

Educational (1912) Department.

ORDINARY MS.

G.O., No. 9/3

DATED 11. 10. 1912.

[Despatch Abstract.]

Govt of India scholars - Regarding letter
from the Govt of India showing cover to a
copy of the report for 1911 by the educational
adviser on the conduct & progress of the
the charge together with the names in regard of
certain matter during the year.

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

[E. & L.]
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EDUCATIONAL DEPARTMENT.

CURRENT FILE.

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[P.T.O. FOR PUT UP PAPERS.]

PAPERS PUT UP WITH CURRENT No. _____

Papers of the department to which the current belongs.

Number.	Date.	Original (=O.) or spare copy (=S. C.)	Remarks. (In this column such of the papers as have been removed for copying, printing, etc., should be marked with a cross.)	Initials of Referencer with date in token of return to Reference department.

Papers of other departments.

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CN 2595
26-9-12

No. 2156

Government of India,
DEPARTMENT OF EDUCATION.

(Education)

Sinla, the 18th September
August 1912.

From

The Hon'ble Mr. H. Sharp, C.I.E.,

Joint Secretary to the Government of India,

To

The Secretary to the Government of Madras,

Education Department.

Sir,

I am directed to forward for the information of His
Excellency the Governor in Council, a copy of the report
for 1911 by the Educational Adviser on the Conduct and the
progress of the Government of India scholars under his
charge, together with the diaries, in original, of the
scholars named below :-



V. G. Nair

A. Kesava Menon

T. Kumaran Nayar.

I have the honour to be,

Sir,

Your most obedient servant,

[Signature]

Joint Secretary to the Government of India.

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Report for 1911 by the Educational Adviser on the
conduct and progress of the Government of India
scholars under his charge.

Education

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REPORTS ON GOVERNMENT SCHOLARS AT CAMBRIDGE.

P. J. Bhatt, from Bombay (*vide* India, Revenue and Agriculture Department Secretary's letter, No. 131, dated 27th June 1907, and Bombay Educational letter, No. 19, dated 20th July 1907, and Bombay Revenue letter, No. 2, dated 13th March 1909).

Mr. Bhatt died of consumption in Berlin on the 6th May last. Full information as to the circumstances has been sent to the Government of Bombay by the India Office.

P. K. Chakrabarti, from Bengal.

This scholar returned to India in November 1910.

Ram Chandra, from the Punjab (*vide* Government of India, Home Department—Education, letter No. 30, dated 25th August 1910).

Mr. Ram Chandra arrived in London on the 12th September 1910, and was admitted to Trinity College, Cambridge, where he is reading for the Mathematical Tripos. His progress and conduct have been entirely satisfactory.

Richard Pomeroy Dalley, from Bengal (*vide* India, Home—Education, letter No. 20, dated 2nd July 1908).

Mr. Dalley has taken Honours in the Natural Sciences Tripos and has been offered a post in the Indian Forest Service.

A. H. Dracup, from Bombay (*vide* India, Home—Education, letter No. 19, dated 5th September 1907).

Mr. Dracup took Honours in both parts of the History Tripos and was granted an extension of his scholarship for one Term to enable him to take his degree. His scholarship terminated in December 1910. He appeared for the open Competitive Examination for the Indian Civil Service in 1911, but failed.

Bisheshwari Prasad, M. Sc., from the United Provinces (*vide* India, Home—Education, letter No. 32, dated 23rd September 1909).

The reports on Mr. Prasad's conduct, progress and character have been uniformly good. He passed the Natural Sciences Tripos in June 1911, and thus qualified for the B. A. degree.

Sonti Venkata Ramamurty, from Madras (*vide* letter from the Government of Madras, No. 4-Education, dated the 14th June 1909).

The reports on Mr. Ramamurty's conduct, progress and character have been uniformly good. Mr. Ramamurty has succeeded in passing the Indian Civil Service Examination, 1911.

Kshitish Chandra Sen, from Bengal (*vide* India, Home Department—Education, letter No. 33, dated 15th September 1910).

Mr. Sen arrived in this country on the 2nd October 1910 and was admitted to Trinity Hall, Cambridge, where he is studying for the Moral Sciences Tripos. His progress and conduct have been entirely satisfactory.

Shah Muhammad Sulaiman, from the United Provinces. This scholar returned to India in February 1911.

REPORTS ON GOVERNMENT SCHOLARS STUDYING MEDICINE AT EDINBURGH.

W. A. Reardon, from Burma (*vide* India, Home Department letter, Sanitary—Medical, No. 18, dated the 13th August 1909).

Mr. Reardon's scholarship was paid up to the 15th June 1910 in accordance with the instructions of the Government of India. On the 21st July Mr. Reardon reported that he had passed the Examination in Materia Medica and thus completed the Third Professional, but that he had still to get through his Final Examination before he was qualified, and consequently had not made arrangements for returning to India.

Miss K. G. Wall, from Burma (*vide* India, Home Department letter, Sanitary—Medical, No. 24, dated 19th August 1909).

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Reports on Miss Wall have been that her progress has been universally good and her conduct satisfactory. Her scholarship was accordingly issued to her up to the 15th June 1911, in accordance with the instructions in the above quoted letter. Miss Wall has been asked whether she has made arrangements for her return to India, and has replied that she is not doing so till her course is complete.

REPORT ON THE GOVERNMENT OF INDIA SCHOLAR STUDYING IN LONDON.

Anandrai Keshavlal Dalal, from Bombay (*vide* Bombay, Educational letter No. 23, dated 26th September 1908).

Dr. Dalal attended the Middlesex Hospital Medical School up to the end of March 1911, and has been working at the Metropolitan Hospital in the capacity of House Surgeon since the 1st April. Dr. Dalal's scholarship expires on the 18th October. All reports about him have been quite satisfactory.

REPORTS ON THE GOVERNMENT OF INDIA TECHNICAL SCHOLARS (LONDON).

Indra Krishna Kaul, from the Punjab (*vide* India, Home—Education, letter No. 4, dated 19th April 1906).

Mr. Kaul returned to India on the termination of his scholarship in July 1910. He was a most industrious scholar; and, I understand, received an appointment as Assistant Sanitary Engineer under the Punjab Government, and afterwards as Second in charge of the Simla Electric Works.

Maung Po Thein, from Burma (*vide* India, Home—Education, letter No. 12, dated 27th May 1909).

Reports on Mr. Po Thein are attached, together with his diary. Mr. Po Thein has throughout been painstaking and industrious and in every way a satisfactory scholar; and his scholarship has been extended for a third year.

A. C. Patel, from Bombay (*vide* Government of India, Home Department—Education, letter No. 21, dated 9th June 1910). Mr. Patel reached England in August 1910 and arrangements were made for him to join the City and Guilds Central Technical College for the study of Electrical Engineering. The accompanying extract from the report of the City and Guilds (Engineering) College shows Mr. Patel's marks for the work done during the Term ending March 1911 and at the Examinations. Mr. Patel has proved himself a most excellent student and has been first among the Electrical Engineering students at this Examination. Permission has been given to Mr. Patel to accompany a party of students from the Institution of Electrical Engineers to Sweden during the summer vacation, and his report is sent herewith.

CITY AND GUILDS (ENGINEERING) COLLEGE.

Term ending March 1911.

(Marks awarded for work done during the Term and at the Examinations.)

Second Year Students.

Electrical Engineering Students.	C. and M. Engineering.	Electrical Engineering.	Chemistry.	Mathematics.	Total.
<i>Matriculated</i>	(150)	(175)	(50)	(125)	(500)
Patel, A. C. (Government of India State Scholar).	130	144	32	115	421

(Passed the London University Matriculation Examination).

Ambat Kesava Menon, from Madras (*vide* India, Home Department—Education, letter No. 21, dated the 15th July 1909).

Mr Menon studied the Chemistry of Soap Making and the Use of Native Oils under Dr. Lewkowitsch for fifteen months. It was hoped that at the end of this period Mr. Menon would gain access to a Soap works for his second year, but considerable difficulties and some delay were experienced in securing these facilities for him. At last an arrangement was made, by the help of Dr. Lewkowitsch, with Messrs. Gibbs and Company, who consented to take Mr. Menon into their Works as a premium pupil and to teach him the art of Soap Making (excluding toilet soap) for one year at a premium of 100 guineas. The Secretary of State agreed to the payment of this premium, and Mr. Menon's scholarship has been extended for a period of six months to enable him to profit by this opportunity.

It will be seen that the cost of Mr. Menon's training is high under Dr. Lewkowitsch for fifteen months at a cost of £183-15-0 a year, and afterwards for a year in Messrs. Gibbs and Company's Factory on payment of this heavy premium. Seeing that there are considerable difficulties in getting any satisfactory training in the study of fats, oils, soaps, etc., except on these high terms, it is highly desirable that no one should be sent as a Government Scholar to study this subject unless he is a practical man who is likely to profit by such study.

The reports on Mr. Menon have been uniformly good, and it will be seen from his accompanying diaries and report that he appears to be taking advantage of the facilities secured for him.

Name.	Subject of Study.	Reference.	REMARKS.
Kiran Chandra Banerji (Special Scholarship).	Sanitary Engineering.	Letter from the Director of Public Instruction, Eastern Bengal and Assam, No. 131-T., dated 3rd/14th December 1910; No. 2122-D-283, dated 3rd March 1911.	In accordance with the request of the Government of Eastern Bengal and Assam, Mr. Banerji was required to execute a bond and has been given a special allowance of £100, paid in quarterly instalments. Mr. Banerji has completed his time at the London College of Sanitary Engineering, and will shortly return to India.

REPORT ON THE GOVERNMENT OF INDIA TECHNICAL SCHOLARS AT THE LEATHERSELLERS' COMPANY'S TECHNICAL COLLEGE.

(1) *Muhammad Nawab*, from the Punjab (*vide* India, Home Department—Education, letter No. 15, dated 10th June 1909).

From Dr. Gordon Parker's report on Mr. Nawab, it appears that this student is making thoroughly satisfactory progress. A letter from Mr. Nawab and his diary, including a report of his work on the Continent, where he was given permission to spend the Summer Vacation of 1910, are also attached. Mr. Nawab was able to obtain facilities to visit the following works:—

Moenus and Company (being introduced by Professor Dr. Becker, Frankfort, to whom Dr. Parker gave him an introduction;): this firm gave Mr. Nawab facilities for seeing Julius Thomson and Company, Mulheim, (near Frankfort); Man and Martius Factory, Frankfort; Epstein Factory, Frankfort; and Doerr and Remhart, Worms a/Rh.

Mr. Nawab has been given permission to visit America during the present Summer Vacation. He urged that there is a large exportation of skins to that country from India and thought that the American method of treating these skins could be introduced into India. As Mr. Nawab is a practical tanner and had worked in his father's business for four years before coming to this country, it was

thought that the Scholarship was granted to him in order that he might gain experience, which would enable him to extend the industry of tanning in India.

Mr. Nawab's Scholarship has been extended up to Christmas, 1911.

(2) *Richard T. Rout*, from Bengal (*vide* Despatch No. 19, Home Department—Education, dated 25th June 1908).

As from Dr. Parker's report and from Mr. Rout's diaries sent herewith, it appeared that he was not profiting by the scholarship, it was felt to be useless to keep him in this country, after the completion of the term at the Leathersellers' Company's College, and Mr. Rout left for India in July.

He has been through the complete course of training at the Leathersellers' Company's College and has passed the following examinations:—

2nd Honours Certificate, Leather Dyeing	} of the City and Guilds of London Institute.
1st Ordinary Certificate, Leather Dyeing	
2nd Ordinary Certificate, Dressing of Skins	

as well as:—

1st Class Pass in the tanning of heavy leathers in the College Examination.

REPORT ON GOVERNMENT SCHOLARS AT GLASGOW.

Leslie Hyde Lacy Langley, from the United Provinces (*vide* India, Home Department—Education, letter No. 17, dated 10th June 1909).

Mr. Langley's conduct and progress are satisfactory.

S. C. Majumdar, from Bengal (*vide* India, Home—Education, Secretary's letter No. 45, dated 24th September 1908).

Mr. Majumdar received an appointment in 1910 as Assistant Engineer in the Indian Public Works Department.

REPORT ON THE GOVERNMENT OF INDIA TECHNICAL SCHOLAR AT LEEDS UNIVERSITY.

Saiyid Faizuddin, from the Central Provinces (*vide* Government of India, Home Department—Education, letter No. 13, dated the 27th May 1909).

The reports on Mr. Faizuddin have been satisfactory; and, as he was allowed in the first place to take up the Diploma course in the Department of Leather Industries in Leeds University, which extends for three years, he has been granted an extension of his scholarship for a third year.

Mr. Faizuddin's diaries are sent herewith.

REPORT ON MR. M. A. R. PANIKER (FORMERLY AT LEEDS UNIVERSITY).

Manakath Allampatah Ramunni Paniker, from Madras (*vide* Despatch No. 23, Home Department—Education, dated 31st October 1907).

Mr. Paniker's is a special case. On the completion of his scholarship he was granted an extension for three years more on condition that the amount was reduced to £75 a year and that Mr. Paniker secured and retained a post in a Factory or similar Institution (*vide* Government of India letter No. 28, Home Department—Education, dated the 18th August 1910). Mr. Paniker has been employed since that time with the Nance Tannage (British), Limited. As the term of his service with this Company depends on the results of the work in which he is engaged, Mr. Paniker is presumably giving satisfaction.

REPORT ON THE GOVERNMENT OF INDIA TECHNICAL SCHOLAR AT LIVERPOOL UNIVERSITY.

Hashmat Rai from Punjab (*vide* Government of India, Home Department—Education, letter No. 30, dated ^{29th September}_{6th October} 1910).

Mr. Hashmat Rai reached England in October, 1910, and after consultation with the Board of Education it was decided to place him under Professor Donnan, of the Muspratt Laboratory in the Liverpool University. The course of study proposed by Professor Donnan for Mr. Hashmat Rai was as follows:—

1st Year.

1. Theoretical Inorganic Chemistry (Lectures).
2. Elementary Physical Chemistry (Lectures).
3. Advanced Inorganic Analytical Work (Practical).
4. Practical Exercises in Physico-Chemical Measurements.
5. Elementary Engineering Design and Drawing Lectures and practical work.
6. German (private lessons).

2nd Year.

1. Applied Electro chemistry (Lectures).
2. Advanced Physical Chemistry (Lectures).
3. Special study of the principles of alkali manufacture, under the guidance of Professor Donnan, including visits to works, if possible.
4. Research work in the laboratory on some problem relating to the alkali industry.
5. Compilation of a critical thesis (with full references and bibliography) on some particular alkali industry, *e.g.*, the electrolytic manufacture of alkali, chlorine, bleaching-powder, and chlorates.

And Professor Donnan made the following remarks:—

“In my opinion, the lecture and laboratory courses indicated in the 1st year are necessary as a preparation for the later special work to be carried out by Mr. Rai”.

“I am also of opinion that the work indicated under ‘2nd year’ should be extended to a third year if possible, as it will probably be difficult to finish the research work in the time available in the second year. I regard this extension of time as a *very important* matter. If Mr. Rai is to return to India with a real knowledge of the problem of the alkali industry and the modern methods required for their solution, he must have *ample* time to devote to his special research work and study. Any curtailment in this respect will, in my opinion, defeat the object which the Indian Government had in view in sending Mr. Rai to England”.

Sanction was given to this course of study subject to the condition that no guarantee should be given at such an early stage of the scholarship that an extension would be granted for a third year, and Mr. Hashmat Rai is following this course. It may be noted that extensions for a third year are ordinarily granted to Technical Scholars who are well reported upon, and reports on Mr. Hashmat Rai have so far been quite satisfactory. In order to enable Mr. Hashmat Rai to learn German, permission has been given to him, on the strong recommendation of Professor Donnan to visit Heidelberg for two months during the present Summer Vacation. All efforts to obtain for Mr. Hashmat Rai admission to Alkali works have failed.

Copies of two concise diaries by Mr. Hashmat Rai are sent with this report.

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REPORT ON GOVERNMENT TECHNICAL SCHOLAR AT MANCHESTER UNIVERSITY.

Ganesh Govind Narke, from Central Provinces (*vide* India, Home Department—Education, letter No. 24, dated 12th August 1909).

Mr. Narke has been granted an extension of his scholarship for a third year, with a view to undertaking advanced post graduate work in Economic Geology. In recommending him for this extension Sir Thomas Holland, Professor of Geology and Mineralogy at the University of Manchester, wrote as follows on June 13th, 1911 :—

“ At the end of his first year he passed the Examination required for the B. Sc. Tech. in Mining, and obtained a 1st Class Honours. During the past session, 1910-11, he has been attending the classes required by the Regulations before the degree can be conferred, and the results of the terminal examinations show that he has been unusually successful. In Mining, he has taken a 1st Class, and was at the head of the list in each term. In Palæontology, he obtained a 2nd Class at the end of the Michaelmas term, and a 1st Class at the end of the Lent term. With these results, added to his successes during the session 1909-10 in Petrology, Metallurgy, Engineering and Mining, he is extremely well qualified to take advantage of an advanced course in Economic Geology, and I would accordingly recommend strongly an extension of his scholarship for the third year. His conduct throughout has been excellent”.

Mr. Narke's diaries are sent herewith.

MANCHESTER MUNICIPAL SCHOOL OF TECHNOLOGY.

Copy of the Mid-Sessional Report (February 1911) and of the Report for 1910-1911 (July 1911) is sent herewith, together with reports on the following Scholars from the Principal of the School :—

M. N. Basak.
P. C. Chaudhuri.
R. V. Gurjar.
Ashutosh Guha.
V. G. Nair.
H. J. Newson.
H. Mookerjee.
Sheo Pershad.
B. B. Pradhan.
G. R. Rele.
J. P. Srivastava.
K. P. Thukral.
A. P. S. Yadav.
S. M. Yusuf.

Diaries are also sent of the following Scholars :—

M. N. Basak ..	..	1st and 2nd Terms, Session 1910-11.
P. C. Chaudhuri ..	..	1st and 2nd Terms, Session 1910-11.
A. Guha ..	..	1st Term, Session 1910-11.
R. V. Gurjar ..	..	1st and 2nd Terms, Session 1910-11.
H. Mookerjee ..	..	1st and 2nd Terms, Session 1910-11.
V. G. Nair ..	..	1st and 2nd Terms, Session 1910-11.
H. J. Newson ..	..	1st Term, Session 1910-11.
S. Pershad ..	..	1st and 2nd Terms, Session 1910-11.
B. B. Pradhan ..	..	1st and 2nd Terms, Session 1910-11.

G. R. Rele ..	..	1st Term, Session 1910-11.
J. P. Srivastava ..	..	1st and 2nd Terms, Session 1910-11.
K. P. Thukral ..	..	1st Term, Session 1910-11.
A. S. Yadav. ..	..	
S. M. Yusuf ..	..	1st and 2nd Terms, Session 1910-11.

In addition to these remarks by Mr. Reynolds and what will be gathered from the diaries of the Scholars themselves, I have to make the following remarks :—

M. Amin, from the Punjab (*vide* India, Home—Education, letter No. 18, dated 25th June 1908).

Mr. Amin was reported by Mr. Reynolds, the Principal of the Municipal School of Technology, to be an earnest student, but he was obliged to undergo an operation for appendicitis in June 1910 and his health was so impaired as to make it doubtful whether he would be so far fit to resume his studies as to justify the extension of his Scholarship for a third year; and an extension for which he applied was, therefore, refused and Mr. Amin returned to India in November 1910.

Manmatha Nath Basak, from Bengal (*vide* India, Home—Education, letter No. 19, dated 24th June 1909).

Mr. Basak gives complete satisfaction in his work and has received an extension of his Scholarship for a third year. He was allowed to spend the summer vacation of 1910 on the Continent in visiting various places connected with Textile Industries. From his report, which is sent herewith, it will be seen that Mr. Basak visited the Dye House of Meister Lucius Brunig at Hoechst, as well as other works in Germany.

K. J. Bhatt, from Bombay (*vide* India, Home—Education, letter No. 23, dated 31st October 1907).

The reports on his work were uniformly satisfactory. He returned to India in September last on the termination of his scholarship.

Raghunath Vithal Gurjar, from Bombay (*vide* India, Home Department—Education, letter No. 16, dated 10th June 1909).

Mr. Gurjar has given complete satisfaction in his work and has received an extension of his Scholarship for a third year. He was allowed to spend the summer vacation of 1910 on the Continent in visiting various places connected with the Textile Industries. From his report, which is sent herewith, it will be seen that he visited several Dye Works in Germany.

Govind Laxman Joshi, from the Central Provinces (*vide* Government of India, Home Department, despatch No. 4, dated 14th March 1907).

Mr. Joshi spent the greater part of his third year at practical work. He had included the subject of calico printing in his studies; and as there is a distinct branch of “Stencil printing,” which is well-developed and worked on a commercial scale in Japan, Mr. Joshi was allowed, on the termination of his scholarship in July last, to proceed to India *via* Japan. It was arranged that Mr. Joshi should send a report of his work in Japan to this office, but up to the present this has not been received.

C. S. B. Naidu, from the Central Provinces (*vide* India Home—Education, letter No. 18, dated 4th June 1908).

Mr. Naidu was allowed to visit the Continent during the summer vacation of 1910 for practical work and worked in Switzerland from October to December 1910. From his report (which is sent herewith) it will be seen that he visited Works as follows :—

Messrs. Bass and Saurer, Arben.
Muller's Embroidery Factory.
Works of Charles Bleedorn.
Arnold B. Heiner's Factory.
Works at Rorschach.

Mr. Reynolds reported that he used his time on the Continent to excellent purpose, and on the termination of his Scholarship at Manchester, Mr. Naidu was granted an extension for three months which he was also allowed to spend on the Continent in order to complete the work of the previous summer vacation. No report has been received from him of the work done during this last visit.

V. G. Nair, from Madras (*vide* India, Home Department—Education, letter No. 12, dated 4th June 1908).

Mr. Nair's Scholarship is about to expire and he will shortly return to India. Mr. Reynolds's reports on this student have been excellent, and he recommended him for an extension for a fourth year for post-graduate work in Dye Houses. Mr. Reynolds wrote :—

“Mr. Nair has already done highly satisfactory work in the study of Textile Chemistry, and has been awarded a degree, upon a special thesis prepared, of Master of Technical Science.”

It was felt, however, that these scholarships are given not for the encouragement of post-graduate work so much as to encourage the development of industries, and the Secretary of State negatived the application.

Sheo Pershad, from the Punjab (*vide* India, Home—Education, letter No. 18, dated 25th June 1908).

Mr. Pershad was allowed to spend the Christmas vacation of 1910-11 in visiting Works at Argenteuil, and his report is attached. Mr. Pershad's Scholarship has now expired and he left for India in July, having received permission to go to Argenteuil again in order to complete work begun there at Christmas.

Henry James Newson, from the United Provinces (*vide* India, Home—Education, letter No. 18, dated 26th May 1910).

Mr. Newson has taken his B. Sc. (with Honours) and M. Sc. in Engineering at Manchester University and has received a certificate of proficiency in Electrical, Civil and Mechanical Engineering at that University. He has recently been allowed to accompany a party from the Institution of Electrical Engineers to Sweden, and his report is attached. In order to enable Mr. Newson to get the practical work in Mechanical Engineering and so get the training, which it is understood will be most useful in the United Provinces, sanction has just been given for him to spend a year at the Works of Messrs. Thornycroft at Southampton, for which a premium of 100 guineas is being paid. A report on other work done by Mr. Newson during the vacation is also sent herewith.

Balkrishna Bhasker Pradhan, from Bombay (*vide* India, Home Department—Education, letter No. 16, dated 10th June 1909).

The reports on Mr. Pradhan's work have been quite satisfactory. During the summer vacation of 1910 he was allowed to work on the Continent, and he has been allowed during the present summer vacation (1911) to accompany a party from the Institution of Electrical Engineers on a visit to Sweden and afterwards to spend ten days at the Nurnberg Works and ten days at the Augsburg Works of the Maschinenfabrik. Mr. Pradhan's report on his visit to Sweden is attached. In consideration of the satisfactory reports on this scholar, his scholarship has been extended for a third year in order to carry out research work in Electrical Engineering.

G. R. Rele, from Bombay (*vide* India, Home—Education, letter No. 17, dated 25th June 1908).

Mr. Rele was allowed to spend a portion of the summer vacation of 1910 on the Continent in order to obtain practical work in connection with his studies, and from his report (which is sent herewith) it will be seen that he visited several works in Germany, Switzerland and Italy.

Opportunity was also obtained for Mr. Rele (on payment of a premium which was sanctioned by the Secretary of State) to enter some printing works, where he obtained experience which was thought likely to be of value to him in the appointment which he has now returned to India to fill, namely, Weaving Manager of Messrs. Morarjee Gokuldas Spinning and Weaving Company in Bombay.

Jwala P. Srivastava, from the United Provinces (*vide* India, Home—Education, letter No. 16, dated 25th June 1908).

As in the case of Mr. Nair, the scholarship of Mr. Srivastava is about to expire, and he will shortly return to India. Mr. Reynolds's reports on this student have been excellent and he recommended him for an extension for a fourth year, which, however, was also refused by the Secretary of State. In making this recommendation Mr. Reynolds wrote :—

“Mr. J. P. Srivastava, M. Sc. Technology, throughout his course here has done most careful and satisfactory work.”

Kashi Prasad Thukral, from the Punjab (*vide* India, Home—Education, letter No. 22, dated 29th July 1909).

Mr. Thukral's scholarship expires on the 6th September, and the Secretary of State has declined to sanction the extension for which he has applied. Mr. Thukral is an able student, but Mr. Reynolds reported on the 14th July that his work during the past Session had not been entirely satisfactory, that he had been frequently absent (the reason assigned being illness) and that this absence interfered with the quality and extent of his work. After careful consideration it was held that an extension in this case would not be justified.

S. M. Yusuf, from the United Provinces (*vide* India, Home—Education, letter No. 16, dated 25th June 1908).

Mr. Yusuf's scholarship has now expired and he has returned to India.

REPORT ON THE GOVERNMENT OF INDIA TECHNICAL SCHOLARS STUDYING AT CLIFTON JUNCTION, NEAR MANCHESTER.

Maung Ba Tin, from Burma (*vide* Government of India, Home Department—Education, letter No. 15, dated the 12th May 1910).

Mr. Ba Tin reached this country in September 1910. Before his arrival I had been in correspondence first with the Board of Education and afterwards with Dr. Mellor of the Staffordshire Education Committee to whom the Board of Education referred me as being the most likely person to be able to provide him with the facilities required. I was informed, however, that the Pottery Laboratory of Stoke-on-Trent was being utilised to its fullest extent, and that local applicants were waiting for any vacancies that might occur. I was afterwards placed in communication with Mr. Wedgwood, of Messrs. Wedgwood and Sons (Chairman of the Joint Advisory Committee of the District), with whom both I and Sir Herbert Thirkell White (who interested himself considerably in the case) had several interviews; but there was local opposition to the admission of a foreign student, with the result that I was advised to make arrangements for his admission to a German Pottery School. Other efforts were also made, but without any success. Happily, however, I was at last placed in communication with Mr. William Burton, of Pilkington's Tile and Pottery Company, who consented to the admission of Mr. Ba Tin, on payment of a premium, into that Pottery, and arranged for him to take lessons simultaneously from the Salford Technical School; and Mr. Ba Tin accordingly commenced work under Mr. Burton's directions in February 1911.

Pending the completion of these arrangements for Mr. Ba Tin, he had been permitted to take lessons in the Putney School of Arts; but his time would certainly have been spent to much better advantage if arrangements could have been made for him to commence straight away under Mr. Burton immediately on arrival; and I would suggest that, in the case of a Scholar who is to study a subject about which there may be difficulties in making arrangements, the Scholar should not be allowed to leave India until it is known that the arrangements are complete.

Mr. Burton reports that Mr. Ba Tin is applying himself there diligently to his work and is an eager student.

REPORT ON THE GOVERNMENT OF INDIA TECHNICAL SCHOLARS. (BARBADOS).

G. N. Sahasrabuddhe, from Bombay (*vide* Government of India, Home Department—Education, letter No. 21, dated 9th June 1910).

Mr. Sahasrabuddhe reached England in August 1910, and, pending the completion of arrangements for his course of study, was allowed to visit (1) the Wye Experimental Station, (2) Cambridge, (3) Ipswich, (4) Rothamsted, and (5) Edinburgh and Glasgow for the purpose of studying scientific agricultural methods in this country. His report on this work is enclosed herewith.

Some little time was occupied in making arrangements for Mr. Sahasrabuddhe's course of study, and after considerable correspondence it was decided that the best course to pursue was to place Mr. Sahasrabuddhe under the direction of the Imperial Commissioner of Agriculture (Dr. Watts) in the West Indies, rather than to arrange for his admission into the Audobon Sugar School or the Toulane University Sugar School at New Orleans as suggested in the Government of India despatch.

Dr. Watts undertook complete charge of Mr. Sahasrabuddhe and he accordingly left for Barbados in November 1910. Dr. Watts submitted a programme of studies for Mr. Sahasrabuddhe, including visits to Trinidad, British Guiana, Jamaica, Cuba, Porto Rico, St. Kitts and Antigua. In order to complete this programme, Mr. Sahasrabuddhe proposed to remain in the West Indies until July 1912 and then to proceed by way of Hawaii and Java to India, where he expected to arrive in September next when his scholarship expires. As it appeared, however, that the suggested visits to Hawaii and Java would be relatively unprofitable in consideration of the difficulty of gaining access to factories, sanction was not given to the latter part of this programme and Mr. Sahasrabuddhe has been instructed to submit revised proposals for the closing period of his scholarship.

Mr. Sahasrabuddhe's diaries from August to December 1910, and from January to June 1911 accompany this report, and memoranda which he has drawn up on (1) Muscovado Sugar Machinery and different scope for *Gur* manufacture in India, and (2) on the Antigua Central Sugar Factory, and (3) on the sugar-cane cultivation in the Leeward Islands were sent to the Secretary to the Government of Bombay, Education Department, in India Office letter, dated 8th September 1911. It appears from the letters covering Mr. Sahasrabuddhe's reports that he has proved himself to be an excellent student and that he has profited to the full by the facilities that have been given him.

REPORT ON THE GOVERNMENT OF INDIA TECHNICAL SCHOLARS AT BIRMINGHAM UNIVERSITY.

Girish Chandra Bardaloye, from Eastern Bengal and Assam (*vide* India, Home Department—Education, letter No. 11, dated 20th May 1909).

D. C. Nag, from Eastern Bengal and Assam (*vide* India, Home—Education, letter No. 21, dated 2nd July 1908).

T. Kumaran Nair, from Madras (*vide* India, Home Department—Education, letter No. 25, dated 28th July 1910).

M. N. Sen-Gupta, from Bengal (*vide* India, Home—Education, letter No. 19, dated 25th June 1908).

Reports from the Vice-Principal of Birmingham University on each of these students are attached, from which it will be seen that their attendance, conduct and progress have been quite satisfactory, except in the case of Mr. Sen-Gupta, whose attendance and conduct are satisfactory, but whose progress has been rather slow. Mr. Nair's diary is sent herewith.

Mr. Nag's scholarship has expired; but he has been given permission to visit certain Mines near Dresden on his way back to India. Mr. Nag has been instructed to furnish to the Chief Secretary to the Government of Eastern Bengal, on his arrival in India, a statement of the results of this continental tour.

The scholarships of the following students who were mentioned in my report of November 1910 have expired:—

Paul T. Bruhl.

P. V. Dandekar.

M. N. P. Kurup.

Himansu Mohan Mitra.

Maulvi Obaidullah.

Manmatha Kumar Ray.

REPORTS ON THE INDIAN GOVERNMENT SCHOLARS.

University or College.—Birmingham University.

Name of Scholar.—G. C. Bardaloye.

Subject of Study.—Mining.

Academic Session.—1910-11.

Course of lectures attended.—Complete second-year Mining Courses.

Examinations passed (if any) during the Session.—Passed second Mining Examination, except in Metallurgy, June 1911.

Attendance, progress and conduct.—Attendance, progress and conduct quite satisfactory.

General remarks.—Mr. Bardaloye hopes to complete his 2nd Examination this month by passing in Metallurgy, for which subject he has recently sat.

University or College.—Birmingham University.

Name of Scholar.—D. C. Nag.

Subject of Study.—Mining.

Academic Session.—1910-11.

Course of lectures attended.—Complete third-year Mining Course.

Examinations passed (if any) during the Session.—Final Examination for Degree of B. Sc. in Mining; passed June 1911. Division II.

Attendance, progress and conduct.—Attendance, progress and conduct have been quite satisfactory.

University or College.—Birmingham University.

Name of Scholar.—T. K. Nair.

Subject of Study.—Metallurgy.

Academic Session.—1910-11.

Course of lectures attended.—Metallurgy: first-year course, and complete second-year courses.

Examinations passed (if any) during the Session.—Completed 1st Examination, June 1911; passed 2nd Examination, except Engineering and Applied Mathematics.

Attendance, progress and conduct.—Attendance, progress and conduct quite satisfactory.

General remarks.—Mr. Nair has just been taking again the two remaining subjects of his 2nd examination and hopes thereby to successfully complete same.

University or College.—Birmingham University.

Name of Scholar.—M. N. Sen-Gupta.

Subject of Study.—Mining.

Academic Session.—1910-11.

Course of lectures attended.—Complete third year Mining Course.

Examinations passed (if any) during the Session.—Completed 2nd Mining Examination except Applied Mathematics in June 1911. Unsuccessful at Final Mining Examination.

Attendance, progress and conduct.—Attendance and conduct satisfactory. Progress somewhat slow.

General remarks.—Mr. Sen-Gupta should have completed his Degree in June last, but appears to have found the work difficult,—especially the mathematics of his second year.

R. S. HEATH,

Vice-Principal.

The 25th September 1911.

REPORT ON THE GOVERNMENT OF INDIA SCHOLAR AT OXFORD.

Walter Gabriel Howell Elliot, from Madras (*vide India*, Home Department—Education, letter No. 22, dated 30th June 1910).

Mr. Elliot is studying for the Indian Civil Service at Jesus College, Oxford, and his conduct and industry are satisfactory.

GOVERNMENT OF INDIA SCHOLAR (TECHNICAL) IN EDINBURGH.

Name.	Subject of study.	Reference.	REMARKS.
Fanindra Nath Bose (Special Scholarship).	Sculpture ..	Letter from the Director of Public Instruction, Eastern Bengal and Assam, No. 108-T., dated 29th November 1910.	In accordance with the request from the Government of Eastern Bengal and Assam an allowance of £12-10-0 is being paid to Mr. F. N. Bose quarterly. His progress and conduct are reported to be excellent. Mr. F. N. Bose has also received a travelling Scholarship (£100 tenable for a period of nine months) from the Scotch Education Department.

REPORT ON STUDENTS GRANTED SCHOLARSHIPS FOR THE STUDY OF ARABIC AND SANSKRIT.

Azimuddin Ahmad, from Bengal (*vide India*, Home—Education, letter No. 18, dated the 17th June 1909).

Mr. Azimuddin Ahmad has continued his study of Arabic under Professor Fischer, who wrote on the 25th July: "Mr. Ahmad has been working during the last term with his usual perseverance and industry, and his behaviour in every way is praiseworthy." For the purpose of his Thesis Mr. Ahmad is collating certain manuscripts in the Escorial Library, Madrid, and has been given permission to visit Madrid for this purpose. He has also been collating manuscripts in the British Museum, London. On the strong recommendation of Professor Fischer, Mr. Ahmad's scholarship has been extended for a third year. Mr. Ahmad has also been studying German and Latin.

A. H. Mensur Ahmed, from Bombay (*vide India*, Home Department—Education, letter No. 27, dated 11th August 1910).

Mr. Mensur Ahmed is studying Arabic under Dr. Sachau, of Berlin. Reports on his progress have been quite satisfactory, and, like Mr. Azimuddin Ahmad, he has been given permission to visit the British Museum, London, and the Escorial Library, Madrid, for the purpose of collating certain manuscripts. Mr. Mensur Ahmed has also been studying German, Latin and French.

P. D. Gune, from Bombay (*vide India*, Home Department—Education, letter No. 27, dated 11th August 1910).

Mr. Gune is studying Sanskrit under Professor Brugmann, of Leipzig, and Professor Windisch, also of Leipzig, and appears to be making satisfactory progress.

Tukaram Krishna Laddu, from the United Provinces (*vide India*, Home Department—Education, letter No. 18, dated 17th June 1909).

Mr. Laddu has continued to make satisfactory progress with his studies, and in the Oriental Languages Tripos at Cambridge he attained, in May 1911, the standard required for advanced students. In accordance with the letter from the Government of India (Home Department—Education, No. 4, dated 23rd March 1911) Mr. Laddu has been granted an extension of his scholarship for a third year, which he is to spend in Germany, working under the direction of Professor Hultsch of Halle.

Pandit Prabhu Dutt Shastri, M.A., from the Punjab (*vide India*, Home Department—Education, letter No. 26, dated 16th September 1909).

Mr. Shastri proved himself a very able student and has taken the Ph. D. degree at Kiel University, and the Research degree of B. Sc. under the Board of Literæ Humaniores, Oxford. As he had completed his course in June, he was allowed to return to India in July; and he is, I understand, applying for a post in the Educational Service.

GOVERNMENT OF INDIA SCHOLARS, 1911.

Name.	Subject of Study.	Reference.	REMARKS.
1. Girja Shankar Bajpai, from the United Provinces.	Higher Mathematics and Science, and I.C.S.	India, Secretary's letter No. 32-Education, dated 24th August 1911.	Arrangements have been made for Mr. Bajpai to join Merton College, Oxford. It was not possible to secure admission for him to Balliol College.
2. Richard Sidney Blaker, from the Punjab.	First Class Honours degree (B. C. L.) in Jurisprudence.	India, Education, letter No. 9, dated 15th June 1911.	Mr. Blaker stated that he wished to take up the study of Law instead of Medicine, the subject mentioned in the Government of India letter; and as holders of the Scholarships tenable by domiciled Europeans and Eurasians are ordinarily allowed to select their subjects this proposal was approved and admission has been secured for Mr. Blaker into Queen's College, Oxford, subject to his passing Responsions.
3. Harold Douglas Bennett, from Bengal.	Mechanical and Electrical Engineering.	India, Education, letter No. 11, dated 15th June 1911.	The course of study of Mr. Bennett is still under consideration; it is probable that he will be placed at Faraday House, where facilities can be provided for practical as well as theoretical work.
4. Abinash Chandra Datta, from Eastern Bengal and Assam.	Silk weaving, dyeing and finishing.	India, Education, letter No. 11, dated 15th June 1911.	Mr. Datta has been sent to the Municipal School of Technology, Manchester.
5. Todar Mall, from the Punjab.	Sanskrit ..	India, Education, letter No. 15, dated 10th August 1911.	Arrangements are being made for him to work under Professor Macdonell at Oxford as a Non-Collegiate student; and it is proposed that he shall afterwards take his Ph. D. degree in a German University.

Name.	Subject of Study.	Reference.	REMARKS.
6. P. V. Mehd, from Bombay.	Manufacture of tanning extracts and their use in tanning.	India, Education, letter No. 12, dated 29th June 1911.	After consultation with Professor Procter, in accordance with the suggestion in the enclosure to the Government of India letter, arrangements have been made for Mr. Mehd to take a course of instruction at the Leathersellers' Company's Technical College, Bermondsey.
7. G. A. Muhammadi, from the Central Provinces.	Manufacture of oils, fats and their products.	India, Education, letter No. 11, dated 15th June 1911.	The question of sending Mr. Muhammadi for a course of training under Dr. Lewkowitsch is under consideration; and in this connection attention is invited to the remarks on Mr. A. K. Menon in the accompanying report.
8. K. M. Muttanah, from Coorg.	Mechanical Engineering.	India, Education, letter No. 11, dated 15th June 1911.	The course of study of Mr. Muttanah is still under consideration: it is probable that he will be sent to Faraday House.
9. H. Sakharama Rao ..	Textile Manufacture.	India, Education, letter No. 11, dated 15th June 1911.	Arrangements have been made for Mr. Rao to continue his course of training at the Municipal School of Technology, Manchester.
10. Phani Bhusan Ray ..	Mechanical and Electrical Engineering.	India, Education, letter, No. 11, dated 15th June 1911.	The course of study to be arranged for Mr. Ray is still under consideration.
11. I. J. Sorabji ..	Sanskrit ..	India, Education, letter No. 15, dated 10th August 1911.	Arrangements are being made for Mr. Sorabji to work under Professor Rapson, of Cambridge University, as a Non-Collegiate student.
12. R. C. Srivastava ..	Manufacture of sugar.	India, Education, letter No. 11, dated 15th June 1911.	Arrangements are being made for Mr. Srivastava to commence his course of instruction at the Municipal School of Technology, Manchester. In regard to the third year's course of study, in the event of an extension being granted to him to study the sugar industry either in the East Indies or West Indies, reference is invited to the remarks in the accompanying report about Mr. Sahasrabudhe; and I should be glad to receive from India an opinion as to whether there are facilities for work in the East Indies, and whether Scholars are in any case to be sent there for an extension of their scholarships, or whether Scholars who may be sent to the East Indies to study the sugar industry will be sent direct from India.

REPORT BY A. KESAVA-MENON.

I beg to give below a summary of the work I have been doing in the soap factory of Messrs D. and W. Gibbs for the last three months. The work has been entirely practical, everything being conducted on a large manufacturing scale. The details of the daily work have not been recorded for each day, since I have been watching different manufacturing operations and working out many processes myself, which could not conveniently be put down as any particular day's work. One or more of these following operations in the process of making soap has been tried and worked by me at different soap pans containing different soap boils.

The process of making soap involves many operations. The oil or fat that is charged into the 'copper' or 'wrought iron' pan where the soap is made, undergoes a multiplicity of changes before it is transformed into what is termed in commerce as 'soap'. These changes are effected especially through the agency of solutions of caustic soda or potash, which plays an important part in soap making. The first operation in soap boiling involves the '*spending*' or '*saponification*' of the oil or fat by means of solutions of caustic soda or caustic potash, according as the soap is required to be hard or soft. When all the oil, or fat, or mixture of both is 'killed' by the lyes, the soap is 'salted out' with brine, to separate the glycerol and impurities which settle at the bottom of the pan. To obtain the latter result the pan is allowed to rest overnight, or for a few hours and the lyes containing the glycerol and salt are drawn off before the next operation which is called the '*washing operation*'. The contents of the copper are washed repeatedly three or four times with water to remove the last traces of glycerol—a valuable bye-product—whereby the copper is closed and has to be opened with salt. The salt lyes are next drawn off after a few hours and the copper is put through the 3rd operation called '*strength*'. Caustic lyes are added to give strength and stability to the soap and to ensure the complete saponification of the oil or fat. The fourth and the last operation is finishing or '*fitting*' the soap. The soap is fitted in such a way that a certain proportion of water, termed the water of constitution, is left in the soap, the impurities in the oil and lyes employed are deposited at the bottom and a mass of clean soap is thereby obtained. All these operations are conducted through the aid of steam which is carried into the coppers by means of iron coils.

The soap in the coppers is drawn into frames after two or three days or a week or fortnight as the case may be. Fillers are crutched into soaps that are not intended to be genuine as in the case of some household soaps. The soap rests in the frames for a couple of days or more and is then cut into slabs which are again divided into bars of desired weight and size.

The operations in the copper require to be carefully conducted, since any carelessness in their being properly carried out, spoils the quality and yield of soap.

I have watched and studied the manufacture of different kinds of household soaps, including laundry and mottle soaps, and, of course, much practice is necessary before I could be said to be perfect.

REPORT ON THE ART OF HAND (MACHINE) STITCH EMBROIDERY AND CHAIN STITCH EMBROIDERY BY S. PERSHAD.

In my last report in connection with the summer vacation tour to France and Switzerland, I mentioned everything in detail connected with and necessary for the Hand (machine) Stitch Embroidery Trade carried on, on the Continent. There is also produced some finer work (mainly lace-work) than I came across before by shuttle machines, which can be worked much quicker than the hand machines, but it is the latter that stand the best chances in India because of the special and good work required for those markets and that special work cannot be produced by shuttle (Fil-continu) machines.

This time I continued the practice of the above with Mr. Hugentobler and worked there in the mornings. In the afternoon I used to go to the works of Messrs. E. Cornely and Fils, 87 Foubourg St. Dennis, Paris, in order to learn the working and regulating of the chain-stitch machine, cording and braiding machines. The chain-stitch embroidery is largely exported to India from Switzerland in whites and from Germany on velvets and velveteens for caps and ladies' shoes.

The machine is similar in shape and size to a sewing machine. The operator, sitting on a chair, works the pedals by his feet which go to work the fly-wheel and thereby the main shaft, working with the right hand the handle which sets the stitching motion in action and also moves the cloth in the required direction—left hand being used just to guide the cloth. Thus results the production of a geometric, zig-zag or floral pattern—in the last case the thread has to be cut and stitch made fast at the completion of every flower. The design is generally stamped on the cloth, and the operator merely traces it by the machine, though for a well-practised hand the stamping is not necessary.

The main points of importance to learn in connection with the working of the machine are:—

- (1) accurate setting of the needle which is like a fine hook;
- (2) adjusting the cloth-plate and the looper;
- (3) threading the machine;
- (4) adjusting the length of the stitch;
- (5) regulating the tension of the thread;
- (6) oiling and cleaning.

All these can soon be picked up with a fair amount of practice but the most important item is the speed of working the machine consistent with accuracy. This entirely depends on practice and for that, these machines could be fitted with small motors (mainly D. C. ones) running the fly-wheel at the rate of 1,200 to 1,300 revolutions per minute.

In France it is a kind of Factory Industry where the workmen are paid standing wages, but in Switzerland it is a Home Industry and the work is paid by the length of yarn used and so much per 100 or 1,000 breaks (in case of broken or floral work). This industry has a wide field in India and the machines a great outlet provided an Instalment System be introduced for reimbursement.

The specimens of my work are enclosed herewith—

Sample No. 1. Pantograph machine work at Argenteuil. The length worked=8.40 metres.

Sample No. 2. Chain-stitch machine work at Paris. This shows the work of last 2 days together with dismantling and resetting the machine.

All the time previous to that was devoted to practice in handling and working the machines.

REPORT BY H. J. NEWSON ON TOUR THROUGH SWEDEN.

TROLHÄTTAN WATER POWER STATION.

The power is derived from the River Göta Elf, which comes from Lake Wenner. The drop from the surface of the lake to Trolhättan is 32 metres and this consists of 4 small falls. The maximum discharge of the river is 900 cubic metres per second and minimum 320 cubic metres per second. The river discharge is carried to the power station by means of a canal 1,300 metres long—part (latter) carries 350 cubic metres per second and the rest 250. This canal carries normally 250 cubic metres per second. The discharge of the canal is to be increased to 350 cubic metres per second by means of another canal carrying 100 cubic metres per second to the beginning of the larger section.

The canal is for the most part 14.2 metres wide and 7.7 metres deep.

At the head race the canal is 72 metres wide with 9 sections of 8 metres each. Five of these only are at present in use—four for the main pipes (4.25 metres diameter, each) and connected to the main turbines and the fifth is for 3 small pipes 1.2 metres diameter for the D. C. generator turbines.

An ice sluice is arranged on both sides of the dividing basin. The iron grating which serves to collect small pebbles, fish, ice, etc., is heated by sending a strong current (approximately 7,500 amps.) at 50 volts to melt the ice which adheres to it. Velocity of water through grating is about 1 metre per second.

The 4 large horizontal turbines—directly coupled to the generator—develop normally 10,000 H. P. each (maximum 12,500 with a net head of 30.5 metres at 187.5 revolutions per minute).

The regulation of speed is maintained by a type of oil pressure generator consisting essentially of an oil pump, pressure and vacuum tanks and governing mechanism.

The generators generate 3-phase current at 10,000 volts and a frequency of 25, the maximum K. V. A. being 11,000. To avoid high temperature in the station and to minimise the hum the stator is completely enclosed in a casing.

The rotor is fitted with ventilating fans and cold air is introduced at the top while the hot air is led out from the bottom through closed passages.

For the excitation of generators and also for lighting and power a D. C. voltage of 220 is used. At present the plant consists of 2,500 H. P. directly coupled to D. C. generators. In parallel with these is a battery of 4,800 amps. hours as reserve and for regulation.

The regulation of main generators consists of a booster on the generator shaft to boost from—220 to + 110 volts, giving a range of regulation from 0 to 330 volts without interfering with the D. C. plant.

The power from the generating station is led by 3-phase cables to the transforming house through a tunnel. The transformers raise the voltage from 10,000 to 50,000 volts.

The transforming plant consists of 4 groups of three, 3,670 K. V. A. single-phase transformers. These are oil-insulated and water-cooled.

The transformer rooms are completely closed and provision of outlet made for the rush of oil in case of fire. The water-cooling is controlled by signal contacts in the "Switch Gallery" where an alarm is given when the temperature of the water exceeds limit. The water-cooling plant consists of 2 pumps with a capacity of 1,500 litres per second and a lift of 15 metres and 2 other pumps of 500 litres per second, capacity and lift 25 metres, all driven by a motor. The former also supply water for 'over tension discharge'. Besides 2 tanks of 50 cubic metres and one of 10 cubic metres capacity are kept as reserve, the former for cooling and the latter for 'over tension discharge'. A small pump is kept for changing or pumping out the oil from the transformers.

Energy is transmitted to the various places directly from the generator at 10,000 volts in the case of short distances and at 50,000 volts in the case of long distances.

The different lines can be fed either separately from a generator or transformer or 2 generators or 2 transformers as the case may be, or from bus-bars.

The machines and lines are provided with relays of induction motor type for overload. For 'over tension' discharge a jet of water continuously flowing is provided and for 'static discharge' and lightning 2 horn arresters in series are used. A coarse resistance in the shape of a current of water is used for large dynamical over tension discharges and for small energy a horn arrester in series with oil resistance is used.

Cylindrical arresters are used for fine discharges of high frequency currents. The various high tension cells are made quite fire proof and are completely separated from one another.

A 10,000 volt aluminium double over-head line, 12.1 kilometres long, goes direct to Stallbacka and Vargön, the cross section of the conductor being 100 square millimetres and 160 square millimetres respectively.

A 10,000 volt earth cable, 3 kilometres long supplies energy to Stridsberg and Björcks works at Knorren and a sub-station changing the frequency from 25 to 50. A 50,000 volt, 71.2 kilometres long, 35 square millimetres double copper lines runs to Skara and another 67.6 kilometres long, 70 square millimetres double copper line runs to Gothenberg. The span of the towers is 170 metres in the first case and 200 metres in the second. An earthed iron wire is run over each line. Pin insulators are used for the Skara line and suspension insulators for the other copper line. Girder towers on concrete bases are used throughout.

LUDVIKA.

Amalgamated Electric Company.

Shown over the works and the work, so far as the mechanical construction is concerned, was as usual.

(1) *Machine for winding copper strip transformer coils.*—The strip before being wound is guided by five rollers to do away with the kinks.

(2) Another item of interest was an adjustable former, made out of a steel plate with 2 horizontal and 2 vertical slots along with necessary clamps, to make armature coils of copper wire.

(3) An interesting machine was the punching machine to cut small sized commutator strips out of a wedge shaped bar.

A large spider of slow speed 750 k. w. D. C. machine was shown us.

Condenser brushes are invariably used for transformers of 100,000 volts as above. Glass tubes filled with an insulating material are used for insulating the primary from the secondary of small transformers.

WATER POWER STATION, LUDVIKA.

Head available 20 m. and the discharge approximately 23.5 cubic m. per second. Two large wooden flumes with iron bands and having a diameter of 4 m. convey the water to the station.

The plant consists of—

(i) Two 450 k.w., 10,000 volts, 40 periods per second, 26 amps., three-phase generators coupled with two horizontal turbines running at 270 revolutions per minute. The two turbines are connected to one pipe.

The excitation generator for these 2 machines is driven by a small turbine running at 730 revolutions per minute and connected to the end of the steel pipe and between the main turbines. The latter develops 33 k.w. at 110 volts. Flexible coupling is used for the main generator.

The generator regulates the flow of compressed oil actuating the guide.

(ii) Two 630 k.w., 10,000 volts, 40 periods per second, driven by a double turbine at 267 revolutions per minute one being fitted with a fly wheel.

(iii) One 200 k.w., 2,000 volts, 100 amps, 100 periods per second, 3-phase generators driven by a turbine at 500 revolutions per minute.

(iv) A D. C. generator 50 k.w., 110 volts, driven by a separate turbine at 700 revolutions per minute is used for excitation.

The 100 period generator is for the town of Ludvika.

GRÄNGESBERG.

Iron Mine.

Two 750 H. P. slow speed (22 revolutions per minute) D. C. motors, directly coupled to the tapered drum in between, are used for hauling the ore. For starting purposes, the contacts of the resistances take the form of a large commutator over which a rocker with brushes moves. Besides the electric brake there is a large friction brake actuated by a magnetic plunger.

The passenger lift is driven by a small induction motor through gearing, with water resistance for starting purposes. The power to the mine is supplied by a sub-station transferring 10,000 volts, 3-phase current to D. C. 500 volts. There are two air compressors driven by belts from two 3-phase 350 H. P., 500 volts synchronous motors. The ore is roughly crushed by a conical shaped roller moving round in a large steel vessel.

The ore is separated by hand. An electric railway is used in the mine.

VESTARAS.

Manufacture of copper wire and tubes.

For annealing copper a temperature of from 600° to 700° C is used. The wire to be annealed is passed through water to a chest filled with steam (avoids oxidation). Machines shown were (i) machine for making strand out of copper wire for transmission line; (ii) drawing different sizes of wires of copper and brass.

Shown the processes for drawing and expanding various sizes of tubes.

VISIT TO WORKS OF MESSRS. FIELDING AND PLATTS, GLOUCESTER.

Looked over the department that deals with the manufacture of—

(a) Hydraulic machine tools for riveting and flanging chiefly in connection with ship work.

They make stationary and portable riveters for boilers, bridges, ships, railway wagons, tanks, etc., travelling plants for riveting *in situ* belt and gear driven pumps, duplex steam pumps, compound, triple expansion and condensing rotative pumping engines, by hydraulic accumulators and intensifiers, presses and machines for all purposes, punching and shearing machines.

Their patent hydraulic boiler shell-plate bender was interesting.

The hydraulic flanging presses are when desired fitted with water-saving apparatus to reduce the quantity of high pressure water required and the size of pumps and accumulators.

These are usually fitted with a main ram or rams below and with 4 vice or holding rams.

(2) They are also large makers of gas and oil engines and gas producing plant for driving gas engines, heating purposes, enamelling stoves, etc.

I was shown over the subsidiary parts of the works such as foundries, pattern shops, etc., but these call for no report.

REPORT BY B. B. PRADHAN.

TROLLHÄTTAN.

Water-power Station.

The river Göta Elf coming from the Lake Venner, which latter, is 44 metres above the sea-level and has a surface of 5,570 sq. kilometres, has a drop of 32 metres in Trollhättan consisting of 4 small falls. The maximum discharge of the river is 900 cub. metres per second and the minimum, 320 cub. metres per second. A canal 1,300 metres long, the latter part of which is designed to carry 350 cub. metres per second and the rest, 250 cub. metres per second at present carries normally 250 cub. metres per second of the river discharge to the power station. By means of another canal to carry 100 cub. metres per second to the beginning of the larger section, the discharge of the canal will be increased to 350 cubic metres per second.

Except at one part, where for want of space the bottom width is 10.5 metres and depth 10 metres, the rest of the canal is 14.2 metres at the bottom and 7.7 metres deep. At low level, after the large sluice gate 17 metres wide and 9 metres deep and weighing 60 tons, the discharge of the canal has a normal section of 114 sq. metres and a velocity of 2.2 metres per second. At the "head race" the canal is widened to 72 metres with 9 sections of 8 metres each. At present only 5 of these are in use, 4 for the main 4 pipes, 4.25 metres diameter, and connected to the main turbines and the fifth one for 3 small pipes 1.2 metres diameter for D. C. generator

turbines. On both sides of the "dividing basin" an ice sluice has been arranged. The iron grating for collecting small pebbles, fish, ice, etc., can be heated by sending a strong current (about 7,500 amps.) at 50 volts to melt the ice sticking in the same. The velocity of water through the grating is 1 metre per second normally. Each pipe has a mean length of 60 metres. Each of the 4 large horizontal turbines directly coupled to the generator develops normally 10,000 H. P. and a maximum of 12,500 H. P. with a net head of 30.5 m. at 187.5 revolutions per minute. Each turbine has two "runners" and is completely enclosed by a steel mantle.

The regulation of speed is maintained by oil under pressure actuating the "guides." The D. C. generator turbines each develop 500 H. P. at 410 revolutions per minute.

The major part of the plant has been supplied by Swedish Companies. Of the four large turbines two were made by Nydqvist and Holm of Trollhättan, and the other two by Karlstads Mek. Verkstad of Christiania. The generators and the major part of the switch gear have been supplied by the Allmänna Svenska Electric Company of Westeras.

The generators generate 3-phase current at 10,000 volts and 25 periods per second, the maximum K. V. A. being 11,000. To avoid high temperature in the station and to minimise the humming noise, the stator is completely enclosed in a casing. The rotor is fitted with ventilating fans and cold air is led at the top and hot air from them is led out from the base by closed passages.

For the excitation of the generators, as well as for lighting and power a D. C. voltage of 220 is used. The plant (D. C.) consists of at present 2,500 H. P. turbines directly coupled to D. C. generators. In parallel with these is a battery of 4,800 amp.-hours, as reserve and for regulation. The regulation of excitation of the main generators is unique and consists of a booster on the generator shaft to give a boost of from -220 to +110 volts, i.e., the excitation can be regulated from 0 to 330 volts without interfering with the D. C. plant. The power from the generating station is led by 3-phase cables to the transforming house through a tunnel.

The transformer building contains transformers to raise the voltage from 10,000 to 50,000 volts with "cooling" gear, as well as the necessary switch gear and a laboratory. The object of separating the turbine house from the rest is, I was given to understand, to enable the plant being erected quickly.

The transforming plant consists of four groups of three, 3,670 K.V.A. single-phase transformers. The same are oil insulated and water-cooled. The transformer rooms are completely closed and provision of outlet made for the rush of oil in case of fire. The water-cooling is controlled by signal contacts in the "switch gallery" where an alarm is given when the temperature of water exceeds the limit. The water-cooling plant consists of 2 pumps with a capacity of 1,500 litres per second and a lift of 15 metres and 2 other pumps of 500 litres per second capacity with 25 metres lift, all driven by a motor.

The former also supply water for "over-tension discharge". Besides, 2 tanks of 50 cubic metres and one of 10 cubic metres capacity are kept as reserve, the former for cooling and the latter for "over-tension" discharge. A small pump is kept for changing or pumping out the oil from the transformers. The energy is transmitted to the various places, directly from the generator (10,000 volts) in the case of short distances, and at 50,000 volts in that of long distances. The different lines can be fed either separately from a generator or transformer or 2 generators or provided with relays of the induction motor type for over-load. For "over-tension" discharge a jet of water continuously flowing is provided and for static discharge and lighting 2 horn-arresters in series are used. A coarse resistance in the shape of a current of water is used for large dynamical over-tension discharges and for arresters are used for fine discharges of high frequency currents. The various High Tension cells are made quite fire proof and completely separated from one another.

A 10,000 volt aluminium, double, over-head line, 12.1 kilometres long goes direct to Stallbacka and Vargön, the cross-section of the conductor being 100 square millimetre and 160 square millimetre respectively.

Also a 10,000 volt earth cable, 3 kilometres long supplies energy to Stridsberg and Björcks works at Knorren and a sub-station changing the frequency from 25 to 50. A 50,000 volt 71.2 kilometres long, 35 square millimetres double copper line runs to Skara and another 67.6 kilometres long, 70 square millimetres double copper line runs to Gothenberg. The span of the towers is 170 metres in the first case and 200 metres in the second one. An earthed iron wire is run over each line. Pin insulators are used for the Skara line and suspension insulators for the other copper line. Girder towers on concrete bases are used throughout.

LUDVIKA.

Amalgamated Electric Company.

This is comparatively a small firm and the machinery used is not complicated.

Among other things, the following were noted and sketched: (1) A machine for winding copper strip transformer coils. The strip before being wound is guided by 5 rollers to do away with the kinks. (2) An adjustable former made out of a steel plate, with 2 horizontal and 2 vertical slots and the necessary clamps, to make armature coils of copper wire. (3) A punching machine to cut small-sized commutator strips out of a wedge shaped bar. (4) A taping machine for round or square copper conductors.

Resistances of 150 ohms to carry 200 amps. are now used in the neutral wire of H. T. systems to avoid rush of current and consist of cast iron grids immersed in oil.

A large spider of a slow-speed 750 K. W. D. C. machine was inspected. Condenser brushes are invariably used for transformers of 100,000 volts or above. Glass tubes filled with an insulating material are used for insulating the primary from the secondary of small transformers.

GRÄNGESBERG.

Electrical equipment of iron mine.

Two 750 H. P. slow speed (22 revolutions per minute) D. C. motors directly coupled to the tapered drum in between are used for hauling the ore. For starting purpose, the contacts of the resistances take the form of a large commutator over which a rocker with brushes moves. Besides the electrical brake, there is a large friction brake actuated by a magnetic plunger. The arrangement is claimed to be very reliable.

The passenger lift is driven by a small induction motor through gearing, with water resistance for starting purposes. The power to the mine is supplied by a sub-station transforming 10,000 volts 3-phase current to D. C. 500 volts. There are two air compressors driven by belts from two 3-phase 350 H. P. 500 volts synchronous motors.

The ore is roughly crushed by a conical shaped roller moving round in a large steel basin. The ore is separated by hand. Electric railway is used in the mine. The collection of water in the mine is only 180 litres per second. There is also an open mine; about 800 H. P. pumps being used for the same when necessary.

LUDVIKA.

Water power Station.

The head available is 20 m. and the discharge, approximately 23.5 cub. m. per second. Two large wooden flumes with iron bands around and having a diameter of 4 m. convey the water to the station. The plant consists of (i) two 450 K.W. 10,000 volts, 40 periods per second and 26 amps. 3 phase generators coupled to two horizontal turbines running at 270 revolutions per minute. The two turbines are connected to one pipe, on either side of it and are fitted with flywheels. The excitation generator for these 2 machines is driven by a small turbine running at 730 revolutions per minute.

lutions per minute and connected to the end of the steel pipe and between the two main turbines. The latter develops 33 K. W. at 110 volts. Flexible coupling is used for the main generators. The governor regulates the flow of compressed oil actuating the guides; (ii) two 630 K. W. 10,000 volts, 40 period per second, also driven by a double turbine at 267 revolutions per minute, one being fitted with a flywheel; (iii) one for 200 K. W. 200 volts 100 amp. 100 periods per second, 3-phase generator driven by a turbine at 500 revolutions per minute; (iv) there is also a D. C. generator 50 K. W. 110 volts driven by a separate turbine at 700 revolutions per minute for excitation. The 100 period generator is for the town of Ludvika. Each machine has a separate panel. Three lines leave the station.

VESTARÄS.

Manufacture of copper wire and tubes.

For annealing copper a temperature of 600°—700° C. is used. The wire to be annealed is passed under water to a chest filled with steam. This avoids oxidation.

A machine for making a strand out of copper wire for transmission lines was inspected, so also other machines for drawing different sizes of wire of copper and brass. A reversing roller is used for large copper plates. Aluminium wire for over-head lines is also manufactured. Methods of drawing and expanding various sizes of tubes were noted and sketched. One of them, for large copper pipes, was directly actuated by a hydraulic ram.

A special machine for moulding different profiles of brass from viscous condition was sketched.

Allmaenna Svenska Electric Company.

A 3-phase 30,000 volts Berry transformer was under repairs. Also a 13,000 H. P. 12,000 volts 3-phase generator was being constructed. The flywheel effect is made up for by the rotor itself. There is a large bed to take work up to 25' x 15'.

Stamping of armature sectors of large machines is done by a ratchet and paul arrangement. 5 amps is the standard current for the secondary of a current transformer. H. T. fuses are enclosed in glass tubes. In the H. T. department a small transformer to give 100,000 volts is installed. To avoid a dead short circuit on the transformer, when a spark jumps across a water, resistance in the shape of 6 tubes $\frac{1}{2}$ m. long (each) and 35 mm. diameters inside and filled with water is used.

The adjusting of voltage is done by a cast-iron resistance across 380 volts. The primary of the transformer is fed from suitable tapings on this.

The methods of winding D. C. armatures and the stators and rotors of A. C. machines either with closed or open slots was noted. Armatures are tested for 1,000 volts between copper and iron and for 800 volts between copper and copper.

STOCKHOLM.

Ericsson and Company (Telephones).

Automatic American machinery is used throughout. Magneto wall and table telephones are largely manufactured, also instruments for telephoning on telegraph lines, telephone instruments for power installations, all types of operator's sets, central switch boards and lightning and power protectors are made. Apparatus for long distance telephones on Egnér system and the secret intercommunication are manufactured.

REPORT BY MR. G. R. RELE.

With reference to your instructions in the month of August last, I have the pleasure of forwarding you the report of my practical work and visits to various works during my stay on the continent kindly sanctioned by the Secretary of State in Council.

Having left London for Brussels on the 10th of August last, I made three visits to the Brussels International Exhibition especially to the chemistry, phy-

sics and machinery departments which interested me most, as I could profit by coming to know some of the textile machine makers, who not only showed me their specialities exhibited but consented to make arrangements to see their machines at work in continental Bleaching, Dyeing and Finishing Works, and all these visits proved to me to be very interesting and instructive.

From Brussels I proceeded to Munchen Gladbach where I visited a machine at work and two of the velveteen and cord-cutting and finishing factories; visits to these two factories reflected a good deal on my previous knowledge of this branch of textile industry.

From M. Gladbach I proceeded to Elberfeld to visit the works of Messrs. Fred Bayer & Company, as they had promised to show me some of their colour specialities and also to arrange some visits to some works, accordingly this visit to their works helped me to arrange visits to some of the works in Italy.

From Elberfeld I proceeded to Chemnitz where I met my friend, Mr. C. Haubold of the firm of Messrs. C. G. Haubold, Engineers, Chemnitz, who kindly supplied me with an introduction letter to Messrs. August Dippman & Co., Engravers to Calico Printers (works at Frankenberg). At these works I was kindly allowed to work regularly by the said firm where I continued for about two weeks, during which time I could obtain a good idea as to the various methods of engraving calico printers rollers and also of the schreiner calender rollers.

After completing my period of work at the above mentioned work, I returned to Chemnitz where I paid a few visits to the engineering works of Messrs. Haubold for making a study of some of their machines, and also visited some Bleach and Dye works in and near Chemnitz. During my stay at Chemnitz I visited a textile machine work and also the works and show rooms of Messrs. Hass and Stahl, makers of electrical bleaching apparatus, at Ane. On the next day the proprietor of the above mentioned machine work made arrangements to show me his machinery in operation in factory at Mittweida (about an hour's run by train from Chemnitz).

From Chemnitz I proceeded to Berlin to commence my regular practical work at the Bleaching, Dyeing and Finishing establishment of Messrs. Heinrich Wollsohn & Company, at Grunau, Berlin, the introduction being kindly provided by Messrs. Haubolds of Chemnitz.

The works of Messrs. Heinrich Wollsohn & Company had a capacity of about 6,000 lbs. of finished goods per day, and was equipped with very up to date machinery, secondly the Director of the said works, Mr. H. Sprenger, was very kind to me in explaining the chief points of interest and making my stay at their works as interesting and instructive as possible.

On completing my work at the Grunau Bleach works, I commenced a series of visits at the Bleaching and Dyeing, etc. establishment of Mr. Gebauer (a friend of my employers at Bombay) at Berlin, and on the days I could not pay a visit to Mr. Gebauer's works I utilised my time in doing some important dye trial at the Volunteer Dye House of Messrs. Berlin, Anilin & Company, under Professor Sansonie of the said firm. During my stay at the above mentioned colour manufacturing works I requested Professor Sansonie (in addition to some more of my friends) to try to secure me permission to work in some print work; fortunately Professor Sansonie succeeded to secure the requested permission in the Stamperia Lombarda in Italy. On paying some intermittent visits to Mr. Gebauer's Bleachery he subsequently permitted me to work regularly in his huge works with a capacity of about 60,000 lbs. of finished goods per day, and these works produced a varied variety of goods, and this fact therefore gave me an excellent chance of enlarging my knowledge of the subject.

From Berlin I left on my way to Novara, Italy, and en route I broke the journey at Frankfurt; Mulhausen; Bale; Zurich; where I visited some important works and factories and subsequently arrived at Novara on 12th of November last, and commenced my regular work at the Stamperia Lombarda as arranged, this being an important branch of my course of studies, and at the same time the admission in the works was obtained with great many efforts, practically when I had given

up all hope of such an opportunity, I took the greatest advantage of the opportunity. Thanks are due to Dr. Caberti, the Director of the said print works, who took special interest in me, and with the co-operation of his assistants I could get a very good insight of the working and management of print works, and the most economical manipulation of the material. Practically my apprenticeship in these big print works altogether removed my doubts about the successful equipment and working of Orient Works in India.

After completion of the period of my work at Stamperia Lombarda I made a general study of the Textile Industry in Italy, where water is the principal source of motive power for driving the machinery of most of the factories there, through the medium of Electro Motors, and with the above mentioned object in view I had observations at the following factories.

- (1) Old and new spinning and weaving mills of the Manifatura Tosi at Novara.
 - (2) and (3) Bleaching and Finishing, and Dyeing Finishing two separate works of the Manifatura Tosi at Castellansa.
 - (4) Bleaching, Dyeing, Finishing and Weaving establishment of the Cotonificio Cantoni at Legnano.
 - (5) Weaving, Dyeing and Finishing
 - (6) A yarn Dye Works
 - (7) Printing, Raising and Finishing works
 - (9) A Dyeing and Finishing work for silk and half silk goods at Como about 30 miles from Milan.
- ... } at Bustoe.

In conclusion, I have the pleasure to mention that with the introductions provided by my future employers, the Morargee Goculdass Mills, Ltd., Bombay, and with the help of the acquaintances I subsequently formed, and principally the kind consideration given by the Secretary of State in Council to my case in sanctioning the travelling expenses, and the payment of the required premium in good time, enabled me to acquire practical and industrial experience in my undertakings to my entire satisfaction, and I hope that this will make me sufficiently competent to commence my due service to my country in increasing, and expanding, its industries, as my duty.

I have also forwarded the diary of my systematic work on the continent, which is an extract of daily notes regarding the details of the observations I could make during my visits to the various factories named.

Thanking you in anticipation of kindly forwarding a copy of this to the India Office.

REPORT BY G. N. SAHASRABUDDHE.

I have the honour to submit the following report of my tour in England to study the practice of English Agriculture. I visited 4 places in all, viz., Wye in Kent; Rothamsted Farm near Harpenden; Cambridge and Ipswich.

The object of visiting Wye was to get a general idea of English agricultural practice. I visited the "South Eastern Agricultural College" there. All the students and most of the staff there were away on holiday. But one of the officers there took me round the college buildings and the farms. They were harvesting their wheat at that time and I could see the different kinds of harvesting machines and the thrashing machines at work. The farm is an extensive one comprising about 460 acres of which about 175 acres is arable land; pasture comprises about 250 acres; the rest of the land being occupied by vegetable and hop garden, a small forest plantation and the buildings. The farm is mainly for demonstrational and teaching purposes and the experimental work there appeared to be incidental. I visited some of the adjoining cultivators' fields also. The chief feature of the tract appeared to be animal husbandry, especially growing

of beef and bacon, though I could see also a good deal of sheep farming. Amongst the cattle the "Short-horn" appeared to be the predominant type. Though amongst the college live-stock they have a good dairy herd comprising the important breeds such as Jersey, Guernsey, Ayrshire, etc. Dairying did not appear to be very much in demand by the people. It was here that I could first notice clearly the important feature of the English agriculture viz., the meadows. The meadow is evidently the backbone of English agriculture, because with it not only can the farmers manage their animal husbandry, but it also supplies the necessary forage for the work horses nearly all the year round. The usual rotation is a four year one as follows:—

- (1) Roots (Potatoes or Mangles).
- (2) Winter corn (Wheat).
- (3) Fodder (Clover or Lucerne or mixture).
- (4) Spring corn (Oats).

At the Wye College farm also a six year rotation is being tried. But as far as I could see this four year rotation is general all throughout England with a few modifications here and there in the choice of crops. Roots are generally manured with farm yard and superphosphate. In England wheat is generally sown in November and harvested in next August, so that it takes about 10 months to grow. Clover is generally sown while wheat is growing, though it makes very little progress till the wheat is harvested. Clover and Lucerne are generally made into hay. Then follows the spring corn.

At Rothamsted I saw the Classic and International experiments started by the late Sir John Lawes and conducted by the late Dr. Gilbert whose place is now taken up by Dr. Hall. Most of these experiments were started as early as 1834, so that it is now more than 60 years that they are being carried on practically without change or interruption. Their international character is specially interesting to outsiders, as their aim is to study "How plants grow", rather than to find out the economic practice of crop-growing for a particular tract. The chief lines of work here carried on are:—

- (1) Effects of manures upon crops grown in rotation.
- (2) Manurial requirements of root crops.
- (3) Effect of increasing amounts of nitrogen.
- (4) Effects of mineral manures.
- (5) Effects of artificial manures with dung.
- (6) Effects of manures on the texture of the soil.
- (7) Study of manures on permanent grass land.
- (8) Study of the manurial requirements of wheat comprising:—
 - (a) Effect of nitrogenous manures.
 - (b) Comparative effect of nitrate of soda and ammonia salts.
 - (c) Effects of the mineral constituents.
 - (d) The retention of manures in the soil.
- (9) Manurial experiments with Barley comprising the same lines as above.
- (10) Study of the residue of manures.
- (11) Innoculation of leguminous plants.

Besides these field experiments various laboratory and pot experiments are going on. The various things I saw there are too numerous even to name them here, but I shall write about a few points which attracted my special attention. Here I could clearly see the effect of manures on the texture of the soil. Wherever artificial manures are being given year after year, the soil has become so bad that it has become difficult to work it properly in the spring. In this respect the

plots manured with nitrate of soda and sulphate of potash are worst. This is quite in accordance with a belief amongst the Nira-valley cultivators, where the use of such an organic bulky manure as farmyard is well known as an antidote to the presence of excessive salts in the soil and also to a certain extent to the bad effects produced by repeated applications of concentrated manures.

On the permanent grass plots I could notice a sort of selective influence of the manures on the growth of herbage. In all these plots no particular seed was sown, free scope being given to Nature to supply its own seed and to grow what crop she liked. But the effect of the manures given to the different plots is so marked that we can easily put the line of demarcation between two plots simply from the appearance of the herbage. Naturally plants require a good deal of nitrogen which if they do not get in sufficient quantities from the soil, some plants get it from the atmosphere. In these circumstances it is but natural that where there is a scarcity of nitrogen in the soil, on account of the struggle for existence the plants which can get the supply of nitrogen from outside, should predominate. We can see this phenomenon in these plots. In the unmanured plots and in the plots supplied with all other ingredients except nitrogen we see the predominance of the leguminous plants. But as a contrast to this, these plants are practically absent in plots manured with nitrogenous manures, especially sulphate of ammonia.

Amongst the Laboratory experiments those with "The Partial Sterilization of the Soil" naturally attracted my chief attention. Unfortunately when I visited the place all the expert staff were away on holiday including Drs. Russel and Hutchinson, who are tackling the above subject, but I had a discussion on the subject with one of the assistants of Dr. Hutchinson. As a similar work is at present being done by the Bombay Agricultural Department, I was naturally interested to see the results obtained at Rothamsted. Some of these results have already been published by the above gentlemen in their paper "The effect of partial sterilization of soil on the production of plant food" (Journal of Agricultural Science, Volume 3, Part 2) and further have been discussed by Dr. Russel in the recent meeting of the British Association at Sheffield. I need here only to recapitulate them in a few words. The chief methods of sterilization adopted are:—(a) Heating the soil to a temperature of 100 for two hours and (b) exposures to the Tulane vapour; and the conclusion at present arrived at is that the fertility of a soil is determined by the activity of its ammonia producing bacteria and that their number is kept in equilibrium by the activity of the protozoa for which these bacteria serve as food and that by sterilization of the soil these protozoa are destroyed. Though most of the bacteria are also destroyed in the process yet those that remain are exceedingly active. I could see some of the lantern plates prepared by Dr. Hutchinson to explain this theory.

Then I went to Cambridge to see especially the experiments of Professor Biffin in connection with the Mendelian theory of plant-breeding. But unfortunately though Professor Biffin was there he was engaged in some other affairs, and even after staying there for two days I could not see him and as the laboratory and other experimental work was stopped on account of holidays I could see practically nothing and thus my visit ended in a *fiasco*.

Thence I went to Ipswich to visit the Agricultural Implement Factory of Messrs. Ransoms, Sims and Jeffries, who gave me a cordial reception and explained to me the various processes of working. I saw there various new implements, including their latest "Disc Plough" and the Thrashing Machines, Agricultural Engines, etc. I discussed with them the merits and demerits of many of them and explained to Messrs. Ransoms the present pressing needs of Indian agriculturists in the implement line.

REPORT ON INDIAN GOVERNMENT SCHOLAR.

University or College -	Municipal School of Technology, Manchester.
Name of Scholar -	V.G. Nair.
Subject of Study -	Chemical Research (Dyeing)
Academic Session -	1910-1911
Course of lectures attended-	see Time Table.
Examinations passed (if any) during the Session.	Was not required to sit for Examinations.
Attendance, progress, and conduct.	Good.
General remarks -	



Date

J.H. Reynolds
Principal or Professor.

MUNICIPAL SCHOOL OF TECHNOLOGY, MANCHESTER.

SESSION 1910-1911

Classes taken by Mr. *V. G. Nair.*

	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY
	SUBJECT.	SUBJECT.	SUBJECT.	SUBJECT.	SUBJECT.	SUBJECT.
9-30—10-30	<i>Special Research Work in the Dyeing Laboratory</i> <i>Every Morning 9-30 to 12-30</i> <i>(except Saturday)</i>					<i>Dyehouse</i>
10-30—11-30						
11-30—12-30						
12-30—1-30	LUNCH.	LUNCH.	LUNCH.	LUNCH.	LUNCH.	
1-30—2-30	<i>Special Research Work</i> <i>Monday. Tuesday</i> <i>afternoons</i>			<i>in the Dyeing Laboratory</i> <i>Thursday and Friday</i> <i>1-30 - 4-30</i>		<i>Dyehouse</i> <i>1-30 to 4-30</i>
2-30—3-30						
3-30—4-30						
			RECESS.			
6-25—7-25						
7-25—8-25						
8-25—9-30						

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REPORT ON INDIAN GOVERNMENT SCHOLAR.

University or College	-	Municipal School of Technology Manchester
Name of Scholar	-	V. G. Nair
Subject of Study	-	Dyeing Research - 4th year.
Academic Session	-	1910-11.
Course of lectures attended-		See Time-table herewith.
Examinations passed (if any) during the Session.		See page 20 of Sessional Report. Calico & Linen Printing, Hons. 2nd (City & Guilds).
Attendance, progress, and conduct.		Satisfactory.
General remarks	-	Has been awarded the degree of M.Sc.Tech.

Date August 26th, 1911.

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J. H. Reynolds
Principal or Professor.

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MUNICIPAL SCHOOL OF TECHNOLOGY, MANCHESTER.

Dyeing Research - 24th Year

SESSION 19
Classes taken by Mr. *G. L. Hair*

SESSION 19

MONDAY.

SUBJECT:

TUESDAY.

SUBJECT.

WEDNESDAY.

SUBJECT.

THURSDAY.

SUBJECT

FRIDAY.

SUBJECT

SATURDAY

SUBJECT

12-30--1-30

LUNCH.

LUNCH.

LUNCH.

LUNCH.

LONGH.

1-30—2-30

2-30—3-30

3-30—4-30

RECESS.

Dyehouse

Q-30

10:30—11:30
11:30—12:30

← Special Opening Laboratory →

1-30

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this Committee.
11/10/14