extensive consumption of boiled rice, the unboiled rice being used by very poor people who find it more sustaining. In Burma also both kinds are prepared, perhaps more of the latter as her exports are of this sort. But in America only unboiled rice is manufactured. This difference of quality is due in a great measure to the various purposes for which the rice of these countries is required. Indian rice is used exclusively for food, Burma rice for food, distillation and starch, and American rice for food and confectionery. But

I fear that the difficulty of drying has been greatly exaggerated in this country. Because by the indigenous method even unboiled paddy is dried in the sun before being husked, an erroneous idea prevails among some of us that this process would be needed for this paddy if husked in the machine. But such would not be the case, for both in Rangoon and America unboiled paddy is husked in the mills without any previous process of drying; and various qualities of Bengal paddy, unboiled and without any special drying, have been husked very satisfactorily in the Engelberg and Cowie's Hullers. Of course, it is always understood that well-matured and naturally dried paddy is to be put into the husking machine. The only question with us, therefore, is the drying of boiled paddy. This can always be conducted under a tropical sun to a limited extent. I have myself dried boiled paddy regularly in the sun on a large platform which I am told is also done at the Coconada Rice Mills. Daily a hundred or two hundred maunds of grain can be conveniently dried in this manner if there is sufficient ground for the purpose. But the treatment of larger quantities in this way would become rather cumbrous. Attempts have therefore been made to dry boiled paddy artificially both here and in Burma, but none with any satisfactory result. Hot air has been always used in the process and though the drying has been somewhat successful, the colour of the rice has never been as clear and white as that of the sun-dried grain. But there is no reason why we should give up hope in this matter when tea and particularly wheat, about the colour of which consumers are very fastidious, are now being artificially dried. Indeed, I believe it is Gibb's Wheat Dryer that has showed the best results with paddy up to now and it is quite possible that Messrs. Thos. Robinson and Son Ld. of Rochdale, makers of the celebrated Mallinson's Wheat Dryer will be able to present a perfect Paddy-Dryer if they find a market for it. I may here mention that Mr. Rakhai Dass Khan, Rice huller maker of Sulkea, has recently supplied to a Chetlah miller a Paddy-Dryer which dries boiled paddy with a certain amount of success.

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By the system above stated the cost of rice preparation per maund would be approximately 2 as. 6 p. for unboiled and 3 as. for boiled rice, unpolished, such as would be needed for home consumption. Rangoon millers reckon an average of 3 as. as the cost of preparing polished rice. If a system of artificial drying is introduced, the cost of boiled rice should be reduced by 6 pies approximately. It will therefore be evident that by the introduction of the Rangoon and American systems of manufacture, the price of the greatest staple food of our country will be reduced by about four annas on the maund and an enormous quantity of labour will be set free for more profitable industries.

10th December, 1906.

THE SECOND INDIAN INDUSTRIAL CONFERENCE

MJ381.2

Rice Manufacture.

BY HENRY H. GHOSH, Esq., CALCUTTA

THE conditioning, husking and cleaning of paddy or 'the manufacture of rice' as it is briefly termed in America being associated in this country with the cultivation of paddy has so far received very little attention. But in America, Burma and Siam it is worked as a manufacturing industry which is the more correct system as the processes relating thereto are quite distinct from the agricultural operations connected with paddy. This system of separating the agriculture and manufacture of a great produce has been adopted in India with regard to wheat and there are sufficient grounds for introducing it in the case of paddy. The manufacture of rice in this country is an extensive industry. The value of rice produced here far exceeds the value of all the other agricultural produce of India put together. At the opening of the Pusa Institute, the Revenue and Agricultural Member Sir Denzil Ibbetson said that he calculated the total value of the agricultural produce of India to be £349 millions and the "Agricultural Statistics of India" shows that about 29 million tons of rice valued @ £190 millions are annually prepared in this country. The preparation of rice is therefore the most valuable manufacturing industry in India, and if the statistics of other great manufactures were examined, I should not be surprised if it turned out to be the most valuable manufacturing industry in the world. This enormous industry is, however, being conducted at present on the most primitive methods which are extremely slow, laborious and expensive, to persist in which would not be sound economy. Apart from the question of reducing the cost of production and thereby lowering the price of the staple food of this country, when you consider the vast

amount of time and labour wasted on this industry which may be more profitably employed in others—of which the cultivation and manufacture of cotton may be named—you will agree with me that our industrial economics is still in a very backward condition and urgently needs a proper adjustment. Public attention has already been drawn to this manufacture by 'the Statesman' newspaper. Considering the vastness of the industry and the bright vista of economic possibilities it opens up before us, I think this subject commends itself to our very serious consideration. Having manufactured rice for a few years in this province, I think I am able to form some idea of the improvements that may be made in this industry.

The indigenous method of rice preparation in which the pounder (*dhaki*) or the mortar and pestle (*hath-masuli*) plays an important part is too well-known to need description. The method, apart from being extremely crude, tedious and expensive does not yield a clean produce, free from impurities. The average cost of preparation by this method is 6½ as. per maund of rice considering the low value of agricultural labour in this country. This cost increases to about 7 as. for boiled (*ushna*) rice and decreases to about 6 as. for unboiled or sun-dried (*alloh* or *attob*) rice. The working time required by one person to prepare a maund of boiled rice by this method is about 21 hours. This is made up as follows:—1 hour for paddy-clearing, ½ hour for putting into and taking out of water the paddy (the soaking which occupies about 24 hours requiring no attention) 2 hours for boiling and 1½ hour for drying it (although the paddy remains in the sun for about 5 hours) one person working all this time. The husking and cleaning of the paddy in the Dhaki is always done by two persons who would together take about 8 hours. For purpose of calculation this would be equivalent to 16 hours for one person, making up a total of 21 working hours. Similarly, a maund of unboiled rice would take about 1 hour for clearing, 1 hour for drying and 16 hours for husking and cleaning, making up a total of 18 working hours. Calculating the value of the

labour @ 3 as per day of 9 working hours, the cost of 21 hours' labour would be 7 as. and of 18 hours' 6 as. being respectively the cost of preparing boiled and unboiled rice. This average cost of 6½ as. also coincides with the rate paid to hired-workers for rice preparation in certain parts of Bengal which is generally 6 as. per maund of rice, the worker retaining the half a maund of husk which may be valued at half an anna.

Before going further into this subject, it may be mentioned that the cost of rice manufacture varies mostly with the quality of rice wanted whether boiled or unboiled polished or unpolished, but that it also varies slightly with the quality of paddy used. In coarse paddy, the cost is somewhat lower than in fine paddy. The aforesaid cost is for medium qualities only. It may also be observed that a maund of medium quality Bengal paddy would yield about 26 seers of rice, 13 seers of husk (*thoosh*) and 1 seer of meal (*kuro*); and that the yield of rice increases slightly in coarse paddy and diminishes somewhat in fine paddy.

It would not be possible for me to state within the limits of this paper the principles upon which rice is manufactured in America and Burma, but I shall here describe in the briefest outline a fairly efficient and economic system by which rice manufacturing may be initiated in this country. This system is very similar in most of its processes to either the Rangoon or the American system and I may add that I have attained rather satisfactory results from it

CONDITIONING.

The separation of refraction.—However much Bengal paddy is fanned at the time of purchase there is always a certain percentage of refraction in it such as balls of mud, bits of stick and straw which have to be separated from the grain. When unboiled rice is wanted this is done by a 'circular-motion separator' as in Rangoon. This separator consists of a set of sieve-circulating in one plane and requires very little power to drive. When boiled rice is wanted the separation or refraction is effected by specific gravity in the soaking process.

The soaking process—Previous to being boiled, paddy is soaked in fresh water for about 24 hours which softens the husk and clears it of all admixture. The balls of mud dissolve in the water, the paddy sinks to the bottom of the vat and the bits of stick and straw float up which are then easily removed.

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MJ381-2 $\frac{B}{P}$ 37

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amount of time and labour wasted on this industry which may be more profitably employed in others—of which the cultivation and manufacture of cotton may be named—you will agree with me that our industrial economics is still in a very backward condition and urgently needs a proper adjustment. Public attention has already been drawn to this manufacture by 'the Statesman' newspaper. Considering the vastness of the industry and the bright vista of economic possibilities it opens up before us, I think this subject commends itself to our very serious consideration. Having manufactured rice for a few years in this province, I think I am able to form some idea of the improvements that may be made in this industry.

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POLISHING

When brown rice is cleaned it is technically known as 'white rice'. Polishing is the process by which the surface of white rice is glazed. This treatment is only necessary for rice that is exported. Schulze's Pearler has turned out perfectly polished rice at the Ramkristopur Rice Mills Ltd. •

Rice cleaning and polishing, which is a portion of the industry here advocated, is not new to the country. This system of rice milling entirely for the export trade has been carried on for several years at Ramkristopur and Chetlah near Calcutta, and the complete manufacture of rice is now conducted by a handful of millers scattered about in North Western India and the Madras Presidency. But the only reason I can attribute to the slow growth of the industry is that, unlike the other countries, boiled rice is largely consumed here and the difficulty of paddy drying has always loomed very large in the minds of those that have from time to time been enquiring about it. Had they been reasonable in their apprehensions, the problem of drying might have been solved ere this. I have often tried to correct false notions regarding this industry but my endeavours have been futile.

By the system above stated the cost of rice preparation per maund would be, approximately 2 as. 6 p. for unboiled and 3 as. for boiled rice, unpolished, such as would be needed for home consumption. Rangoon millers reckon an average of 3 as. as the cost of preparing polished rice. If a system of artificial drying is introduced, the cost of boiled rice should be reduced by 6 pies approximately. It will therefore be evident that by the introduction of the Rangoon and American systems of manufacture, the price of the greatest staple food of our country will be reduced by about four annas on the maund and an enormous quantity of labour will be set free for more profitable industries.

10th December, 1906.

X9(1781) - 252

D6

Cotton Cultivation in Bengal.

BY D. N. MOOKERJI, Esq, M. R. A. C.

Assistant Director of Agriculture, Bengal.

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Though cotton used to be fairly common only a short time ago it is doubtful if Bengal ever grew sufficient cotton for her own requirements. There is evidence that about the middle of the 18th century when her manufactures were still in full

activity if not in the height of their prosperity Bengal grew only one-eighth of the cotton she required, the quantity imported from other Provinces of India amounting to seven-eighths of the total consumption (*Vide* Medlicott's *Cotton Hand-Book for Bengal*, P. 44) Cotton cultivation was carried on in Bengal for local purposes only. It seldom appeared for sale even in the village bazars. It was spun by the village women and served to clothe the raiyats and their families after being worked up by the nearest weaver.

The reason why Bengal does not grow much cotton lies on the surface. It is because the soil and climate are suitable for more remunerative crops. The famous Photee of Dacca, as we have seen, yielded on an average 9mds of seed cotton per acre. Taking one fourth of this as lint the fibre amounted to 180 lbs. This is a very high outturn, for taking India as a whole the average yield of cotton per acre does not much exceed a maund only. Photee though exceedingly fine was probably a short stapled variety and we can only speculate as to what its price would have been if it still continued in existence. But taking such cottons as we now find in general cultivation in Behar or Choto-Nagpur, and taking the out-turn even as 200lbs per acre if cultivated in the fertile alluvial soil of Bengal, the gross value per acre would not be much above Rs. 45. Now compare this with Jute. An acre would yield on an average 15 mds of fibre which even at Rs. 8 per md, would mean Rs. 120. In the present year of high prices of food grains the raiyat has reason to be particularly grateful to Jute. For my part I cannot see any sense in advising the raiyat to take to cotton in place of Jute.

There are millions of women, Hindu and Mahamedan who are debarred by social etiquette and the exigencies of domestic life from working outside their own homes. You want to find employment for their idle hours. They can spin as their grandmothers used to do not so very long ago when the *Charuka* was a great feature of every village home. You are ready again to welcome with joy the rough *Saries* and *Dhuties* of home-

spun yarn. There is no competition of wages here. There are hundreds of thousands of poor widows who would only be too glad to add something, however small, to their present impossible incomes. Against this idea so enthusiastically put forth by many of our countrymen to-day I have not a word to say. I only contend that it is not necessary for our raiyats to grow cotton in place of a more remunerative crop. We can buy the fibre that we want our wives and daughters to spin. There is no lack of cotton in India. Vast quantities are exported to foreign countries, to distant Japan and Germany for instance. We can import it from the other Provinces as we used to do before.

I could understand the present excitement over cotton cultivation if the idea was to grow a better crop than is found in the country generally with the object of regaining our lost markets. Consider for a moment our position in this respect. In the later eighties Great Britain took between 30 to 40 per cent of the cotton exported from India. In 1899-1900 the amount had fallen as low as three per cent. And though there has been a slight improvement since (in 1903-04 the amount was 6 per cent) yet practically speaking Great Britain has closed her door against Indian cotton.

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Compare with this the out-turn of cotton in India. In 1904-05 the mill consumption and exports amounted to 3,390 bales. Adding 380 thousand bales, the official estimate of consumption outside the mills, the total comes to 3,770 bales. Our bales are 400 lbs each. Reduced in terms of 500 lbs bales for comparison with the United States figures our annual output amounts to barely 3 million bales.

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European supervision, and later on practical and experienced cotton cultivators were brought over from the United States. Sea Island, Egyptian, Upland Georgian, New Orleans, Bourbon, Peruvian and other varieties were tried but all to very little purpose.

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The book is a digest of all information available from official records and other sources on the subject of the production of cotton in the Bengal Provinces. By the term Bengal Provinces, however, was meant not only what now constitute Bengal Proper and Eastern Bengal and Assam, but also the United Provinces and a part of the Punjab on the one hand, and Arracan, Pegu, Tenasserim, Singapur and the Andaman Islands on the other.

I shall content myself only with a few words on the work of one of the four American cotton planters who landed in India in January 1841. I mean Mr. Price Mercer. He was stationed like his fellow planters in the North West ; but later on *at his own request* he was transferred to Dacca which had been from time immemorial the best cotton field of Bengal. Mr. Price was according to the Governor-General a person "thoroughly acquainted with the plantations in America, and conversant with all circumstances connected with the production of cotton of the best description."

Mr. Price was like his brother planters, given a free hand and readily supplied with all that he suggested as necessary for carrying on his experiments.

The course of these experiments which lasted from 1844 to 1849 was attended by a series of disasters. The experiments were a failure in every sense. They not only failed in proving to

the native cultivators that fine kinds of exotic cotton could be profitably grown in the district, but they failed in turning out any cotton whatever, at any cost of production, of which the quality was approved by the English brokers, and worse still, they failed to establish any fact as to what varieties of seed were suited, to any of the different localities tried. At the close of the Experiment Mr. Commissioner Dunbar, who was throughout its career greatly interested in its success, informs Government that its history does not establish any one fact of general interest, certainly not that the Dacca district is incapable of growing exotic cotton. According to Dr. Royle the failure was due to the American planters sticking to their preconceived notions and failing to adapt their methods to the soils and especially the climates of India.

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Now compare our conditions with those of America. In Choto Nagpur, Behar and Orissa there is practically no rain before June to admit of ploughing or sowing. But then, when the monsoon begins the downpour is tremendous often amounting to 10 or 15 inches of rain in a month.

However where the soil is undulating the rain does not stand on the ground and this heavy precipitation does less damage

to the cotton crop than in the level country. In East Bengal on the other hand we have moderate rain in April and even in March. This is very favourable, but unfortunately when the monsoon does break the rainfall is even worse than in Behar. In many of the Eastern districts the rainfall from April to September amounts to 70 or 80 inches and even more. Add to this the general low level of the Eastern districts, a condition which is also unsuitable to cotton. American Cotton as we have seen is only a moderately moisture-loving plant.

If our conditions are unlike those of the cotton States of America, they are still more different from the conditions of Egypt. In that country there is practically no rain, all cultivation depending upon either irrigation or inundation. The following table gives the average annual rainfall at a few of the important stations :—

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The rainfall at Cairo is very uncertain. In many years the fall does not even amount to an inch.

Cotton is grown only in the Delta of the Nile. This industry to which Egypt owes her present financial prosperity is hardly three quarters of a century old. The country used to be inundated by the Nile making it impossible for any crops to be grown during the season of flood. But Mahomet Ali Pasha put up vast embankments to keep the flood water out. He also dug canals to provide for irrigation. Formerly cotton was cultivated to a very small extent as a pernnial only in the enclosures of Upper Egypt. Now cotton is grown everywhere in the Delta as an annual crop. As in America the sowing takes place in April and the harvesting is finished by November. The crop altogether receives about 14 irrigations of which 9 are given

by lifting water from the bed of the river. Almost as in Eastern Bengal the river begins to rise from early in June and by August rises sufficiently high to admit the water through openings in the dykes.

But irrigation though it certainly means expense, also means regulating the moisture conditions perfectly. There is on the other hand no controlling rainfall. In America there is no irrigation for cotton, but there the rainfall is moderate and fairly regular. With us the rainfall is immoderately heavy. The out-turn of Egyptian cotton is on an average 500 lbs per acre; of American cotton 200 lbs; while of Indian cotton it is no more than 80 lbs. American cotton is superior to ours in quality while Egyptian cotton is so superior to both that there is practically no comparison between them. Egyptian cotton competes with Sea Island cotton of which America grows only a few thousand bales and the price of which varies between two to three times that of ordinary Upland or New Orleans cotton.

But Sea Island cotton does not grow very well in Egypt nor has America succeeded with Egyptian cotton. Because, therefore, Dacca used once to grow very good cotton it does not necessarily follow that she will be successful with American, Egyptian or Sea Island cotton.

Interspersed through the records of failure are instances of success, but very curiously these apparent victories were not followed up. Considering, however, the general fate of the efforts one may seem too bold to recommend their renewal; but the science of agriculture has advanced a very great deal since the days the American planters worked and failed. When their rule of thumb did not avail them they were left completely helpless. But it ought not to be impossible now by selection and breeding to produce a plant to suit our conditions. We may take courage by the example of America herself in overcoming the difficulty with the acclimatization of Sea Island cotton, the finest cotton in the world. The story is interesting. This cotton, (*Gossypium*

barbadense) is a native of the West Indies. It is a perennial or tree variety yielding in its native home its harvest in the winter. When an attempt was made to cultivate it in the mainland where the winter is much severer than in the Island, the plants were killed by frost before bearing any flowers or pods. The stocks were, however, allowed to stand over and next spring some of them threw up new shoots. These bore some flowers and ripened some pods by next autumn before being again taken over by frost. The few seeds thus secured formed the starting point in the work of acclimatization. These seeds were sown and from the plants that came up those giving the earliest flowers and pods were selected as mother plants. This simple process was repeated for a few years till a race was obtained yielding its harvest by October and November like the general Upland cotton.

Not only has Sea Island cotton been acclimatized in the United States, but what is more, it has been so improved by careful selection as to be double the value of the original variety.

I have not space to go into the attempts that are being made in various countries, but specially America, to improve their native varieties of cotton by crossing with foreign varieties such as Egyptian and Peruvian. Not only are breeding and selection better understood now than before but also in manuring we have advanced a long way from the time when the chemical experts of the Government of India recommended a peaty soil for the finest sorts of cotton on the express ground that the plant took the carbon required for its lint from the ground. A tyro now knows that neither cotton nor any plant in the world ever takes any carbon from the ground; they take it of course from the carbonic acid of the atmosphere. That cotton required phosphoric acid for its best development had not yet been discovered, nor had the name of super phosphate been heard of. But I imply no blame to those experts personally who lived before the days of Liebig, Laws, & Gilbert. They merely laboured under the limitations of the infancy

of Science. But the fact remains that the ideas of 60 years ago have been revolutionized.

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

X9 (17810).2

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Interspersed through the records of failure are instances of success, but very curiously these apparent victories were not followed up. Considering, however, the general fate of the efforts one may seem too bold to recommend their renewal; but the science of agriculture has advanced a very great deal since the days the American planters worked and failed. When their rule of thumb did not avail them they were left completely helpless. But it ought not to be impossible now by selection and breeding to produce a plant to suit our conditions. We may take courage by the example of America herself in overcoming the difficulty with the acclimatization of Sea Island cotton, the finest cotton in the world. The story is interesting. This cotton, (*Gossypium*

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Not only has Sea Island cotton been acclimatised in the United States, but what is more, it has been so improved by careful selection as to be double the value of the original variety.

I have not space to go into the attempts that are being made in various countries, but specially America, to improve their native varieties of cotton by crossing with foreign varieties such as Egyptian and Peruvian. Not only are breeding and selection better understood now than before but also in manuring we have advanced a long way from the time when the chemical experts of the Government of India recommended a peaty soil for the finest sorts of cotton on the express ground that the plant took the carbon required for its lint from the ground. A tyro now knows that neither cotton nor any plant in the world ever takes any carbon from the ground, they take it of course from the carbonic acid of the atmosphere. That cotton required phosphoric acid for its best developement had not yet been discovered, nor had the name of super phosphate been heard of. But I imply no blame to those experts personally who lived before the days of Liebig, Laws, & Gilbert. They merely laboured under the limitations of the infancy

of Science. But the fact remains that the ideas of 60 years ago have been revolutionized.

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

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Cotton Cultivation in Bengal.

BY D. N. MOOKERJI, Esq., M. R. A. C.

Assistant Director of Agriculture, Bengal.

THE cotton area in Bengal is steadily contracting. It used to be fairly common within the memory of men still living. But it has completely vanished from many districts within a few decades. But taking India as a whole the area under the crop is expanding. The following table may be interesting :—

Years.	Acreage under cotton	
	in Bengal and Eastern Bengal.	in all India.
1892-93	229,900	13,422,107
1900-01	127,700	14,231,150
1904-05	89,800	19,014,432

It is doubtful if cotton was ever a favourite crop with the Bengal raiyat. Dacca was famous for her wonderful muslin and the district produced the finest cotton in the world. But the cultivation of this cotton does not appear to have been a matter of much profit to the raiyat. John Bebb, Commercial Resident at Dacca under the East India Co., writing in 1790 gave the cost of cultivating an acre of *Photee* cotton as Rs. 28-8. A fair average crop was 9 mds. of seed cotton worth only Rs. 36. This therefore left the raiyat no more than Rs. 7-8 per acre as profit. Indeed according to Mr. Bebb the actual cultivators of this cotton "were ground down until a bare subsistence was left them."

Though cotton used to be fairly common only a short time ago it is doubtful if Bengal ever grew sufficient cotton for her own requirements. There is evidence that about the middle of the 18th century, when her manufactures were still in full

activity if not in the height of their prosperity Bengal grew only one-eighth of the cotton she required, the quantity imported from other Provinces of India amounting to seven-eighths of the total consumption (*Vide* Medlicott's *Cotton Hand-Book for Bengal*, P 44). Cotton cultivation was carried on in Bengal for local purposes only. It seldom appeared for sale even in the village bazars. It was spun by the village women and served to clothe the raiyats and their families after being worked up by the nearest weaver.

The reason why Bengal does not grow much cotton lies on the surface. It is because the soil and climate are suitable for more remunerative crops. The famous Photee of Dacca, as we have seen, yielded on an average 9mds of seed cotton per acre. Taking one fourth of this as lint the fibre amounted to 180 lbs. This is a very high outturn, for taking India as a whole the average yield of cotton per acre does not much exceed a maund only. Photee though exceedingly fine was probably a short stapled variety and we can only speculate as to what its price would have been if it still continued in existence. But taking such cottons as we now find in general cultivation in Behar or Choto-Nagpur, and taking the out-turn even as 200lbs per acre if cultivated in the fertile alluvial soil of Bengal, the gross value per acre would not be much above Rs. 45. Now compare this with Jute. An acre would yield on an average 15 mds of fibre which even at Rs. 8 per md, would mean Rs. 120. In the present year of high prices of food grains the raiyat has reason to be particularly grateful to Jute. For my part I cannot see any sense in advising the raiyat to take to cotton in place of Jute.

There are millions of women, Hindu and Mahamedan who are debarred by social etiquette and the exigencies of domestic life from working outside their own homes. You want to find employment for their idle hours. They can spin as their grand mothers used to do not so very long ago when the *Churka* was a great feature of every village home. You are ready again to welcome with joy the rough *Saries* and *Dhuties* of home-

spun yarn. There is no competition of wages here. There are hundreds of thousands of poor widows who would only be too glad to add something, however small, to their present impossible incomes. Against this idea so enthusiastically put forth by many of our countrymen to-day I have not a word to say. I only contend that it is not necessary for our raiyats to grow cotton in place of a more remunerative crop. We can buy the fibre that we want our wives and daughters to spin. There is no lack of cotton in India. Vast quantities are exported to foreign countries, to distant Japan and Germany for instance. We can import it from the other Provinces as we used to do before.

I could understand the present excitement over cotton cultivation if the idea was to grow a better crop than is found in the country generally with the object of regaining our lost markets. Consider for a moment our position in this respect. In the later eighties Great Britain took between 30 to 40 per cent of the cotton exported from India. In 1899-1900 the amount had fallen as low as three per cent. And though there has been a slight improvement since (in 1903-04 the amount was 6 per cent) yet practically speaking Great Britain has closed her door against Indian cotton.

Of the world's commercial demand for the raw material the United States alone supply as much as 85 per cent. She produces on an average 10 million bales (bale = 500lbs) per year and can increase her supply practically indefinitely if the demand were to grow and the present prices maintained.

Compare with this the out-turn of cotton in India. In 1904-05 the mill consumption and exports amounted to 3,390 bales. Adding 380 thousand bales, the official estimate of consumption outside the mills, the total comes to 3,770 bales. Our bales are 400 lbs each. Reduced in terms of 500 lbs bales for comparison with the United States figures our annual output amounts to barely 3 million bales.

India has at present about 19 million acres under cotton against 28 million acres in the United States. Yet while the

latter produce 10 millions bales of cotton per year, we produce only 3 million bales. Or in other words, while the United States acreage exceeds ours by barely 50 per cent, her annual out-turn exceeds ours by something like 250 per cent. The average yield of an acre in India is about a maund of 80 lbs. ; that in the United States is 200 lbs. What is more, American cotton is of superior quality and fetches a much higher price in the market.

As for Egyptian cotton there is no comparison between it and either American or Indian cotton. The out-turn is about 500 lbs. per acre and the price per pound is quite double that of American cotton. Egyptian cotton rather competes with the Sea Island cotton, the finest cotton in the world, of which Gorgia, Florida and South Carolina produce only a few thousand bales every year

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

The attempt to improve Indian cotton is not new. It has occupied the attention of the Government of India for nearly three quarters of a century.

It began in 1829* by the Court of Directors drawing the attention of the Government to the importance of the indigenous short-stapled varieties and recommending for trial throughout India the Cultivation of the finest of Dacca cottons.

In consequence of this order Dacca cotton was experimentally planted in many places throughout Bengal, without success however.

Government spared neither money nor trouble. Large farms, each consisting of several hundred acres, were established under

An earlier attempt was probably that made in 1826 to grow Sea Island cotton in Balasore. This proved an utter failure)

European supervision, and later on practical and experienced cotton cultivators were brought over from the United States. Sea Island, Egyptian, Upland Georgian, New Orleans, Bourbon, Peruvian and other varieties were tried but all to very little purpose.

Neither time nor space would admit of my referring even cursorily to the various attempts. I would only refer the student who is interested in the subject to Mr. Medicott's *Cotton Hand-Book for Bengal* which was published in accordance with the resolution of His Excellency the Governor-General in Council, dated 22nd July 1861.

The book is a digest of all information available from official records and other sources on the subject of the production of cotton in the Bengal Provinces. By the term Bengal Provinces, however, was meant not only what now constitute Bengal Proper and Eastern Bengal and Assam, but also the United Provinces and a part of the Punjab on the one hand, and Arracan, Pegu, Tenasserim, Singapur and the Andaman Islands on the other.

I shall content myself only with a few words on the work of one of the four American cotton planters who landed in India in January 1841. I mean Mr. Price ~~Mereen~~. He was stationed like his fellow planters in the North West ; but later on *at his own request* he was transferred to Dacca which had been from time immemorial the best cotton field of Bengal. Mr. Price was according to the Governor-General a person "thoroughly acquainted with the plantations in America, and conversant with all circumstances connected with the production of cotton of the best description."

Mr. Price was like his brother planters, given a free hand and readily supplied with all that he suggested as necessary for carrying on his experiments.

The course of these experiments which lasted from 1844 to 1849 was attended by a series of disasters. The experiments were a failure in every sense. They not only failed in proving to

the native cultivators that fine kinds of exotic cotton could be profitably grown in the district, but they failed in turning out any cotton whatever, at any cost of production, of which the quality was approved by the English brokers, and worse still, they failed to establish any fact as to what varieties of seed were suited, to any of the different localities tried. At the close of the Experiment Mr. Commissioner Dunbar, who was throughout its career greatly interested in its success, informs Government that its history does not establish any one fact of general interest, certainly not that the Dacca district is incapable of growing exotic cotton. According to Dr. Royle the failure was due to the American planters sticking to their preconceived notions and failing to adapt their methods to the soils and especially the climates of India.

At his own request Mr. Price was allowed to transfer the scene of his activity from Eastern Bengal to Assam where his failure was only worse ; but we shall not follow him there.

In America cotton is grown in the south. It is sown in April and the harvest is finished by November. The average rainfall during the growing period of the plant (from April to September, is about 25 inches. In the early months (April and May) the precipitation is on an average about 30 inches a month. The rain-fall as everywhere else varies of course from year to year, but in the Southern States of America it varies within very narrow limits, and the cotton crop never suffers to the extent of being "half a crop". The crop suffers if the rain-fall in April and May exceeds the normal even by an inch per month.

Now compare our conditions with those of America. In Choto Nagpur, Behar and Orissa there is practically no rain before June to admit of ploughing or sowing. But then, when the monsoon begins the downpour is tremendous often amounting to 10 or 15 inches of rain in a month.

However where the soil is undulating the rain does not stand on the ground and this heavy precipitation does less damage

to the cotton crop than in the level country. In East Bengal on the other hand we have moderate rain in April and even in March. This is very favourable, but unfortunately when the monsoon does break the rainfall is even worse than in Behar. In many of the Eastern districts the rainfall from April to September amounts to 70 or 80 inches and even more. Add to this the general low level of the Eastern districts, a condition which is also unsuitable to cotton. American Cotton as we have seen is only a moderately moisture-loving plant.

If our conditions are unlike those of the cotton States of America, they are still more different from the conditions of Egypt. In that country there is practically no rain, all cultivation depending upon either irrigation or inundation. The following table gives the average annual rainfall at a few of the important stations —

	Annul rainfall.
Alexandria	81 inches.
Port-said	34 do.
Ismalia	21 do.
Suez	11 do.

The rainfall at Cairo is very uncertain. In many years the fall does not even amount to an inch.

Cotton is grown only in the Delta of the Nile. This industry to which Egypt owes her present financial prosperity is hardly three quarters of a century old. The country used to be inundated by the Nile making it impossible for any crops to be grown during the season of flood. But Mahomet Ali Pasha put up vast embankments to keep the flood water out. He also dug canals to provide for irrigation. Formerly cotton was cultivated to a very small extent, as a perennial only in the enclosures of Upper Egypt. Now cotton is grown everywhere in the Delta as an annual crop. As in America the sowing takes place in April and the harvesting is finished by November. The crop altogether receives about 14 irrigations of which 9 are given

by lifting water from the bed of the river. Almost as in Eastern Bengal the river begins to rise from early in June and by August rises sufficiently high to admit the water through openings in the dykes.

But irrigation though it certainly means expense, also means regulating the moisture conditions perfectly. There is on the other hand no controlling rainfall. In America there is no irrigation for cotton, but there the rainfall is moderate and fairly regular. With us the rainfall is immoderately heavy. The out-turn of Egyptian cotton is on an average 500 lbs. per acre; of American cotton 200 lbs.; while of Indian cotton it is no more than 80 lbs. American cotton is superior to ours in quality while Egyptian cotton is so superior to both that there is practically no comparison between them. Egyptian cotton competes with Sea Island cotton of which America grows only a few thousand bales and the price of which varies between two to three times that of ordinary Upland or New Orleans cotton.

But Sea Island cotton does not grow very well in Egypt nor has America succeeded with Egyptian cotton. Because, therefore, Dacca used once to grow very good cotton it does not necessarily follow that she will be successful with American, Egyptian or Sea Island cotton.

Interspersed through the records of failure are instances of success, but very curiously these apparent victories were not followed up. Considering, however, the general fate of the efforts one may seem too bold to recommend their renewal; but the science of agriculture has advanced a very great deal since the days the American planters worked and failed. When their rule of thumb did not avail them they were left completely helpless. But it ought not to be impossible now by selection and breeding to produce a plant to suit our conditions. We may take courage by the example of America herself in overcoming the difficulty with the acclimatization of Sea Island cotton, the finest cotton in the world. The story is interesting. This cotton, (*Gossypium*

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THE SECOND INDIAN INDUSTRIAL CONFERENCE.

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**The Effect of Import Duties on
Industrial Development.**

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

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

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

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

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

In my previous paper I have already alluded to the causes which have given an undue prestige to the fiscal policy prevailing in Great Britain for which the term "Free Trade" is a misnomer. I have also briefly alluded to the fact that British industrial supremacy was established under a policy of strict

protection. Under that policy she developed her manufactures and had a complete monopoly of them. She had control of all the markets of the world, and became greatest capitalist nation. Alison in his "History of Europe" wrote:—

"There is perhaps no example in the annals of mankind of a nation having made such advances in industry, wealth and numbers, as Great Britain has made since the peace. In the 30 years that have elapsed since the Battle of Waterloo, during which it has enjoyed in Europe at least almost uninterrupted peace, its population has increased more than one-half, having advanced from 18,500,000 to 28,000,000. Its imports have doubled, having risen from £32,000,000 to £70,000,000, its exports have more than tripled, having swelled from £42,000,000 to £130,000,000, exclusive of Colonial produce, its shipping has doubled, having grown from 2,500,000 to 5,000,000 tons.....During the same period the agricultural industry of the country has been so far from falling short of this prodigious increase in its commercial transactions that it has signally prospered. The dependence of the nation on foreign supplies has steadily diminished until the grain annually imported had come (on an average of 5 years ending with 1835) to be no more than a 200th part in average years of the annual consumption, and the prodigy was exhibited of a rural industry in an old state, possessing a narrow and long cultivated territory, not only keeping pace with but outstripping an increase of numbers and augmentation of food required for the purpose of luxury unparalleled in any age." Alison "History of Europe" Chap.XCV.66.

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

It was about 1835 that an extraordinary era of prosperity sprang up throughout the whole civilised world tending to an enormous increase in the wealth of the world. This was due to numerous improvements in arts, sciences and inventions, as well as to improved communications by railways, steam navigation and telegraphs, which made such rapid strides during

the second quarter of the 19th century. England was the great pioneer in these improvements, then came the great rush of gold from California and Australia causing an expansion of the currency of the world, a condition which is always accompanied by increased activity of trade. Foreign nations shared this prosperity as well as ourselves. but England was in a better position than any other nation to reap the advantages of this altered condition of affairs. As already stated she had the markets of the world in her hands, she had developed her coal, her iron and her textile industries under the policy of strict protection ; and had complete monopoly of them. She not only supplied manufactures and machinery for the whole world, but as the great capitalist nation she furnished funds for every public work abroad with the understanding that plant of every description should be supplied from England. The value of her investments increased enormously with the rapid development of the countries in which they had been invested, and she has been enabled constantly to reinvest the produce of these investments, so that her wealth as a capitalist has become enormous and must now amount to many thousand millions sterling.

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

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

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

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

"For the information of Parliament that the commercial and manufactur-

ing interests had been for some time in a state of great activity and prosperity."

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

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

But what is the cause of this loss of industrial and commercial supremacy? It is simply due to our own folly in failing to foster a reciprocal trade with India and our Colonies. The British Empire has a huge area of 12,000,000 sq. miles, comprising enormous, but undeveloped, wealth, whether mineral or

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

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

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

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

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

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

In the year 1896 Mr. A. Williamson, being convinced that the duty, on any article which had to encounter competition of a home product fell upon the foreign producer and not upon the consumer, challenged the Cobden Club, in order to test this question, to issue a short circular to the chief exporters of Great Britain asking their experience. As the challenge was declined, Mr. Williamson set a circular to a large number of representative exporters of our chief manufacturing centres embracing cotton, woollen, carpet, iron and steel, brass, gold, silver, electro-plate, hardware, guns, cycles, engineering, glass, India rubber and other industries. Out of 531 replies 530 admitted that the *incidents of taxation fell upon them and not upon the consumer*. The only dissenting reply was from an American Cycle exporter, who had recently opened business in Coventry.

(A few Examples, proving that the imposition of tariff does not necessarily raise prices are given in Appendix No. 1)

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

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

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

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

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

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

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

competition was thereby stimulated to an extent which tended to a fall rather than a rise in price.

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

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

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

All these industries and many others had been developed by the means of import duties. The duty was therefore raised from 1 cent to 2.2 cents per lb. This, according to a Free Trader's contention should have raised the price of tin plates in the United States from 3 to 4.2 cents, but on the contrary, as the industry developed the price fell from 3 to 2.2 cents in 1898, and the development of the tin plate industry has been a complete success. The production of tin plates in the United States has increased from 1,000 tons in 1891 (the year in which the McKinley Act took effect) to 412,000 tons in 1902. During this period the value of imported tin plates amounted to 1,492,000 dollars paying duty, but subject to a draw back of 99 per cent if exported in a manufactured form.

The United States Census of 1900 shows that there has been an increase of 104 per cent in the number of fruit and vegetable canning establishments since 1890—an increase of 73 per cent in the amount of wages paid in the same industry, 101 per cent increase in the cost of fruit and vegetables canned,

and 89 per cent increase in the value of the completed product. The average cost of tin plates for 11 years after the McKinley Tariff was imposed has been 2 63 as against 3 cents per lb. in the years 1890-91. When the tariff was first imposed the cost of tin plates, instead of rising, steadily fell, although there was a large import the foreigner paying duty. The great development of the canning industry and the consequent demand for tin plates has tended to a temporary rise in the prices, and this was increased by the great coal strike, as well as by the strike in tin plate operatives who obtained a rise in their wages; but the average price of 1902 was not higher than in 1891.

Now to sum up the results :—

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

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

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

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

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

The history of the United States proves that there have been several periods during which, under the influence of economic charlatans, the Government has relaxed its policy of protection. Such periods have been marked by depression of trade and distress, whilst the periods of strict protection have been marked by activity of trade and general prosperity. For details of this see Appendix No. 2.

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

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

Again he prophesied in 1846 :—

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

More than half a century has elapsed and Free Trade is either an English or a savage custom. Not a single civilized country, except Denmark, has followed our example, but in most countries tariffs are increasing in intensity. Again in 1844 he prophesied that agriculture would flourish under Free Trade, and no interest would receive so much benefit from the Repeal

of the Corn Laws as the farm tenant interest. But our agriculture has been ruined, millions of acres have gone out of cultivation, and both farm tenants and landholders have lost their capital. Property has been constantly changing hands, and freeholds are heavily mortgaged.

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

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

Both he and Mill advocated the imposition of countervailing duties on those foreign nations which restricted, by high duties or prohibition, the importation of produce into their countries (See Appendix 3).

In conclusion, I would recommend to the Provincial Committees of the Industrial Conference a careful study of "Facts for Fiscal Reformers", which I compiled four years ago for the information of the working men's Tariff Reform League of Birmingham; (See Appendix 4), and I would suggest that the following Resolution be submitted for the consideration of the next Industrial Conference

Resolutions.

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

APPENDIX I.

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

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

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

Sir Lyon Playfair the Apologist for the Cobden Club has endeavoured to account for this fall by improved process of manufacture, which of course has some slight share in it, but the only improvement that would very materially cheapen the cost of steel rails is the Bessemer process, which was invented as early as 1855 and was in full use long before the dates above mentioned. The reduction of price is fully accounted for by the fact that between 1868 and 1899 the output of steel rails in the United States increased from 8,618 tons to 2,270,000 tons, whilst the output of the United Kingdom decreased from 1,019,000 tons in 1890 to 838,000 tons in 1899.

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

Mons. Thiers in his speech of January 22nd 1870 stated that a tariff on Linen and Cotton thread had reduced the price of a kilogram of linen thread from 7 to 3½ francs, and that the price of Cotton Thread had been reduced in similar proportion; the British monopoly having been killed by the tariff.

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

In 1867 a protection duty was imposed on wool. In 1872 there were in the United States 143 looms producing 1,500,000 yards of Brussels tapestry; in 1880 there were 1,070 looms producing 16,950,000 yards, and the price fell from 2.30 dollars in 1872 to 1.50 dollars in 1880 and to 93 cents in 1890.

Mr. Wycoff, United States Census Agent, stated that the average decline in the value of silk goods was not less than 25 per cent probably as much as 50 per cent in 15 years.

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

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

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

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

The 'American Economist' of October 2nd, 1891, gives the average retail prices of fifty-six articles in common use, at three periods. In the first column is shown prices in 1857, near the close of the last Free Trade of the United States; in the second column are the prices in 1889, a year before the McKinley Bill passed; in the next, or third column, is given the prices of 1890, during the electoral campaign; whilst the last column gives the prices after the passing of the McKinley Act. About four weeks previously a letter was sent to 1,400 official correspondents of the American Protective Tariff League, asking them to get these prices from the merchants of the vicinity. The returns have been most complete. In many instances the testimonies of three and four merchants are given. The correspondents did not ask a dealer's politics, they were simply instructed to get actual retail prices as they existed at the periods stated.

Articles.	1857.	Oct. 1889	Oct. 1890	Sept. 1891.
	8	8	8	8
Axe ..	1.49	0 95	0 92	0 88
Binding Twine, lb.	—	0.14½	0.14½	0.11
Blankets pair	6 83½	4 23	4 90½	3 70
Blue Shirting, yard ..	0.17½	0 11½	0.11	0.09½
Boots ..	4 76	3 27	3 07	2 72½
Calico, yard	0.14½	0.07½	0 06½	0.06
Carpets, yard ..	1.30½	0 77½	0 72½	0.66½
Cotton Gloves ..	0 34½	0.24½	0 22½	0 19½
Cotton Hosiery ..	0.47	0.25½	0 25½	0.20½
Cotton Knit Goods ...	0.98	0 52½	0 46½	0 41½
Cotton Thread, spool ...	0.09½	0.05	0.04½	0 04½
Crowbar, lb. ...	0 11½	0.07½	0.06½	0 06½
Drawing Chains, pair ..	1.28½	0.71½	0 65½	0.58½
File ...	0 42	0.27½	0.24	0.20½
Fork 3-tined ...	0 90½	0.56½	0 52½	0.46½
Flannel, yard ...	0.70	0.30½	0.37½	0 34½
Fruit Cans, per dozen ...	3 00	0.72	0.65	0.54½
Gingham, yard ..	0.22½	0.10½	0.10½	0.08½
Hand Saw ...	2.43½	1 62½	0.53	1.39
Hoe ...	0 85	0.48½	0.43	0.37½
Hemp Rope, lb ...	0.21	0.14	0.14½	0 11½
Linen, yard ..	0.83	0 48½	0.47	0.42½
Mowing Machine ...	121.15	56.98	52 60	47.10
Nails, Wire, lb. ..	—	0.05	0.04½	0.03½
Nails, Iron, lb. ...	0 08½	0.03½	0.03½	0.03
Oilcloth, yard ..	0.84	0.38	0.35½	0 31
Overalls ...	1 20½	0.83½	0.79½	0.70½

Articles.	1857.	Oct. 1889.	Oct. 1890.	Sept. 1891.
	\$	\$	\$	\$
Pearl Bottons, dozen	0.22½	0 11½	0.11¾	0.13¾
Pins, Paper ..	0.11½	0.06¾	0 06½	0.05¾
Plough	20.12½	14.37½	13.93½	12.90
Rake, Horse .	41.25	22 56½	21.24½	19.40¾
Reaper & Binder	247.85	142.36	129.85	115.95
Rubber Boots	4.83½	3.10¾	3.00	2.73¾
Salt, lb.	2.30	1. 75	1.65	1.38
Shoes	5.84	3 45	3 15	3.06
Sheeting, yard	0.12¾	0.08	0 07¾	0.06¾
Shovel	1.47	0.97¾	0 93¾	0.80½
Spade	1 44½	0.96¾	0.95¾	0.84
Starch, lb. .	0.13½	0.09¾	0 09¾	0.09½
Straw Hat, good.	1.75	1.28	1 25	1.10
Straw Hat, common.	0.44	0.31	0.28	0.23½
Sugar, lb., granulated .	0.19½	0.09¾	0 09½	0.05½
Sugar, lb., brown ..	0 16½	0.08½	0.08	0.04½
Sugar Bowl ..	0.61	0.38½	0 37½	0 32½
Scythe	1.22	0.85½	0 74½	0.68¾
Tin Dipper ..	0.25	0.12½	0.11½	0.10 ½
Tin Milk Pail	0.75½	0.46¾	0.43½	0 39¾
Tin Milk Pain ..	0.37½	0.18½	0 17½	0.15½
Ticking, yard	0 35½	0 20	0.18¾	0.17
Waggon	130.00	95.00	90.00	75.00
Washboard	0 41	0.24½	0.24	0.22¾
Washtub	1.20	0.70½	0.65	0.65
Wheelbarrow	2.23	1.65	1.60	1.40
Wooden Pails .	0.45	0.24½	0 22	0.20½
Woollen Clothing	24 00	16.75	14.50	14.25

APPENDIX. No. II.

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

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

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

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

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

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

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

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

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

APPENDIX. No. III.

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

TO THE EDITOR OF THE DAILY NEWS.

SIR GULFORD MOLESWORTH ON FREE TRADE.

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

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

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

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

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

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

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

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

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

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

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

Yours, &c.

GUILFORD L. MOLESWORTH.

The Manor House, Bexley

July 2nd, 1902.

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

To the Editor of the Daily News.

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

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

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

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

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

With regard to Adam Smith's opinion, that

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

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

The only limitation is this —

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

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

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

GUILFORD, L. MOLESWORTH.

THE MANOR HOUSE BEXLEY, KENT.

July 8th, 1902.

APPENDIX. No. IV.

FACTS FOR FISCAL REFORMERS

Compiled for the Working Men of Birmingham in 1907

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

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

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

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

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

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

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

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

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

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

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

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

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

28. After the enactment of the Corn Laws in 1815 the average price fell gradually so that in the three years 1843-45 preceeding the Repeal of the Corn Laws, the average price was 50s 9d. per quarter.

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

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

31. The distress in 1840-42, which gave rise to the Anti-Corn Law agitation, was not due to dear bread, but to a temporary monetary crisis caused by a sudden drain of gold to the United States.

32. The average price of wheat for the five years preceeding the Repeal in 1846 was almost lowest that had been touched during the half century 1840-50.

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

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

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

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

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

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

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

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

41 Since that time most of our industries have either been ruined or have struggled hard for existence.

42. Our Colonies are also becoming more and more Protectionist, and are flourishing under that policy, and Canada and our South African possessions are able to give the Mother Country preferential treatment and to their honour do so as yet without reciprocity on our part.

43. Many of our best workmen have emigrated to the United States where they obtain higher remuneration for their labour.

44 The capital recklessly expended by us in purchasing abroad that which might have been produced at home has armed Protectionist nations with the sinews of war in competition with us

45 Instead of fostering our own industries and providing employment for our working classes, we purchased from the foreigner in 1901 produce to the value of £416,000,000, much of which we could well have produced ourselves or in our Colonies. The value of exports to those nations in return was only £175,000,000

46. Canada is being thrown into the arms of the United States by our policy and our refusal to respond to her advances for reciprocal trade.

47. We are constantly raising our direct taxes, while the United States lower theirs.

48. Since 1868 our direct Imperial taxation has increased from £19,000,000 to £59,000,000, and our direct local taxation by rates from £20,000,000 to £40,000,000.

49. The cost of food and the necessaries of life is not less in England than in Protectionist countries.

50. The wages in Protectionist America are, in the majority of cases, nearly double those prevailing in our "Free Trade" country.

51 The prophecies which induced our people to adopt Free Trade have proved to be false.

52. We stand alone, excepting Denmark, as "Free-Traders" amongst civilised nations, and Free Trade is now recognised as either all British or a savage custom.

53. The predictions of ruin to those countries which have adopted Protection have altogether failed.

54. The volume of commerce is no criterion of the prosperity of our industries

55 The excess of £241,000,000 per annum of our foreign imports over our foreign exports show that we are consuming more than we produce, we are living, to a great extent, on the interest of that capital which we have gained in former days of prosperity.

56. We have of late years been parting largely with our foreign securities in payment to Protectionist nations.

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

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

59. The special exports of the United States increased in 1898 by £70,000,000 when compared with 1890, while those of the United Kingdom decreased by £30,000,000.

B
P. 39

The Effect of Import Duties on Industrial Development.

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

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

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

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

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

In my previous paper I have already alluded to the causes which have given an undue prestige to the fiscal policy prevailing in Great Britain for which the term "Free Trade" is a misnomer. I have also briefly alluded to the fact that British industrial supremacy was established under a policy of strict

protection Under that policy she developed her manufactures and had a complete monopoly of them. She had control of all the markets of the world, and became greatest capitalist nation Alison in his "History of Europe" wrote.—

"There is perhaps no example in the annals of mankind of a nation having made such advances in industry, wealth and numbers, as Great Britain has made since the peace. In the 30 years that have elapsed since the Battle of Waterloo, during which it has enjoyed in Europe at least almost uninterrupted peace, its population has increased more than one-half, having advanced from 18,500,000 to 28,000,000. Its imports have doubled, having risen from £32,000,000 to £70,000,000, its exports have more than tripled, having swelled from £42,000,000 to £130,000,000, exclusive of Colonial produce, its shipping has doubled, having grown from 2,500,000 to 5,000,000 tons.... During the same period the agricultural industry of the country has been so far from falling short of this prodigious increase in its commercial transactions that it has signally prospered. The dependence of the nation on foreign supplies has steadily diminished until the grain annually imported had come (on an average of 5 years ending with 1835) to be no more than a 200th part in average years of the annual consumption, and the prodigy was exhibited of a rural industry in an old state, possessing a narrow and long cultivated territory, not only keeping pace with but outstripping an increase of numbers and augmentation of food required for the purpose of luxury unparalleled in any age." Alison "History of Europe" Chap XCV 66.

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

It was about 1835 that an extraordinary era of prosperity sprang up throughout the whole civilised world tending to an enormous increase in the wealth of the world. This was due to numerous improvements in arts, sciences and inventions, as well as to improved communications by railways, steam navigation and telegraphs, which made such rapid strides during

the second quarter of the 19th century. England was the great pioneer in these improvements, then came the great rush of gold from California and Australia causing an expansion of the currency of the world, a condition which is always accompanied by increased activity of trade. Foreign nations shared this prosperity as well as ourselves, but England was in a better position than any other nation to reap the advantages of this altered condition of affairs. As already stated she had the markets of the world in her hands, she had developed her coal, her iron and her textile industries under the policy of strict protection ; and had complete monopoly of them. She not only supplied manufactures and machinery for the whole world, but as the great capitalist nation she furnished funds for every public work abroad with the understanding that plant of every description should be supplied from England. The value of her investments increased enormously with the rapid development of the countries in which they had been invested, and she has been enabled constantly to reinvest the produce of these investments, so that her wealth as a capitalist has become enormous and must now amount to many thousand millions sterling.

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

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

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

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

"For the information of Parliament that the commercial and manufactur-

ing interests had been for some time in a state of great activity and prosperity."

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

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

But what is the cause of this loss of industrial and commercial supremacy? It is simply due to our own folly in failing to foster a reciprocal trade with India and our Colonies. The British Empire has a huge area of 12,000,000 sq. miles, comprising enormous, but undeveloped, wealth, whether mineral or

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

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

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

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

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

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

In the year 1896 Mr. A. Williamson, being convinced that the duty, on any article which had to encounter competition of a home product fell upon the foreign producer and not upon the consumer, challenged the Cobden Club, in order to test this question, to issue a short circular to the chief exporters of Great Britain asking their experience. As the challenge was declined, Mr. Williamson set a circular to a large number of representative exporters of our chief manufacturing centres, embracing cotton, woollen, carpet, iron and steel, brass, gold, silver, electro-plate, hardware, guns, cycles, engineering, glass, India rubber and other industries. Out of 531 replies 530 admitted that the *incidents of taxation fell upon them and not upon the consumer*. The only dissenting reply was from an American Cycle exporter, who had recently opened business in Coventry.

(A few Examples, proving that the imposition of tariff does not necessarily raise prices are given in Appendix No. 1)

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

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

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

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

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

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

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

competition was thereby stimulated to an extent which tended to a fall rather than a rise in price.

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

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

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

All these industries and many others had been developed by the means of import duties. The duty was therefore raised from 1 cent to 2.2 cents per lb. This, according to a Free Trader's contention should have raised the price of tin plates in the United States from 3 to 4.2 cents, but on the contrary, as the industry developed the price fell from 3 to 2.2 cents in 1898, and the development of the tin plate industry has been a complete success. The production of tin plates in the United States has increased from 1,000 tons in 1891 (the year in which the McKinley Act took effect) to 412,000 tons in 1902. During this period the value of imported tin plates amounted to 1,492,000 dollars paying duty, but subject to a draw back of 99 per cent if exported in a manufactured form.

The United States Census of 1900 shows that there has been an increase of 10.4 per cent in the number of fruit and vegetable canning establishments since 1890—an increase of 73 per cent in the amount of wages paid in the same industry, 101 per cent increase in the cost of fruit and vegetables canned,

and 89 per cent increase in the value of the completed product. The average cost of tin plates for 11 years after the McKinley Tariff was imposed has been 2 65 as against 3 cents per lb. in the years 1890-91. When the tariff was first imposed the cost of tin plates, instead of rising, steadily fell, although there was a large import the foreigner paying duty. The great development of the canning industry and the consequent demand for tin plates has tended to a temporary rise in the prices, and this was increased by the great coal strike, as well as by the strike in tin plate operatives who obtained a rise in their wages ; but the average price of 1902 was not higher than in 1891.

Now to sum up the results :—

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

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

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

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

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

The history of the United States proves that there have been several periods during which, under the influence of economic charlatans, the Government has relaxed its policy of protection. Such periods have been marked by depression of trade and distress, whilst the periods of strict protection have been marked by activity of trade and general prosperity. For details of this see Appendix No. 2.

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

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

Again he prophesied in 1846:—

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

More than half a century has elapsed and Free Trade is either an English or a savage custom. Not a single civilized country, except Denmark, has followed our example, but in most countries tariffs are increasing in intensity. Again in 1844 he prophesied that agriculture would flourish under Free Trade, and no interest would receive so much benefit from the Repeal

of the Corn Laws as the farm tenant interest. But our agriculture has been ruined, millions of acres have gone out of cultivation, and both farm tenants and landholders have lost their capital. Property has been constantly changing hands, and freeholds are heavily mortgaged.

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

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

But, he and Mill advocated the imposition of countervailing duties on those foreign nations which restricted, by high duties or prohibition, the importation of produce into their countries. (See Appendix 3).

In conclusion, I would recommend to the Provincial Committees of the Industrial Conference a careful study of "Facts for Fiscal Reformers", which I compiled four years ago for the information of the working men's Tariff Reform League of Birmingham; (See Appendix 4), and I would suggest that the following Resolution be submitted for the consideration of the next Industrial Conference.

Resolutions.

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

APPENDIX I.

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

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

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

Sir Lyon Playfair the Apologist for the Cobden Club has endeavoured to account for this fall by improved process of manufacture, which of course has some slight share in it, but the only improvement that would very materially cheapen the cost of steel rails is the Bessemer process, which was invented as early as 1855 and was in full use long before the dates above mentioned. The reduction of price is fully accounted for by the fact that between 1868 and 1899 the output of steel rails in the United States increased from 8,618 tons to 2,270,000 tons, whilst the output of the United Kingdom decreased from 1,019,000 tons in 1890 to 838,000 tons in 1899.

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

Mons. Thiers in his speech of January 22nd 1870 stated that a tariff on Linen and Cotton thread had reduced the price of a kilogram of linen thread from 7 to 3½ francs, and that the price of Cotton Thread had been reduced in similar proportion; the British monopoly having been killed by the tariff.

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

In 1867 a protection duty was imposed on wool. In 1872 there were in the United States 143 looms producing 1,500,000 yards of Brussels tapestry; in 1880 there were 1,070 looms producing 16,950,000 yards, and the price fell from 2.30 dollars in 1872 to 1.50 dollars in 1880 and to 93 cents in 1890.

Mr. Wycoff, United States Census Agent, stated that the average decline in the value of silk goods was not less than 25 per cent probably as much as 50 per cent in 15 years.

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

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

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

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

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

Articles.	1857.	Oct. 1889	Oct. 1890	Sept. 1891.
	\$	\$	\$	\$
Axe	1.49	0 95	0 92	0 88
Binding Twine, lb.	—	0.14½	0.14½	0.11
Blankets pair	6 83½	4.23	4 09½	3 70
Blue Shirting, yard	0.17½	0 11½	0.11	0.09½
Boots	4 76	3 27	3.07	2.78½
Calico, yard	0.14½	0.07½	0.06½	0 06
Carpets, yard	1 30½	0 77½	0 72½	0.66½
Cotton Gloves	0 34½	0.24½	0 22½	0 19½
Cotton Hosiery	0.47	0.25½	0.25½	0.20½
Cotton Knit Goods	0.08	0 52½	0 46½	0.41½
Cotton Thread, spool	0.09½	0.05	0.04½	0 04½
Crowbar, lb	0.11½	0.07½	0.06½	0 06½
Drawing Chains, pair	1.28½	0.71½	0.65½	0.58½
File	0.42	0.27½	0.24	0.20½
Fork 3-tined	0 99½	0.56½	0 52½	0.46½
Flannel, yard	0.70	0.39½	0.37½	0.34½
Fruit Cans, per dozen	3.00	0.72	0.65	0.54½
Gingham, yard	0 22½	0.10½	0.10½	0.08½
Hand Saw	2.43½	1.62½	0.53	1 39
Hoe	0.85	0.48½	0.43	0 37½
Hemp Rope, lb	0.21	0.14	0 14½	0.11½
Linen, yard	0 83	0 48½	0.47	0.42½
Mowing Machine	121.15	56.98	52 60	47.10
Nails, Wire, lb.	—	0 05	0.04½	0.03½
Nails, Iron, lb.	0 08½	0.03½	0.03½	0.03
Oilcloth, yard	0.84	0.38	0.35½	0 31
Overalls	1.20½	0.83½	0.79½	0 70½

Articles.	1857.	Oct. 1889.	Oct. 1890.	Sept 1891.
	\$	\$	\$	\$
Pearl Bottons, dozen	0.22 $\frac{1}{4}$	0.11 $\frac{1}{4}$	0.11 $\frac{1}{4}$	0.13
Pins, Paper	0.11 $\frac{1}{2}$	0.06 $\frac{3}{4}$	0.06 $\frac{1}{2}$	0.05
Plough .. .	20.12 $\frac{1}{2}$	14.37 $\frac{1}{2}$	13.93 $\frac{1}{4}$	12.9
Rake, Horse	41.25	22.56 $\frac{3}{4}$	21.24 $\frac{3}{4}$	19.4
Reaper & Binder	247.85	142.36	129.85	115.
Rubber Boots	4.83 $\frac{1}{2}$	3.10 $\frac{1}{2}$	3.00	2.73
Salt, lb.	2.30	1.75	1.65	1.3
Shoes	5.84	3.45	3.15	3.04
Sheeting, yard	0.12 $\frac{1}{2}$	0.08	0.07 $\frac{1}{2}$	0.06
Shovel	1.47	0.97 $\frac{1}{2}$	0.93 $\frac{1}{2}$	0.80
Spade	1.44 $\frac{1}{2}$	0.96 $\frac{1}{2}$	0.95 $\frac{1}{4}$	0.8
Starch, lb.	0.13 $\frac{1}{2}$	0.09 $\frac{1}{2}$	0.09 $\frac{1}{4}$	0.06
Straw Hat, good.	1.75	1.28	1.25	1.1
Straw Hat, common.	0.44	0.31	0.28	0.2
Sugar, lb., granulated	0.19 $\frac{1}{4}$	0.09 $\frac{1}{2}$	0.09 $\frac{1}{2}$	0.06
Sugar, lb., brown. .. .	0.16 $\frac{1}{2}$	0.08 $\frac{1}{2}$	0.08	0.06
Sugar Bowl	0.61	0.38 $\frac{1}{2}$	0.37 $\frac{1}{2}$	0.3
Scythe .. .	1.22	0.85 $\frac{1}{2}$	0.74 $\frac{1}{2}$	0.6
1 in Dipper .. .	0.25	0.12 $\frac{1}{4}$	0.11 $\frac{1}{2}$	0.1
Tin Milk Pail	0.75 $\frac{1}{2}$	0.46 $\frac{1}{4}$	0.43 $\frac{1}{4}$	0.3
Tin Milk Pain	0.37 $\frac{1}{4}$	0.18 $\frac{1}{2}$	0.17 $\frac{1}{2}$	0.1
Ticking, yard	0.35 $\frac{1}{2}$	0.20	0.18 $\frac{3}{8}$	0.1
Waggon	130.00	95.00	90.00	75.
Washboard	0.41	0.24 $\frac{1}{2}$	0.24	0.2
Washtub	1.20	0.70 $\frac{1}{2}$	0.65	0.5
Wheelbarrow	2.23	1.65	1.60	1.
Wooden Pails	0.45	0.24 $\frac{1}{2}$	0.22	0.1
Woollen Clothing,	24.00	16.75	14.50	12.

APPENDIX. No. II.

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

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

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

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

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

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

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

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

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

APPENDIX. No. III.

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

TO THE EDITOR OF THE DAILY NEWS.

SIR GULFORD MOLESWORTH ON FREE TRADE.

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

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

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

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

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

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

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

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

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

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

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

Yours, &c.

GUILFORD L. MOLESWORTH.

The Manor House, Bexley :

July 2nd, 1902.

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

To the Editor of the Daily News.

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

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

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

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

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

With regard to Adam Smith's opinion, that

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

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

The only limitation is this —

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

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

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

GUILFORD, L. MOLESWORTH.

THE MANOR HOUSE BEXLEY, KENT:

July 8th, 1902.

APPENDIX. No. IV.

FACTS FOR FISCAL REFORMERS.

Compiled for the Working Men of Birmingham in 1902

By SIR GUILFORD MOLESWORTH, B.C.I.E.

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

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

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

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

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

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

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

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

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

25. The price of wheat in Protectionist countries is not necessarily higher than in free-trade England; in some cases it is lower. Bodio's analysis of the price of wheat in the principal markets of Europe for the average of 16 years 1860-84 shews that the price in Brussels and Paris was 3 per cent. higher than in London, but in Amsterdam it was 1 per cent. lower than in London, in Rome 3 per cent. lower; in Berlin 10 per cent. lower; in Budapesth 14 per cent. lower; and in Vienna 25 per cent. lower than in London.

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

27. During the French War (period 1800-13, prior to the enactment of the 1815 Corn Laws) the average price of wheat rose to 107s. under Free import.

28 After the enactment of the Corn Laws in 1815 the average price fell gradually so that in the three years 1843-45 preceeding the Repeal of the Corn Laws, the average price was 50s. 9d per quarter.

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

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

31 The distress in 1840-42, which gave rise to the Anti-Corn Law agitation, was not due to dear bread, but to a temporary monetary crisis caused by a sudden drain of gold to the United States

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

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

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

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

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

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

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

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

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

41. Since that time most of our industries have either been ruined or have struggled hard for existence.

42. Our Colonies are also becoming more and more Protectionist, and are flourishing under that policy, and Canada and our South African possessions are able to give the Mother Country preferential treatment and to their honour do so as yet without reciprocity on our part.

43. Many of our best workmen have emigrated to the United States where they obtain higher remuneration for their labour.

44. The capital recklessly expended by us in purchasing abroad that which might have been produced at home has armed Protectionist nations with the sinews of war in competition with us.

45. Instead of fostering our own industries and providing employment for our working classes, we purchased from the foreigner in 1901 produce to the value of £416,000,000, much of which we could well have produced ourselves or in our Colonies. The value of exports to those nations in return was only £175,000,000.

46. Canada is being thrown into the arms of the United States by our policy and our refusal to respond to her advances for reciprocal trade.

47. We are constantly raising our direct taxes, while the United States lower theirs.

48. Since 1868 our direct Imperial taxation has increased from £19,000,000 to £59,000,000, and our direct local taxation by rates from £20,000,000 to £40,000,000.

49. The cost of food and the necessaries of life is not less in England than in Protectionist countries.

50. The wages in Protectionist America are, in the majority of cases, nearly double those prevailing in our "Free Trade" country.

51. The prophecies which induced our people to adopt Free Trade have proved to be false.

52. We stand alone, excepting Denmark, as "Free-Traders" amongst civilised nations, and Free Trade is now recognised as either all British or a savage custom.

53. The predictions of ruin to those countries which have adopted Protection have altogether failed.

54. The volume of commerce is no criterion of the prosperity of our industries.

55. The excess of £241,000,000 per annum of our foreign imports over our foreign exports show that we are consuming more than we produce, we are living, to a great extent, on the interest of that capital which we have gained in former days of prosperity.

56. We have of late years been parting largely with our foreign securities in payment to Protectionist nations.

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

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

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

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P 39

The Effect of Import Duties on Industrial Development.

BY SIR GUILFORD MOLESWORTH, K C I E.

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

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

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

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

In my previous paper I have already alluded to the causes which have given an undue prestige to the fiscal policy prevailing in Great Britain for which the term "Free Trade" is a misnomer. I have also briefly alluded to the fact that British industrial supremacy was established under a policy of strict

protection Under that policy she developed her manufactures and had a complete monopoly of them. She had control of all the markets of the world, and became greatest capitalist nation Alison in his "History of Europe" wrote:—

"There is perhaps no example in the annals of mankind of a nation having made such advances in industry, wealth and numbers, as Great Britain has made since the peace. In the 30 years that have elapsed since the Battle of Waterloo, during which it has enjoyed in Europe at least almost uninterrupted peace, its population has increased more than one-half, having advanced from 18,500,000 to 28,000,000. Its imports have doubled, having risen from £32,000,000 to £70,000,000, its exports have more than tripled, having swelled from £42,000,000 to £130,000,000, exclusive of Colonial produce, its shipping has doubled, having grown from 2,500,000 to 5,000,000 tons.... During the same period the agricultural industry of the country has been so far from falling short of this prodigious increase in its commercial transactions that it has signally prospered. The dependence of the nation on foreign supplies has steadily diminished until the grain annually imported had come (on an average of 5 years ending with 1835) to be no more than a 200th part in average years of the annual consumption, and the prodigy was exhibited of a rural industry in an old state, possessing a narrow and long cultivated territory, not only keeping pace with but outstripping an increase of numbers and augmentation of food required for the purpose of luxury unparalleled in any age." Alison "History of Europe" Chap XCV 66.

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

It was about 1835 that an extraordinary era of prosperity sprang up throughout the whole civilised world tending to an enormous increase in the wealth of the world. This was due to numerous improvements in arts, sciences and inventions, as well as to improved communications by railways, steam navigation and telegraphs, which made such rapid strides during

the second quarter of the 19th century. England was the great pioneer in these improvements, then came the great rush of gold from California and Australia causing an expansion of the currency of the world, a condition which is always accompanied by increased activity of trade. Foreign nations shared this prosperity as well as ourselves, but England was in a better position than any other nation to reap the advantages of this altered condition of affairs. As already stated she had the markets of the world in her hands, she had developed her coal, her iron and her textile industries under the policy of strict protection ; and had complete monopoly of them. She not only supplied manufactures and machinery for the whole world, but as the great capitalist nation she furnished funds for every public work abroad with the understanding that plant of every description should be supplied from England. The value of her investments increased enormously with the rapid development of the countries in which they had been invested, and she has been enabled constantly to reinvest the produce of these investments, so that her wealth as a capitalist has become enormous and must now amount to many thousand millions sterling.

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

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

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

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

“For the information of Parliament that the commercial and manufactur-

ing interests had been for some time in a state of great activity and prosperity."

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

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

But what is the cause of this loss of industrial and commercial supremacy? It is simply due to our own folly in failing to foster a reciprocal trade with India and our Colonies. The British Empire has a huge area of 12,000,000 sq. miles, comprising enormous, but undeveloped, wealth, whether mineral or

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

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

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

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

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

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

In the year 1896 Mr. A. Williamson, being convinced that the duty, on any article which had to encounter competition of a home product fell upon the foreign producer and not upon the consumer, challenged the Cobden Club, in order to test this question, to issue a short circular to the chief exporters of Great Britain asking their experience. As the challenge was declined, Mr. Williamson set a circular to a large number of representative exporters of our chief manufacturing centres embracing cotton, woollen, carpet, iron and steel, brass, gold, silver, electro-plate, hardware, guns, cycles, engineering, glass, India rubber and other industries. Out of 531 replies 530 admitted that the *incidents of taxation fell upon them and not upon the consumer*. The only dissenting reply was from an American Cycle exporter, who had recently opened business in Coventry.

(A few Examples, proving that the imposition of tariff does not necessarily raise prices are given in Appendix No. 1)

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

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

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

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

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

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

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

competition was thereby stimulated to an extent which tended to a fall rather than a rise in price

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

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

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

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

The United States Census of 1900 shows that there has been an increase of 104 per cent in the number of fruit and vegetable canning establishments since 1890—an increase of 73 per cent in the amount of wages paid in the same industry, 101 per cent increase in the cost of fruit and vegetables canned,

and 89 per cent increase in the value of the completed product. The average cost of tin plates for 11 years after the McKinley Tariff was imposed has been 265 as against 3 cents per lb. in the years 1890-91. When the tariff was first imposed the cost of tin plates, instead of rising, steadily fell, although there was a large import the foreigner paying duty. The great development of the canning industry and the consequent demand for tin plates has tended to a temporary rise in the prices, and this was increased by the great coal strike, as well as by the strike in tin plate operatives who obtained a rise in their wages; but the average price of 1902 was not higher than in 1891.

Now to sum up the results :—

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

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

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

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

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

The history of the United States proves that there have been several periods during which, under the influence of economic charlatans, the Government has relaxed its policy of protection. Such periods have been marked by depression of trade and distress, whilst the periods of strict protection have been marked by activity of trade and general prosperity. For details of this see Appendix No. 2.

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

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

Again he prophesied in 1846 —

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

More than half a century has elapsed and Free Trade is either an English or a savage custom. Not a single civilized country, except Denmark, has followed our example, but in most countries tariffs are increasing in intensity. Again in 1844 he prophesied that agriculture would flourish under Free Trade, and no interest would receive so much benefit from the Repeal

of the Corn Laws as the farm tenant interest. But our agriculture has been ruined, millions of acres have gone out of cultivation, and both farm tenants and landholders have lost their capital. Property has been constantly changing hands, and freeholds are heavily mortgaged.

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

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

Both he and Mill advocated the imposition of countervailing duties on those foreign nations which restricted, by high duties or prohibition, the importation of produce into their countries. (See Appendix 3).

In conclusion, I would recommend to the Provincial Committees of the Industrial Conference a careful study of "Facts for Fiscal Reformers", which I compiled four years ago for the information of the working men's Tariff Reform League of Birmingham; (See Appendix 4), and I would suggest that the following Resolution be submitted for the consideration of the next Industrial Conference.

Resolutions.

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

APPENDIX I.

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

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

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

Sir Lyon Playfair the Apologist for the Cobden Club has endeavoured to account for this fall by improved process of manufacture, which of course has some slight share in it, but the only improvement that would very materially cheapen the cost of steel rails is the Bessemer process, which was invented as early as 1855 and was in full use long before the dates above mentioned. The reduction of price is fully accounted for by the fact that between 1868 and 1899 the output of steel rails in the United States increased from 8,618 tons to 2,270,000 tons, whilst the output of the United Kingdom decreased from 1,019,000 tons in 1890 to 838,000 tons in 1899.

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

Mons. Thiers in his speech of January 22nd 1870 stated that a tariff on Linen and Cotton thread had reduced the price of a kilogram of linen thread from 7 to 3½ francs, and that the price of Cotton Thread had been reduced in similar proportion; the British monopoly having been killed by the tariff.

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

In 1867 a protection duty was imposed on wool. In 1872 there were in the United States 143 looms producing 1,500,000 yards of Brussels tapestry, in 1880 there were 1,070 looms producing 16,950,000 yards, and the price fell from 2.30 dollars in 1872 to 1.50 dollars in 1880 and to 93 cents in 1890.

Mr. Wycoff, United States Census Agent, stated that the average decline in the value of silk goods was not less than 25 per cent probably as much as 50 per cent in 15 years.

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

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

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

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

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

APPENDIX I

Articles.	1857-	Oct. 1889	Oct. 1890	Sept. 1891.
	\$	\$	\$	\$
Axe	1.49	0 95	0 92	0 88
Binding Twine, lb.	—	0.14½	0 14½	0.11
Blankets pair	6 83½	4 23	4 09½	3 70
Blue Shirting, yard	0.17½	0 11½	0.11	0.09½
Boots	4.76	3 27	3 07	2.78½
Calico, yard	0.14½	0 07½	0 06½	0.06
Carpets, yard	1 30½	0 77½	0 72½	0.66½
Cotton Gloves	0 34½	0.24½	0 22½	0.19½
Cotton Hosiery	0.47	0.25½	0.25½	0.20½
Cotton Knit Goods	0.98	0 52½	0 46½	0.41½
Cotton Thread, spool	0 00½	0 05	0.04½	0 04½
Crowbar, lb.	0 11½	0.07½	0.06½	0 06½
Drawing Chains, pair	1.28½	0 71½	0 65½	0.58½
File	0 42	0 27½	0.24	0.20½
Fork 3-tined	0 90½	0.56½	0 52½	0.46½
Flannel, yard	0 70	0.39¾	0 37½	0.34¾
Fruit Cans, per dozen	3 00	0 73	0.65	0.54½
Gingham, yard	0.22½	0.10½	0 10½	0 08½
Hand Saw	2.43½	1 62½	0.53	1.39
Hoe	0.85	0 48½	0.43	0.37½
Hemp Rope, lb	0 21	0.14	0 14¾	0 11½
Linen, yard	0.83	0 48½	0 47	0.42½
Mowing Machine	121.15	56 98	52 60	47.10
Nails, Wire, lb.	—	0 05	0.04½	0.03½
Nails, Iron, lb.	0.08½	0 03½	0 03½	0.03
Oilcloth, yard	0.84	0.38	0.35½	0 31
Overalls	1.20½	0.83¾	0.79½	0 70½

Articles.	1857.	Oct. 1889.	Oct. 1890.	Sept. 1891.
	\$	\$	\$	\$
Pearl Bottons, dozen	0.22½	0.11½	0.11½	0.13½
Pins, Paper	0.11½	0.06½	0.06½	0.05½
Plough	20.12½	14.37½	13.93½	12.90
Rake, Horse	41.05	22.56½	21.24½	19.40½
Reaper & Binder	247.85	142.36	129.85	115.95
Rubber Boots	4.83½	3.10½	3.00	2.73½
Salt, lb.	2.30	1.75	1.65	1.38
Shoes	5.84	3.45	3.15	3.06
Sheeting, yard	0.12½	0.08	0.07½	0.06½
Shovel	1.47	0.97½	0.93½	0.80½
Spade	1.44½	0.96½	0.95½	0.84
Starch, lb.	0.13½	0.09½	0.09½	0.09½
Straw Hat, good.	1.75	1.28	1.25	1.10
Straw Hat, common.	0.44	0.31	0.28	0.23½
Sugar, lb., granulated	0.19½	0.09½	0.09½	0.05½
Sugar, lb., brown.	0.16½	0.08½	0.08	0.04½
Sugar Bowl	0.61	0.38½	0.37½	0.32½
Scythe	1.22	0.85½	0.74½	0.68½
Tin Dipper	0.25	0.12½	0.11½	0.10½
Tin Milk Pail	0.75½	0.46½	0.43½	0.39½
Tin Milk Pain	0.37½	0.18½	0.17½	0.15½
Ticking, yard	0.35½	0.20	0.18½	0.17
Waggon	130.00	95.00	90.00	75.00
Washboard	0.41	0.24½	0.24	0.22½
Washtub	1.20	0.70½	0.65	0.65
Wheelbarrow	2.23	1.65	1.60	1.40
Wooden Pails	0.45	0.24½	0.22	0.20½
Woollen Clothing	24.00	16.75	14.50	14.25

APPENDIX. No. II.

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

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

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

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

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

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

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

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

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

APPENDIX. No. III.

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

TO THE EDITOR OF THE DAILY NEWS.

SIR GULFORD MOLESWORTH ON FREE TRADE.

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

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

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

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

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

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

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

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

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

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

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

Yours, &c.

GUILFORD L. MOLESWORTH.

The Manor House, Bexley .

July 2nd, 1902

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

To the Editor of the Daily News.

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

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

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

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

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

With regard to Adam Smith's opinion, that

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

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

The only limitation is this :—

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

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

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

GUILFORD, L. MOLESWORTH.

THE MANOR HOUSE BEXLEY, KENT:

July 8th, 1902.

APPENDIX. No. IV.

FACTS FOR FISCAL REFORMERS

Compiled for the Working Men of Birmingham in 1902

BY SIR GUILFORD MOLESWORTH, K C I E.

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

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

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

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

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

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

22. Our dependence on foreign nations for wheat supplies tends in war time to raise prices to famine rates. During the Crimean War the price of wheat was higher under free imports than it had been under the Corn Laws since 1813, the average price for the year 1855 being 74s. 8d. per quarter.

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

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

25. The price of wheat in Protectionist countries is not necessarily higher than in free-trade England; in some cases it is lower. Bodio's analysis of the price of wheat in the principal markets of Europe for the average of 16 years 1859-84, shews that the price in Brussels and Paris was 3 per cent. higher than in London, but in Amsterdam it was 1 per cent. lower than in London; in Rome 3 per cent. lower; in Berlin 10 per cent. lower; in Budapesth 14 per cent. lower; and in Vienna 25 per cent. lower than in London.

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

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

28. After the enactment of the Corn Laws in 1815 the average price fell gradually so that in the three years 1843-45 preceeding the Repeal of the Corn Laws, the average price 50s 9d. per quarter.

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

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

31. The distress in 1840-42, which gave rise to the Anti-Corn Law agitation, was not due to dear bread, but to a temporary monetary crisis caused by a sudden drain of gold to the United States.

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

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

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

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

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

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

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

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

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

41 Since that time most of our industries have either been ruined or have struggled hard for existence.

42 Our Colonies are also becoming more and more Protectionist, and are flourishing under that policy, and Canada and our South African possessions are able to give the Mother Country preferential treatment and to their honour do so as yet without reciprocity on our part.

43. Many of our best workmen have emigrated to the United States where they obtain higher remuneration for their labour.

44 The capital recklessly expended by us in purchasing abroad that which might have been produced at home has armed Protectionist nations with the sinews of war in competition with us.

45 Instead of fostering our own industries and providing employment for our working classes, we purchased from the foreigner in 1901 produce to the value of £416,000,000, much of which we could well have produced ourselves or in our Colonies. The value of exports to those nations in return was only £175,000,000.

46 Canada is being thrown into the arms of the United States by our policy and our refusal to respond to her advances for reciprocal trade.

47 We are constantly raising our direct taxes, while the United States lower theirs.

48. Since 1868 our direct Imperial taxation has increased from £19,000,000 to £59,000,000, and our direct local taxation by rates from £20,000,000 to £40,000,000.

49 The cost of food and the necessaries of life is not less in England than in Protectionist countries.

50. The wages in Protectionist America are, in the majority of cases, nearly double those prevailing in our "Free Trade" country.

51. The prophecies which induced our people to adopt Free Trade have proved to be false.

52. We stand alone, excepting Denmark, as "Free-Traders" amongst civilised nations, and Free Trade is now recognised as either all British or a savage custom.

53. The predictions of ruin to those countries which have adopted Protection have altogether failed.

54 The volume of commerce is no criterion of the prosperity of our industries.

55 The excess of £241,000,000 per annum of our foreign imports over our foreign exports show that we are consuming more than we produce, we are living, to a great extent, on the interest of that capital which we have gained in former days of prosperity.

56. We have of late years been parting largely with our foreign securities in payment to Protectionist nations.

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

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

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

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Hand-loom Weaving in India.

BY RAOJI B. PATEL, M. R. A. C.,

Director of Agriculture and Industries Baroda State.

In my paper on Hand-loom weaving, read before the last Conference at Benares, I tried to show that, if certain improvements be made in the hand-loom and preparatory machines, the increased production would exceed the total imports of cotton piece goods into the country. The following further calculation will make the idea clear :—

The production of hand-loom working in the country is estimated at 165 crore yards. The looms work at an average effective speed of twenty picks per minute, and if this can be increased to 50 picks, the increased production of the same number of looms would be $247\frac{1}{2}$ crore yards. This increase more than equals the total cloth imports of the country. As this increase can be produced by the same number of men as now engaged on the looms, the price per yard will be cheaper than at present, and their ability to withstand foreign competition will so far be increased.

I have been asked to give in this short paper some idea of the manner in which this consumation can be reached. Before any conclusions can be drawn, it will be necessary to enter into some details of the various classes of cotton piece goods consumed in the country and to limit the spheres of work of the Indian hand-loom, the Indian Power-loom and of foreign looms.

Beginning with the coarsest, cotton goods consumed in India may be divided into the following four classes.

- (1). Very coarse goods, using 6^s to 16^s counts for warp and up to 20^s yarn for weft.

(2). Coarse Mediums, 20^s to 26^s warp and 20^s to 40^s weft.

(3) Mediums, 26^s to 40^s warp and 30^s to 50^s weft

(4). Fine, higher than 40^s warp and weft.

The following table gives a probable estimate in millions of yards of these classes of cloth consumed in the country, with their sources of production :—

No	Class	Wrap counts	Weft counts	Indian hand-loom supply million yds	Indian Mill supply million yards	Foreign imports million yards.	Total consumption million yards.	Percentage
1	Coarse	6 ^f to 16 ^f	6 ^f to 20 ^f	900	60	300	1,260	26
2	Coarse medium.	20 ^f to 26 ^f	20 ^f to 40 ^f	150	500	1,100	1,750	37
3	Medium	26 ^f to 40 ^f	30 ^f to 50 ^f	450	40	750	1,240	26
4	Fine	over 40 ^f	over 40 ^f	150	...	350	500	11
TOTAL ...				1,650	600	2,500	4,750	100

The bulk of the very coarse classes is woven on Indian hand-looms from Indian mill-yarn. This yarn is made from very inferior cotton and is not given a proper twist for warp. Some of the Bombay Mills tried to produce this class of cloth, but the yarn could not stand the speed of the power-looms, without a sizing of from 50 to 100 per cent., and as the people wanted cotton rather than size in the cloth they bought, the Mills had to give it up as a bad business. This cloth is very thick, warm and durable and is made everywhere in the country for local sale. This class may therefore be considered as coming within the absolute sphere of the hand-loom. Foreign cloth of this class in coloured designs and checks is being imported, but the weavers in Gujart, Northern India and most other parts of the country including Assam are now producing such cloth, and with increased local production the foreign article may for the most part be supplanted.

The main bulk of the coarse medium class is made up of imported shirtings and Indian Mill made shirtings, Chadders T-cloths &c. This class forms over one third of the total cloth consumption of the country and the supply is almost equally divided, between the Indian and foreign power-looms in Grey Goods, while bleached and coloured goods of this class come mostly from the United Kingdom. The hand-loom has a very small share and produces goods of mixed colours. Coloured yarn does not take size enough to satisfy the Indian Mill-owners and they would not take to it, so long as the plain business is profitable. Coarse medium yarn is very strong and can stand any amount of rough usage in the power-loom and the hand-loom has therefore no ultimate chance against it. They are required for this class can all be produced from Indian cottons and the question of relieving the foreigner is one of time only.

The medium class consists mainly of Dhoties, Saries, &c. consumed by the large body of the Indian middle class. Indian cotton is unsuited to produce warp yarn of this class, while the weft yarn produced by the Indian Mills is used up in weaving cloth of the coarse medium class by power looms. Competition in this class is between the foreign looms and Indian hand-looms both using foreign yarn. A cheap machine, cheap home labour and the production of stronger cloth on account of proper dressing of yarn, are in favour of the hand loom workers, while the power looms cannot work so fast on this yarn, as on the coarse medium. If therefore, as postulated before, the hand-loom can be made to produce $2\frac{1}{2}$ times as much as it now produces, the extra production will cover all the grey goods of this class imported, leaving the supply of bleached and coloured or printed goods to foreigners. The shwadeshi protection can help the hand loom workers in this class a great deal, towards passing over the period of transition.

The production of the fine class is restricted to hand loom and foreign power looms, and the speed at which the power loom can work on fine yarn being still further restricted, the

hand loom ought to be supreme in this class of work. The difficulty, however, comes in the want of bleaching and finishing. Of the 350 million yards of foreign imports, white Mulls and Nainsooks make up between them 333 millions. Both these cloths can be produced on hand looms, especially in the humid districts of Madras and Bengal, but the Sun bleaching process, adopted in the country, neither gives a fine feel to the cloth nor preserves its strength. Central bleaching and finishing factories in the fine weaving districts can alone help the weavers to get the upperhand in this competition. Recent experiments have shown the feasibility of producing Egyptian cotton in Sindh, Egyptian and long stapled tree cotton in Gujrat and American cotton in the United Provinces. With these cottons and proper arrangement for humidifying, mills in India equipped for fine spinning can easily compete with foreign mills in producing yarn upto 100 counts. When that day comes, the hand looms can get a still greater advantage with the cheaper Indian yarn.

This enquiry into the details lead us to the conclusion that four factors have stood the greatest friends of the Indian weaver.

- (1). His slow speed of work.
- (2). Cheap machine and home labour.
- (3). Light sizing and proper dressing of yarn.
- (4). Production for local consumption.

In any efforts to improve his lot, these should not be lost sight of, and yet, the speed of his work should be increased in order that, he may live and successfully compete. How far can this be attained is therefore the first point requiring consideration.

Speed of hand looms :—“ Mr. Wallace of the Indian Textile Journal says :—“The object of the inventors should be to ascertain the best possible working speed, in picks per minute of the average weaver and then to adapt the mechanism of the loom to withstand this strain of work.” Our enquiry suggests

the addition of a rider to this proposition to the effect, that this speed should be restricted to the maximum working speed, that the yarn at the weaver's command would be able to stand in the climate at his disposal. Previous experiments undertaken during 1905 with various kinds of looms, and weavers from Gujrat, United Provinces and Bengal showed, that 100 to 120 picks per minute was the highest that an average Indian weaver could do. Experiments during 1906 have, shown however, that under the conditions enumerated above a working speed of steady 70 to 80 picks on a 45 inch loom is all that should be attempted. Higher speed than this brings in its train so many breakages of warp threads, that the effective speed is greatly reduced. An example taken from a high authority will make this clearer.

Mr. A. Chatterton, the director of Industrial enquiries in the Madras Presidency, in a note submitted to the Madras Government says, that at Ahmednagar, Dungary cloth of 108 yarn 30 inches wide and 28 picks to the inch was made on Churchil looms, the production in a day of 8½ hours being 30 yards. He mentions in the same report that the working speed was 160 picks per minute. The following calculation will show the effective speed.

$$30 \times 3 \times 12 \times 28 = 30,240 \text{ total number of picks in the day.}$$

$$8\frac{1}{2} \times 60 = 510 \text{ minutes, working time.}$$

$$\text{No. of effective picks per minute} = \frac{30,240}{510} = 60$$

The loss of time in stoppages due to breakages must have been great.

EFFECTIVE SPEED :—In working every loom stoppages are unavoidable. They are due to :—

1. Changing pirns in the shuttles and breakages in weft.
2. Flying out of shuttle.
3. Fixing temple and taking up cloth.
4. Breakages in warp.

The time taken in changing pirns may be minimised by having a large pirn and a proper winding apparatus. The six

inch pirn taking up about a hank of 40s yarn adopted by the power looms may be taken as the limit in size. With such a pirn properly wound so as to minimise weft breakage, and the loom working at 80 picks, the time taken in stoppages may be reduced to 4 per cent.

Flying out of shuttle is mainly due to faults in construction of the loom, unequal wearing of the shuttle and shuttle race, irregular working and high speed. All these can easily be avoided and even a shuttle guard can be added to the handloom sleys. Under proper conditions $\frac{1}{2}$ per cent will be ample allowance for this.

The time taken in taking-up cloth and fixing temples every time after weaving six inches of cloth or so, amounts to over 12 per cent. Fixed temples with automatic taking-up motion is thus a necessity, not only for the production of even texture in cloth, but also for the saving of 12 per cent in weaving labour.

Breakages in warp in what are called improved Handlooms take up the most time, and it is due to this, that the Indian weaver cannot be induced to adopt them. If a loom can be shown working faster than his own, on medium counts without more breakages than in his old loom, he would be quite willing and ready to adopt it. These breakages are due mainly to :—

1. Bad construction.
2. Bad beaming.
3. High speed.
4. Want of correct hygroscopic condition.

The first cause can be removed by the use of wood-working machinery and proper tools.

Bad beaming has probably a greater influence on breakages than any of the others. Weavers cannot be expected to invest in costly machinery for sizing, dressing and warping and the warps made and dressed in the country fashion, which gives a special advantage to Handloom cloth, cannot properly be beamed by hand. The tension in the threads is uneven and causes a large number of breakages. The same difficulty was found in

Baroda and the finding of a cheap beaming machine for country warps has given us more trouble, than any of the other appliances. We have at last succeeded in making such a machine and breakages are reduced by over 60 per cent.

It is really surprising, how there are practically no breakages up to a certain speed, and how fast they increase, as the speed is increased beyond the limit. This limit varies with the kind of yarn, the number of threads per inch in the reed, the breadth of cloth etc., but a steady working spread of 70 to 80 picks on a 45 inch loom may be taken as a fair limit. The speed should be really limited, not by the number of picks per minute but by the shuttle velocity. Taking an average maximum shuttle velocity of 10 miles per hour, that the Handloom yarn may be expected to withstand under the best conditions, the highest working speed for the various sizes of looms may be stated as follows :—

			picks per minute.
Loom to weave	27 inches cloth.		117 Do.
Do.	36 "	Do.	97 Do.
Do.	45 "	Do.	84 Do.
Do.	54 "	Do.	72 Do.

These speeds are in the inverse proportion of 5, 6, 7 and 8 respectively.

To maintain a proper hygroscopic condition, the Indian weaver has stuck to his pit for ages. The only advantage of frame looms is that they can be put upon upper floors where land is dear, but even the power loom factories have their looms on the ground floor and that ought to teach intending investors in handlooms, that the nearer they have their looms to the ground, the better it is for their working. When the open part of the warp rests on a pit, in which a pail or two of water may be thrown when necessary, the dry surrounding air has very little action on the warp and it can be kept in proper condition for weaving without breakages. This seems to be the simplest and cheapest form of humidifiers and suits the handloom conditions admirably.

With these arrangements and a restriction of speed to 70 to 80 picks in a 45 inches loom, the breakages can be minimised and the stoppages due to them reduced to a maximum of say 12½ percent.

The total stoppages under these conditions viz properly constructed looms, with large pirns and good winding, good beaming, a proper taking up motion and a restriction of speed as above, may amount to as low as 17 per cent. Allowing double the time for stoppages as an average and making it one third, and working at a steady speed of 75 picks per minute on a 45 inches loom, the effective speed would be 50 picks or 2½ times the present effective speed of hand looms. 50 picks effective on 45'' loom with 40° yarn, will be equal to 57 picks effective on a 36'' loom or nearly the same as Mr. Churchill's loom working at 160 picks on 10' counts. The average effective speed of Bombay Power looms on coarse medium goods is only about 100 Picks per minute or double the effective speed of a properly improved handloom and on medium and fine goods, the power loom will have a still small advantage.

The results of our enquiry may thus be summarized:—

1. The sphere of handloom influence being to some extent limited, all efforts should be directed towards the increased production of very coarse, medium and fine counts weaving, and of mixed, coloured and check designs of all classes of goods, leaving the weaving of coarse medium class to the power-looms.

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

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

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

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

6. Proper pirn winding machines to wind firm conical pirns are necessary.

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

For the last two years, there has been a great activity in the country in producing handlooms of various designs and machines for preparatory processes, and every maker applauds his own goods. Many people have bought during the last year these—so called improved looms and appliances and found them unsuitable, sometimes for want of a proper understanding of the business, but mostly on account of the machines themselves, being unsuitable. There is thus a great necessity of authoritative examination and report of all these machines which the people can take as a guide. There is sufficient material for such an examination in the Calcutta Exhibition, and I would strongly recommend the appointment of an expert committee by the conference, to thoroughly test the loom section exhibits on the lines suggested by our enquiry, and publish a report. Any time given by busy men to this work and money spent by the conference will, in my humble opinion, be well spent in the country's service and will not be grudged by the assembled patriots.

Introduction.—Having thus fixed the best looms and appliances, the next great question will be how to introduce them to the weavers and extend their use as quickly as possible. The most practical ways that suggest to me are:—

1. Weaving Schools
2. Object Lessons
3. Monetary help.

Weaving Schools.—Many weaving schools have been and are being started in the country, but few possess a well equipped weaving factory, and without such a factory attached, where all preparatory processes and weaving in various branches suited to Indian conditions can be practically taught, the benefit derived from such schools will be very little indeed. The committee proposed above should be asked to recommend the proper equipment for school factories, and at least one school with such a factory attached should be started in every district. Baroda has sent in a model school Factory to the Exhibition and I would request every member of the conference interested in the Industry to visit it. Any suggestions for additions and alternations will be gladly received and attended to. Such a factory completely fitted up ought not to cost more than Rs 2000 to any district and I am sure the district leaders can easily find this capital. If proper fees be charged to cover the tuition charges and wastage of yarn and material by new students, a school with a factory as suggested and about 40 students, would pay all its expenses. Both theory and practice should be taught and proper attention paid to designing. It is said that the Indian weaver with his inherited skill cannot be matched in designing, but I am afraid that is an assumption not borne out by facts. Even in Benares, the home of design work in India, there are very few designers and all weavers in the sacred city have to dance attendance on these Ustads and their Chelas for the ground work of their sarees. At least one large well-equipped Institution in every Province for training of teachers and designers is also an absolute necessity.

Object Lessons.—In every weaving centre, nay in every village, with a considerable number of weavers, men trained in these schools should be set up with improved appliances to weave the class of cloths, that may be the speciality of the place when once the weavers see that more work is turned out than

they can do with their looms, they will not require any coaxing to adopt them. This can be done by every Swadesher with a small capital, not as a philanthropic work, but as a business. A few improved looms with a beaming machine can be set up either on his own account or lent to local weavers on condition, that they would pay for them by instalments after perfectly satisfying themselves, as to their usefulness.

Monetary Help:—Local Capitalists and associations can do a very great deal in this direction. They can advance money for looms and improved appliances, for yarn, store etc., and take the cloth produced for sale. In this way while helping the weavers, they would help themselves in earning a very good interest on their capital.

The Government of India have recently placed before all local Governments a comprehensive record of the results of the recent movement in this direction and many of the Provincial authorities are arranging to open weaving schools in suitable centres. The efforts of the Sholapur municipality in financing the local weaving Industry have been crowned with great success while successful co-operative weavers unions have already been started at Benares and in some towns of the Madras Presidency.

It will not, therefore, be considered too much to hope, that with a cordial co-operation between the Government and the leaders of the people, as represented by the municipalities, Local Boards and members of the district associations of the Congress and the Conference in this matter, our country may once again attain to one of the highest positions in the production of cloth, and bring back the smile of satisfaction to those engaged in the Industry, which holds the second place among the occupations of the country and the first among Industries