Pol 8. April 67 Nos 30-131
27 " " 393-394
4 May " 72-73

Revenue 1867 - Oct.
Nos. 177.
Circular
From
The Offg Asst. Secty

to the GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

REVENUE—FORESTS.

To

CIRCULAR No. 10 FOREST.

Dated April 23, 1867.

Received

Selection of young men to be trained in Europe for Forest service in India.

CIRCULAR No. 10 FOREST.

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

REVENUE—FORESTS.

FORT WILLIAM, APRIL 23, 1867.

Selection of young men to be trained in Europe for Forest service in India.

Read again:—

Public Works Department Circular No. 6 F, dated 11th April 1867.

Read also—

No. 8, dated 28th February, 1867.

From—*Secretary of State for India,*

To—*The Government of India.*

In continuation of my Despatches of the 31st October, No. 63, and the 15th December, No. 81 of 1866, I have to inform your Excellency in Council that the selection of the young men to be trained on the Continent for Forest service in India has been made by me, after the production of the requsite certificates by the candidates and their examination, conducted partly by Dr. Brandis, Inspector General of the Forests under your charge, and partly by the Civil Service Commissioners, with a view to ascertain the qualifications of the several applicants.

2. These examinations, as well as that by the Medical Board, were dispensed with in only one instance, that of Mr. Louis Gavin, the son of a deceased British soldier, who served through the latter part of the Indian mutiny, and died as a Sergeant-Instructor of Musketry in Her Majesty's 71st Highlanders at Gwalior in 1860. This young man resided at Nancy, in France, where he had been brought up, and whilst his physical capacity was shown by a medical certificate, his qualifications and character were vouched for by Monsieur Nanquette, the Director General of the Forest School at Nancy, under whom all the young men sent to France will be placed, and who has most obligingly assisted the views of Her Majesty's Government in concerting with Dr. Brandis the necessary arrangements relating to this experiment. I therefore added him to the list of selected candidates, the other four being those who had shown themselves best qualified by their knowledge of the subjects required—

Walter Henman, aged 17.

Alfred Pengelly, aged 23.

Edward McArthur Moir, aged 18; and,

Framjee Rustomjee Dasai, aged 20, son of a merchant at Bombay.

These four, together with Louis Gavin, aged 18, have been directed to report themselves to Monsieur Laydeker, Directeur Général des Forêts at Paris, on the 1st of March, to receive instructions for the commencement of their training.

I have &c.

(Signed) H. Verney, for Secy. to Govt. of India.

Secretary to Government

3. I transmit herewith a copy of the *Réglement* for this purpose agreed upon by Monsieur Laydeker and Dr. Brandis, and approved by me in Council.

4. As these five young men were not, from their want of knowledge of the German language, qualified for training at Hanover, and as it seemed to me important that the experiment should be tried by the employment of men educated in Forestry in Germany as well as in France, I determined to select from the list of candidates who had passed the examinations, two more, and have nominated John Kipper Hume, aged 20, and Albert Edward Wild, aged 20, who have been instructed to proceed to Hanover by the 1st of March, and report themselves to Forest Director Burkhardt, who has undertaken the charge of training them.

5. You will, I hope, therefore, receive seven persons well trained for service in the Forest Department at the end of 1869, or the beginning of 1870.

6. I shall await your reply to my Despatch of the 31st of October last before taking any further step in this direction, but

13th February 1867. I transmit to you, by this opportunity, 30 printed copies of a further letter which Dr. Brandis addressed to this Department before his departure, and which contains his opinion as to the changes which should be made in the course pursued this year, should it be deemed expedient to renew the experiment another year.

7. I shall transmit a copy of this Despatch to the Governors in Council at Madras and Bombay, and shall be ready to consider any application which they may make through you for the services of any young men trained in this way for the Forest Department of their respective Presidencies.

8. With reference to the studies of Forest Officers on leave to Europe,

13th February 1867. I transmit to you a copy of the *Reglement* settled between Monsieur Laydeker and Dr. Brandis on this subject, and also 30 copies of a letter from Dr. Brandis detailing the arrangements which he has made with the Forest authorities in Germany.

9. I cannot conclude this Despatch without expressing to your Excellency in Council the high sense which I entertain of the zeal, energy, and ability displayed by Dr. Brandis in his exertions to place these arrangements on a satisfactory basis.

Dated 13th February, 1867.

From—Dr. D. BRANDIS, *Inspector General of Forests*,

To—*Under Secretary of State for India*.

I have now the honour to report, for the approval of Her Majesty's Secretary of State for India, the arrangements which I have made in Germany to facilitate the studies of those Forest Officers on leave who may desire to pass through a course of instruction in Forestry in that country.

2. The following gentlemen have promised me their co-operation in this matter; they have stated their readiness to furnish all information and assistance in their power to Forest Officers on leave in their districts:—

1.—Herr von Mantel, Chief of the Forest Department in Bavaria.

2.—Herr First Director Burckhardt, Hanover.

3.—Herr Director Judeich, Principal of the Forest School at Tharant.

4.—The Administrators of the Estates of the Prince of Furstenberg, through their Chief Forest Officer, Oberforstrath Hlothy, at Donaueschingen.

I would suggest that Forest Officers on leave, proceeding to Germany for their studies, should receive a circular letter of introduction addressed to the above. This letter might contain a request to grant them certificates at the close of their course of instruction. I would also suggest a letter of thanks to these gentlemen, as soon as opportunity offers.

3. In the Memorandum annexed, I have detailed the course which might most conveniently be pursued by Forest Officers proceeding to Germany. As we have in this instance to deal with the administration of forests in several distinct countries, personal changes by death, or removal, may from time to time necessitate changes in this Memorandum of instructions. To obviate as much as possible any inconvenience that may arise from such changes, I have made the following arrangements:—My youngest brother, Herr Carl Brandis, Oberleimbachshof bei Hünfeld, Provinz Hessen, Prussia, has kindly undertaken to give every advice to Forest Officers on leave, while prosecuting their studies in Germany. They should write to him in case there is any need for his assistance. As he is personally acquainted with many of the principal Forest Officers in Germany, and has a considerable knowledge of Forest management in many parts of Germany, his advice may be followed with advantage. I may take this opportunity of stating that, should it hereafter be found desirable to send out to India another experienced Forest Officer from Germany, my brother, with the assistance of the gentlemen named above, will be in a position to recommend good men. I have furnished him (privately) with copies of all documents relating to the instruction of Forest Officers on leave, and of young men destined for the Forest Department.

4. I beg now to offer my suggestions regarding the subjects which Forest Officers on leave might be recommended to study in Great Britain. They are as follows:—

1st.—One month with an approved Wood Manager in Scotland during the time when most planting work is going on. The best time would be early Spring. I am inclined to recommend their spending the time with Mr. M'Corquodale, Wood Manager to the Earl of Mansfield, Scone, near Perth, one of the most experienced and skilful Foresters in Scotland, whose acquaintance I have had the privilege of making. The fees which Mr. M'Corquodale receives from pupils for studying Forestry, I understand to be £5 per mensem.

2nd.—A week at the great Forest nursery of Messrs. Peter, Lawson and Sons, near Edinburgh, to learn nursery and transplanting work. Messrs. Lawson have expressed to me, in the most liberal manner, their readiness to assist Forest Officers on leave introduced to them by a few lines from the India Office. There will be no remuneration in this instance.

3rd.—A practical and theoretical course with a competent Land Surveyor.

4th.—A week or more at the Woolwich, or at any other Dockyard, to study the different kinds and description of timber used for ship-building, the methods used for seasoning and preserving them, and generally the appropriation of timbers to the construction of vessels. I specially mention the Dockyard at Woolwich, because I have had the privilege, on a visit which I paid to that Establishment, with the permission of the Naval authorities, in July 1865, to make the acquaintance of Mr. Thomas Luslett, the Timber Inspector at that Dockyard, an Officer of great experience and most extensive knowledge in timber matters, whose assistance would be of great value to Forest Officers. The permission of the Lords Commissioners of the Admiralty would be requisite. In France, a number of young Forest Officers are from time to time sent to Cherbourg for similar studies.

Should the plan of training young men for the Forest service in India be carried out, they might, after completing all their studies, spend a fortnight at Woolwich with much advantage to their future career in India.

5. Forest Officers who have not had opportunities of studying Natural Sciences before, might employ their sojourn in England in the most useful manner by attending lectures on the following subjects, at any University or College, or at the School of Mines in London:—

1st. Botany.
2nd. Chemistry.
3rd. Natural Philosophy.
4th. Geology.
5th. Natural History (Zoology).

5th.—In conclusion, I beg to observe that the time at the disposal of Forest Officers on leave may rarely enable them to attend to all the subjects enumerated here; but there may be many who are not inclined to prosecute their studies in the Continent, and who may wish to employ their time in this country as usefully as possible.

I would respectfully suggest that this letter, and the Memorandum appended hereto, be printed, to be communicated to Forest Officers on leave, who may report themselves at this Office. The programme for their studies in France has already been lithographed.

Memorandum for the guidance of Forest Officers on leave in Europe, who may go to Germany to pass through a course of instruction in Forestry.

The most useful arrangement would be for Forest Officers on leave to commence by devoting one or two months to a practical course of training under an experienced Forest Officer, and afterwards to spend one half-yearly term at one of the two Forest Schools mentioned below.

2. M. Burckhardt, Director of the Forests in the former Kingdom of Hanover, has kindly undertaken to make the necessary arrangements for this preliminary practical course, which will probably be in a mixed beech and oak forest, and might with great advantage be extended to three months. While thus engaged, Forest Officers are specially recommended to make themselves acquainted with all sub-divisions of one working division (Wirthschaft's complex). They should study the documents relating to the working plan (Wirthschaft's plan), and take a copy of the map of that portion of the forests, as well as of the more important parts of those documents. The careful examination of certain sub-divisions is specially recommended:—

1.—A series of sub-divisions representing the different ages of the forest.

2.—Sub-divisions of different ages where thinning operations are to be carried on, or have been carried on.

3.—Sub-divisions of mature age on different kinds of soil. Forest Officers should seek opportunities to make themselves practically acquainted with the method of valuation surveys (Massenaufnahmen) in forests of mature age. They should seek to acquire some practice in estimating the cubical contents of timber standing on a "Morgen" in mature forest of different quality as to soil and growth of timber.

4.—Sub-divisions of mature age, where felling operations have been commenced, or are to be commenced.

5.—Sub-divisions where the intermediate felling operations are being carried on (Besamungsschlag Lichtschlag). The process of natural regeneration should be studied, and the greater or less success of it under different circumstances.

6.—Sub-divisions where the last cutting is taking place.

7.—Localities where planting or sowing operations are going on to aid natural re-production.

8.—All operations to further the growth of the Oak at the expense of the Beech.

In this study, the aim of Forest Officers should be to make themselves acquainted with the leading principles in the preparation of working plans of these forests, the method of obtaining the fundamental data for the same, and the determination of the quantity that may annually be cut in the forest.

This will be the main object of the preliminary practical course: there will, however, be opportunities, if time is left, to study the management of these forests generally.

3. The two Forest Schools recommended for continuation of the studies of Officers, are at Tharant, near Dresden, and at Aschaffenburg in Bavaria. Director Burckhardt's advice should be taken as to which of the two should be chosen. The regular course of studies at Tharant requires two years, and at Aschaffenburg two years and a half. The Director of the School in Saxony is Forstrath Judeich; he has declared himself ready personally to assist British Forest Officers on leave in their studies, to indicate to them those public lectures which they should attend, and to arrange for private instruction, if such should be found necessary. The summer terms at Tharant commences about the beginning of April, and closes early in August. The winter term begins on the 15th October, and lasts about five months.

At Aschaffenburg there is also a summer and winter term, and similar facilities will be afforded there to Forest Officers on leave as at Tharant.

The principal object of a half year's sojourn at one of these Forest Schools is to obtain a connected knowledge of the principal branches of Forestry, including the administration of, and legislation for forests. For those who wish at the same time to advance their studies of natural sciences, or of applied mathematics, ample opportunities are afforded, both at Aschaffenburg and at Tharant.

4. After completing the studies here sketched, it will then be desirable to visit certain forest districts in other parts of Germany, to see other kinds of forests, and to become familiar with their mode of management.

Two forest districts are specially recommended here, but there are many others which might be usefully visited. Some of them will be enumerated below.

1.—Forstrevier Rothenbuch, in the Spessart, near Aschaffenburg, Bavaria.—Beech and Oak. Improvement of the ratio of Oak to Beech by planting an underwood of Beech. Improvement of [illegible] by planting. Road-making. Study of the [illegible] forest is well managed.

The different districts of the Spessart, which is one of the most extensive forests of Middle Germany, are interesting in many respects. The soil (red sand-stone) is generally poor, yet there are to be found in the forest the largest and finest Oak trees in Europe, not isolated, but in large masses.

For various reasons the system of management here pursued is highly conservative, the quantity fixed to be cut annually is far below the amount produced. The re-production of the forest is mainly by natural means, but aided by careful cultivation wherever necessary. The extensive plantations of coniferous trees (spruce, Scotch fir, larch) on the outskirts of the forest, where it had been deteriorated by the encroachments of the surrounding villages, are most instructive, and should be carefully studied.

II. Forstrevier Rippoldsau, Grand Duchy of Baden. This district, which is situated in the Black Forest, on the head-waters of one of the feeders of the Kinzig River, forms part of the extensive forests belonging to Prince Fürstenberg. The Chief Forest Officer on the estates of this nobleman, Oberforstrath Roth, is one of the most eminent Forest Officers in Germany; the district named is at present in charge of Forstverwalter Ganter, who has been instructed by the "Furstliche Domainen Kanzley" (Office for the Administration of the Prince's Estates) to afford all facility and assistance to Forest Officers from India for studying the management of the forests under his care.

Spruce and silver fir, with Scotch fir on dry warm slopes towards the south, are the principal kinds of trees here. Natural re-production is mainly relied upon, aided by planting wherever needful. The plantations of spruce on the high marshy plateau of the Kniebis might be visited.

The period between the first and last cutting in a mature forest here is usually extended to 30 years, much longer than is the case in other high timber forests. The gradual selection of the trees to be felled is instructive.

Although the forest is often disturbed during the first time of growth of the young crop, yet the thicket is complete. The thinning operations are here carried on with particular care, the poles being valuable for the hop gardens of the Rhine Valley.

The operation of felling, moving the timber to the roads, and sliding it down these roads in winter, should be studied. The roads are narrow, and constructed with skill and great economy.

The floating operations down several tributaries of the Kinzig, Enz, and other rivers in the Black Forest, are extremely instructive.

The general management of the Rippoldsau Forest is much less conservative than that of most of the Bavarian State forests; nevertheless, the maintenance of the forest in a high state of productiveness is fully assured, and at the same time the highest possible revenue is drawn from it.

The administration of these private forests is very economical and efficient.

In the working plan, great stress is laid on the careful and intelligent treatment of each sub-division, according to its own peculiar requirements. The study of the documents composing the "Betriebs einrichtungsplan" is strongly recommended; the careful description of each sub-division, with a statement of what has been done in it during the last ten years, and what has to be done during the ten years following may be taken as a pattern. The last decennial revision of this working plan took place in September 1865.

By way of comparison, it would be instructive to visit some of the adjoining districts of the Black Forest belonging to the State Forests of the Grand Duchy of Baden, and of the Kingdom of Würtemberg. The system of selecting single trees to be felled (Plenter Wirthschaft), has been adopted and carried out with success in some of the private forests in the Valley of the Murg, which might be visited.

The timber trade, which annually draws immense quantities of large descriptions of timber from the different valleys of the Schwarzwald, may be studied, if there should be time for a prolonged stay in these parts.

5. The following is a list of Forest districts, which might with much advantage be visited. They have been selected in Bavaria, because all the branches of Forest Administration are to a high state of efficiency in that country:—

1.—Kranzberg, between München and Freysing. Spruce, silver fir, and Scotch fir.

2.—Bamberg. The forest is called the Haupts Moor, and is remarkable for its splendid Scotch fir, on poor sandy soil.

3.—Frankenwald and Baierische Wald,—for road-making and the improvement of rivers for floating.

6.—Forest Officers on leave, intending to proceed to Germany for their studies, will receive a circular letter of introduction to the following gentlemen:—

1.—Herr von Mantel, München, Königlich Bayerischer Ministerialrath (Chief of the Bavarian State, Forest Department).

2.—Herr Burckhardt, Hanover, Königlich Preussischer Forst Director (Director of the State Forest in the former Kingdom of Hanover).

3.—Herr Director Judeich, Thavant, Königlich Sächsischer Forstrath.

4.—Fürstliche Domainen, Kanzlei, Donaueschingen (Administration of the Estates of the Prince of Fürstenberg).

Forest Officers would do well, in the first instance, to proceed to Hanover; they should write beforehand, as early as possible, to announce their arrival, enclosing a copy of the circular letter of introduction, and asking for a reply, which might await their arrival at Cologne *(Poste Restante)*. In this letter they might state the time which they would be able to devote to their studies in Germany.

After arranging their plans in a general way with Forst Director Burckhardt, they should then write to announce their arrival at the Forest School that may be selected. If Aschaffenburg is chosen, it would be well to write to Herr von Mantel, at München, asking for his instructions and letters of introduction.

From the Forest School they would then make the other arrangements in a similar manner.

The most convenient arrangement would be to commence, early in spring, to attend the summer term of one of the Forest Schools, and to return to England about Christmas.

7. The following books should be procured and studied:—

1.—"Das Baierische Forstgesetz."

2.—"Die Baierische Forstverwaltung."

Director Burckhardt, or others of the gentlemen named above, will recommend, in addition to these, works on the cultivation of forests, and on working plans (Betriebslehre). The literature of Forestry in Germany is so rich, and new and excellent works so constantly appear, that it is better to leave the choice open until they are wanted.

Forest Officers on leave are strongly recommended to enter in a diary both their occupations and the result of their observations, and, besides, to draw up, for their own reference hereafter, reports on the rules and principles of management followed in the different forest districts visited by them.

Dated 13th February, 1867.

From—Dr. D. Brandis, *Inspector General of Forests*,

To—*Under Secretary of State for India*.

I have the honour once to more to address you on the selection of candidates for service in the forests of India, and their professional training before they are sent out. It appears to me that, in case it should hereafter be decided to repeat the experiment which has this year been made, it may be useful to have a statement of the plan proposed for the selection and training of the candidates, with those modifications which the experience of this year's selection seems to render desirable or expedient.

2. In the original proposal, which was embodied in my letter to the Secretary to the Government of India of the 24th September, the plan for training was sketched as follows:—

1st.—One year and a half to be employed in the study of natural sciences at any of the Universities of Great Britain.

2nd.—A practical and theoretical course of land-surveying.

3rd.—Two months' apprenticeship with an approved Forester or Wood-manager in Scotland.

4th.—One year with an approved Forest Officer either in Germany or in France.

3. This course of training pre-supposed, as a necessary condition, that the candidate had received a good general education, specially in mathematics. In that letter I suggested that candidates should merely register certificates of having gone through the course of studies indicated above, and, after completing their training, go out to India at their own expense, taking their chance of any appointments that might be offered them in one of the Forest Departments of the different Provinces.

4. On further consideration it was, however, found that this plan offered considerable difficulties in its execution, and but little chance of success.

When it was, therefore, determined to test the proposal by an experiment to be made this year, a more simple and compact plan was suggested, which was detailed in my letter of the 14th October, and the main points of which having been adopted by Her Majesty's Secretary of State, were embodied in a paper circulated from the India Office, headed,—"Particulars regarding the selection and training of candidates for nomination to Junior appointments in the Forest Department in India."

The standard for admission comprised proficiency in the following subjects:—

1.—English writing and composition.

2.—Elementary Mathematics, including Plane Trigonometry.

3.—Either German or French,

with two subjects not obligatory, but which should entitle candidates proficient in them to preference —

1.—Chemistry and Physics.

2.—Free hand and plan drawing.

5. Candidates selected are to be sent either to Germany or France for their professional education, which will comprise the following subjects:—

1.—The science and practice of Forestry.

2.—Surveying, road-making, and the elements of engineering, as far as required for the duties of a Forest Officer.

3.—Certain branches of jurisprudence which have reference to forest legislation, and administration of forests.

4.—Certain branches of the natural sciences which are of particular importance to the forester,—botany, entomology, chemistry, physics, geology.

The practical part of these studies is to be accomplished by an apprenticeship under an experienced Forest Officer, and the theoretical part should be studied either at one of the Public Forest Schools of the Continent, or under Professors specially engaged for the purpose.

6. By this arrangement, the selection of the candidates was made before their commencing their professional studies. The instruction furnished by every good school in Great Britain would ensure a proficiency in the subjects required for their admission. It could not be objected that young men were led to commence a special line of study at a venture, and without the certainty of obtaining employment in the line chosen by them.

7. Nor can any objection be made to the plan as proposed for this year, on account of the efficiency of the training to be attained. The profession of Forest Officer being an important one in Germany and France, excellent public schools or colleges have been established in every State (some for more than 50 years) for the professional training of these men. At these schools, the different branches of science mentioned above are taught by eminent professors. The fact also of the English students attending the lectures, and going through the practical exercises, and the periodical examinations, in company with a large number of French students preparing for the same profession, may be thought to have some importance. The scheme of instruction framed for our students in Germany, by regular apprenticeship and private instruction under the immediate supervision of some of the first Forest Officers of the country, would offer even greater advantages, and greater certainty of satisfactory results.

8. There would not, therefore, be any reason for considering any alteration of this plan, had it not been publicly attacked in strong terms. The principal attack has been made by Professor Balfour of the Edinburgh University, Director of the Royal Botanic Gardens. He communicated his remarks at a meeting of the Botanical Society of Edinburgh, on the 13th December, and they were reprinted in the *Former* of the 26th December 1866. They are as follows:—

"*Managers for Indian Forests.*—Dr. Balfour laid before the Society a document which had been sent from the India House, relative to the preparation of young men for the Forest Department in India. Dr. Balfour considered that it was most important to train up young men for this Department, but he saw no reason why they should be compelled to study Forestry in Germany and France, and not be allowed to prosecute their studies in this country. He was satisfied that ample opportunities were presented in Britain for the acquisition of knowledge in all departments of science requisite for forest work, as well as in practical operations. There are many excellent Foresters in Britain, who would train young men, and there are excellent nurseries in which the treatment of Cinchona could be well studied. He hoped that the Secretary of State for India would see the propriety of not confining the studies to Germany and France, to the exclusion of Britain. Let young men study were they choose, but let them be carefully examined as to their scientific knowledge and their practical information. If the examination was conducted in a garden, means would be at hand for carrying it on in such a way as at once to bring out the capabilities of the candidates. By leaving the place of study open to candidates, the Government would also be saved expense in the matter. Any who choose to study on the Continent might go there. The German and French languages are not absolutely essential for the Indian Forest Department. It would be better that the candidate should be instructed in Hindustanee, or in some of the Indian dialects, and this could be well done in any seat of learning in Britian. Botany, Chemistry, Natural History, along with practical work in a botanical garden or nursery, could be well prosecuted in Britain."

9. The most important sentence in these remarks is that in which Professor Balfour declares himself "satisfied that ample opportunities were presented in Britain for the acquisition of knowledge in all departments of science requisite for forest work, as well as in practical operations."

If this passage is intended to refer to mathematics, the natural sciences, surveying, it undoubtedly is correct. For the study of these sciences it would be neither necessary nor desirable to seek for opportunities outside of Great Britain.

These, however, are the auxiliary sciences only. The main subject of study in the forest schools of France and Germany is the science and practice of forestry, *viz.*, the culture, management, and working of the forests, and all that is connected with the administration of forests and forest legislation.

10. I believe I am correct in stating that, for the study of these subjects, sufficient opportunities are not presented in Great Britain, whereas the opportunities afforded in the State forests, at the public forest schools, or by private tuition under eminent Forest Officers in Germany or France, are excellent.

I spent a considerable time last year, and the year before last, in examining a large number of wood-lands and plantations in England and Scotland, and have become personally acquainted with a large number of foresters. I have also visited some of the Crown forests in England, and I desire here to state that I have seen many plantations of high timber forest as well as of coppice wood, which had been established with great skill and success, and were under excellent management.

11. But upon the whole the wood-lands in Great Britain are on a much smaller scale than either in France or Germany, and, consequently, the management and administration of forests on a large scale is not so fully developed here as on the Continent, where forestry is recognized as one of the scientific professions, the principles and rules of which are based upon the most careful researches, and are illustrated and explained in a large number of scientific works, which form a large branch of the professional literature of those countries. I may add that, in German and French, there are no less than eight important monthly papers which are exclusively devoted to forestry, not counting a number of smaller periodical publications of the same character.

The State forests of France alone cover an area of 2,706,000 acres with a gross revenue of £1,740,600, upon which the charges amount to £194,320; those of Bavaria cover 1,962,000 acres, and those of Prussia, before the late war, 5,075,000 acres.

12. Again, there are important differences in the general system of management, and upon the whole it may be said that the system which should be followed in many Provinces of India approaches more the method which has gradually developed itself in Germany and France, and which in those countries has been brought to a high state of perfection. Without entering into details, which could not be exhausted in this paper, I may state that, on the Continent of Europe, natural reproduction of the forest is the rule, not of coppice woods only, but also of high timber forest. The main point looked to in the management of a high timber forest in those countries is, so to arrange the cutting and felling as to secure the ground being covered with a crop of self-sown trees before the old crop is entirely removed. This requires careful and methodical management. In Scotland and England, with the exception of coppice woods, and a limited extent of natural forest of Scotch fir in the Highlands, the system generally followed is to cut down the mature crops and to plant.

In a large portion of the Indian forests natural reproduction will have to be relied upon for the maintenance of the forest, planting operations being carried on, as in France and Germany, where the old forest has disappeared, or has been injured, so as to give us no hope of a satisfactory natural reproduction. Under similar circumstances, and on barren wastes, planting operations are carried on in Germany and France with great skill and success on a very large scale, and with great economy.

Upon the whole, an intimate acquaintance with the system and practice of forestry in Germany and France is, in my opinion, a matter of the first importance for the successful management of a large portion of the forests in India.

13. Professor Balfour seems to labour under a misapprehension when, in the concluding sentence of his remarks, he sums up the subjects of education, and states that botany, chemistry, natural history, along with practical work in a botanic garden or nursery, could be well presented in Britain. This, I beg to submit, would be an excellent education for a scientific gardener, but not for a Forest Officer. Nor could the examination be conducted in a garden for the treatment of single plants in a garden, and the management of wood-lands or forests are two things essentially different.

On the other hand, the statement that the German and French languages are not absolutely essential for the Indian Forest Department is perfectly correct. They are merely [illegible] to acquire that knowledge and practical experience [illegible]

14. It may, however, be expedient so to modify the plan of education as entirely to remove the ground of complaint that young men are sent abroad to be instructed in those branches of science which they might equally well study in Great Britain. This may be done by dividing the special training into two portions. The first would comprise the purely scientific part, especially the study of the natural sciences. One year and a half might be assigned to these studies, and any University, College, or other place of instruction in Great Britain might be selected by the candidates. The following would be the branches of study:—

I.—*Mechanical and Natural Philosophy.*—The elements of mechanics, hydrostatics, hydraulics, optics, heat, climate, rain-fall, and the first elements of electricity and magnetism.

II.—*Chemistry. Inorganic.*—The non-metallic elements, and the principal metals.

Organic.—Elements only, with special reference to the chief constituents of the vegetable and animal organism.

The chemical principals of the process of nutrition and of respiration in plants and animals.

Fermentation, decay, putrefaction, destructive distillation.

III.—*Botany.*—Characters of the principal European natural orders. Demonstration of the botanical characters upon common British plants.

The elementary facts referring to the development and nutrition of plants.

IV.—*Geology.*—Elementary portions of descriptive geology.

V.—Either the French or the German language, good colloquial knowledge, with the facility to read and translate into English, easy passages taken from the works of some classical writer.

15. The question would have to be settled, whether the proficiency of candidates in these subjects should be tested by an examination, or whether certificates of regular attendance at the lectures, and a creditable passing of the usual examination during the lectures, granted by the professors themselves, would be sufficient.

I am inclined to recommend an examination in these subjects for two reasons:—

1st.—Certificates granted by Professors and Teachers of sciences are of unequal value.

2nd.—Before sending candidates to study in France or Germany, it should be ascertained, beyond all doubt, that they are sufficiently acquainted with the language to profit by the course of studies arranged for them.

I may also mention that I have submitted this part of the question to Sir Edward Ryan, and understand that there will be no difficulty in the Civil Service Commissioners undertaking this examination, as well as the examination for admission. In both instances, the examination would not be competitive, but merely have the object to test the proficiency of the candidates. A report would be made, and the selection or rejection of candidates would rest with the Secretary of State.

16. It should, however, I think, be distinctly stated in the paper of particulars to be circulated, in case it is decided to carry on the plans here proposed, that these two examinations, one in English, mathematics, and drawing, for admission to a candidateship, the other in sciences and languages, will be held, so as to warn all applicants to be prepared to undergo it. This year it was left uncertain whether an examination should be held or not, and thereby those of the candidates who had left school several years ago were placed at a considerable disadvantage when called upon to undergo an examination in mathematics, for which they were not prepared.

17. In the above statement of the sciences to be studied, I have not attempted to fix the limits of each subject; I have only, in a general way, indicated the more important subjects to which the attention of candidates should be directed. It would hardly be practicable, I believe, further to enter into details. The time assigned to these studies, *viz.*, one year and a half being given, the examiners will find no difficulty in framing their questions, so as to determine the question, whether the candidates have employed their time well, and in the right direction.

The case may arise of applications being made by persons who have taken academical degrees or honours in science and mathematics. The examinations for some of these require more than the subjects enumerated above. Such candidates might be exempted from all examinations, and at once commence their professional studies on the Continent, provided they give proof of a sufficient knowledge of French or German. Other might only be entitled to exemption from examination in certain subjects. The same privilege might be extended to other than academical examinations, leaving it to the Secretary of State to determine how far the certificates of candidates would entitle them to exemptions. No difficulty will, I suppose, be found in providing for the vacancies that may arise through any rejections at the second or science examination, by selecting a larger number of candidates the year following.

18. The arrangement now proposed will have one very great advantage over that under which this year's candidates were selected. The young men, when going to France or Germany for their professional studies, will be better prepared, and more nearly on a par with the students of those countries who attend the Forest Schools, to prepare themselves for the State Forest Service of their country. In this respect, I would beg especially to invite the attention of the Secretary of State to the rules for the admission of students to the French Forest School, as stated in the "Réglement pour l'Admission à l'Ecole Impériale Forestière," submitted with my letter to your address.

The requirements of this examination are higher in almost every branch of knowledge, and, besides those included in our programme, a considerable proficiency in history, political and physical geography, and the elements of astronomy, are required. Moreover, no candidate is admitted who has not the degree of *Bachelier ès Sciences*, the attainment of which requires a good classical education.

I may also add, that these examinations in France are exceedingly strict.

Even under the new arrangements, therefore, many of the English students will be considerably behind their French comrades at the Forest School.

I may mention that, during my late journeys through the forests of France, I have had many opportunities of witnessing the excellent effect produced by such a careful training of their Forest Officers. The high standard of general efficiency of the younger men among them has struck me as very remarkable.

In many of the States of Germany, an impartial observer would arrive at the same result.

19. With the arrangements discussed above, the time to be assigned for professional training on the continent may be shortened to two years. In my letter, of the 24th September, I had limited the term to one year, but when I came to make the arrangements to carry out the plan in France and Germany, I found no one whom I could have entrusted with this work, willing to undertake the training in so short time. In France there is only one way of obtaining the requisite knowledge. This is to attend the regular course of the Imperial Forest School with the students who prepare for the State Forest Service in that country. The duration of this course is 22 months, that is, from the 1st November to the 1st September of the second year. To demand any alteration in this, for the sake of a few students from this country, is out of the question; we must adjust our arrangements to theirs. Now, a preliminary practical training, however short, is indispensable to enable the British students to derive any real benefit from the course of lectures at Nancy. If the sojourn in France is cut down to two years, the months of September and October before the commencement of the biennial course remain. One of the objects in extending it to eight months was to give candidates an opportunity of improving their knowledge in those branches in which they are imperfectly prepared. As a more complete preparation is now contemplated, before sending them to France, so much time will not be needed.

In Germany, where for the present arrangements for private tuition have been made, the consequence of the modification now proposed will be to shorten the second part of the course which, under this year's arrangements, was intended to comprise instruction in the natural sciences, which may hereafter be dispensed with.

20. Doubtless it would be very useful to add to all this an apprenticeship of two months with an approved Forester or Wood-manager in Southland. The most useful season would, I believe, be in early spring; and those candidates who can afford the time, during their scientific studies in Great Britain, would do well to devote part of their vacation to this additional preparation. A strong recommendation to that effect might be given them at the India Office, at the time of their admission; and the certificates granted by their instructor might be made to entitle them to a stipend or other remuneration.

In the particulars it might also be stated, that the instruction in forestry abroad has been arranged as a temporary measure only, until the establishment in Great Britain or India of an efficient Forest School.

21. The term of training for forest appointments in India having under these arrangements been extended to three years and a half, and the standard of education having been raised, something will have to be done to induce a sufficient number of candidates to come forward.

The number of this year's applicants, which was considerable at first, was reduced very much when candidates have clearly understood that the course of training would entail considerable expense. The expense of the studies on the continent has now been estimated as follows:—

For [illegible] per annum, including fees for instruction.

[illegible] instruction being free, with the exception, perhaps, of an additional [illegible] of 6*l.* to 8*l.* per annum to be paid for instruction during the two months of [illegible] training.

If, towards these amounts, the Secretary of State would contribute 60*l.* half yearly, or 120*l.* per annum, many candidates would come forward who might otherwise be deterred by the expense of the training abroad.

I think it would be worth while to raise the stipend to this amount, considering that the number of young men to be trained in Europe for the service in the forests of India will not be large, and that it will decrease as soon as we are able to train Natives for all except the highest posts in the different Forest Departments of India. The young men to be trained and sent out now will, I hope, not only serve as Forest Officers, but contribute their part towards the training of Native Forest Officers and Subordinates.

22. I may here allude to Professor Balfour's suggestion that the candidates should in this country be instructed in Hindustanee or in some of the Indian dialects.

I fear this would have the effect of over-loading the studies of the young men, and that the time which the study of Eastern languages in this country would absorb, could be employed to the same purpose, but with much greater effect in India.

23. With this I have the honour to submit a proposed amended form of particulars, which I would suggest might be considered, in case it should be decided to carry out as a permanent measure, a scheme of training young men for service in the forests of India. With reference to the large number of rejections at this year's medical examination, I have thought it expedient to insert a passage, that none should apply who have not active habits, combined with a strong hardy constitution.

The provisions of this amended plan I have discussed with Dr. Joseph Hooker, Director of Royal Botanic Gardens, Kew, and I would respectfully suggest that his advice be requested on this subject, in case the scheme for the training of Forest Officers is to be entertained. In making this suggestion, I would beg to guard against the impression that Dr. Hooker's views on the subject of the education of Forest Officers for India are in accordance with those expressed in this letter, and in my letter of the 6th October last. I have discussed the subject with him, but Dr. Hooker has in no way committed himself to an opinion. Whatever his views may be, I think that it will be for the benefit of the public service to take his advice on this matter.

I would also solicit permission to send copies of this letter and of the proposed amended "particulars" privately, with my letter of the 6th October last on the same subject, to the following gentlemen:—

1.—Professor Balfour, Director, Royal Gardens, Edinburgh.
2.—Dr. J. D. Hooker, Director, Royal Gardens, Kew.
3.—Dr. Thomson, late Director of Botanic Gardens, Calcutta.
4.—Hon'ble J. Howard, Commissioner of Her Majesty's Woods and Forests.
5.—The Right Hon'ble Sir Edward Ryan, Civil Service Commission.
6.—Sir James Campbell, Bart., Deputy Surveyor of the Dean Forest.

And to any other persons who have taken an interest in these proposals.

Particulars respecting the selection of candidates for nomination to Junior Appointments for the Forest Department in India.

The Secretary of State for India in Council having resolved to send out five young men properly trained and well educated from this country for service in the forests of India, with a view to their being ultimately promoted to the superior posts in that Department, the following are the conditions required of persons seeking to be nominated to one of these appointments, and the advantages held out to them:—

Candidates must be British subjects, and must be between 17 and 25 years of age. None should apply who have not active habits, combined with a strong, hardy constitution. They must send the following documents to the Revenue Department of the India Office between the 1st and 15th November 1867, after which no applications will be received—

1. Their names and parentage, a certificate of their birth, and, if under age, a statement of consent from parents or guardians.

2. A statement of the places of education at which they may have been since they were twelve years old, accompanied by testimonials of good conduct during the last two years, and proof of their having mastered the following branches of knowledge, as well as specimens of their proficiency in free hand and plan drawing:—

I.—English writing from dictation, and English composition.
II.—Arithmetic, including vulgar and decimal fractions.
III.—Algebra, elementary principles, simple and quadratic equations, ratios and proportion, logarithms, arithmetical and geometrical progression, and compound interest.
IV.—Geometry (1st, 2nd, 3rd, 4th, and 6th Books of Euclid) and plane trigonometry.
V.—Free hand and plan drawing.

Those candidates whose testimonials and certificates appear satisfactory, will be invited to appear personally at the India Office on a day to be fixed in December.

The candidates will then be directed to appear for medical examination before the Indian Medical Board.

They will also appear before the examiners of the Civil Service Commission to test their proficiency in the various subjects mentioned above.

Those of the candidates who will be selected by Her Majesty's Secretary of State for India must then agree to undergo a regular course of studies and training of three years and a half in the natural sciences, in the practice and science of Forestry, and in those branches of surveying and engineering required for the profession of a Forest Officer in India. The first, or purely scientific part of this course of training, will take place in Great Britain; for the second part, comprising the instruction in Forestry and the subjects immediately connected therewith, arrangements will, for the present (until an efficient Forest School in Great Britain or in India shall have been established), be made on the continent, that is, in France for those candidates who are sufficiently acquainted with French, and in Germany for those who are familiar with the language of that country. One year and a half is assigned to the first or purely scientific part, and two years to the training in Forestry and the subjects intimately connected therewith. The following are the arrangements to be followed by candidates, but Her Majesty's Secretary of State reserves to himself the right from time to time to make such alterations in the course of studies and training as may be expedient.

The studies of candidates during the first or scientific part of their training shall comprise the following subjects :—

I.—*Mechanical and Natural Philosophy.*—The elements of mechanics, hydrostatics, hydraulics, optics, heat, climate, rain-fall, and the first elements of electricity and magnetism.

II.—*Chemistry, Inorganic.*—The non-metallic elements and the principal metals.

Organic.—Elements only, with special reference to the chief constituents of the vegetable and animal organism; the chemical principles of the process of nutrition and of respiration in plants and animals.

Fermentation, decay, putrefaction, destructive distillation.

III.—*Botany.*—Characters of the principal European natural orders. Ability to describe any common phænogamous plant of ordinary structure, systematically and with accuracy, from a living specimen.

The elementary facts referring to the development and nutrition of plants.

IV.—*Geology.*—Elementary portions of descriptive geology.

V.—Either the French or the German language.—Good colloquial knowledge, with the facility to read and translate into English easy passages taken from the works of some classical writer.

Candidates are at liberty to choose the place of study, but they must, before being admitted to the second or practical part of instruction, pass an examination before the Civil Service Commissioners in the branches of science and in one of the languages enumerated above. This examination will be held in July or August 1869, and the candidates must, on the day previous to the examination, report themselves at the India Office, and produce testimonials from the professors or Masters under whom they have been studying.

Candidates who fail to pass the examination in sciences and one of the languages at the close of the first year and a half, may continue their studies for another year, but they will not be allowed to present themselves more than twice for this examination.

Those candidates who fail to satisfy Her Majesty's Secretary of State that they have attained a sufficient proficiency in the subjects mentioned, will be removed from the list of candidates.

Those candidates who, from previous study, feel themselves competent to pass the second or science examination at the same time as the first, or examination for admission, will be permitted to do so. Application for doing so should be made by them when sending in their papers and testimonials.

Candidates who have taken academical degrees or honours in science and mathematics will, wholly or partially, be exempted from the examination of admission as well as the examination in sciences, and only be required to furnish proof of a sufficient knowledge of German or French. Candidates who have passed any examination requiring a sufficiently high standard of proficiency will be exempted examination in those branches in which they have been previously examined. Her Majesty's Secretary of State for India will determine how far the certificates of candidates may entitle them to exemption, either entire or partial, from examination.

It is very desirable that candidates should, before proceeding to the continent for their [illegible] training, devote two months to a practical apprenticeship with an approved Wood-

manager or Forester in Scotland. Early spring is the best season of the year for this purpose. A certificate of their having done so will entitle them to a stipend of twenty pounds, to be paid in case they pass the science examination.

The course of training in forestry abroad will commence on the 1st September 1869, and be concluded on 1st September 1871.

The following arrangements have been made for those candidates who are qualified in French. They will proceed to Paris and report themselves at the "Direction Générale des Forêts. The months of September and October will be spent in a forest district for preliminary practical training. By the 1st November they will proceed to Nancy, where they will be received as students at the Imperial Forest School, and pass through the regular biennial course of studies, practical exercises, and periodical examinations with the French students. The whole expense of their residence in France has been estimated at 300 francs per month, or 144*l.* per annum. The instruction is gratuitous.

No entrance fees are paid at the School. A small remuneration may have to be paid in addition to the above sum for the preliminary practical training.

Those candidates who possess a sufficient knowledge of German will proceed to Hanover, and report themselves to Mr. Burckhardt, the Director of Forests in the former kingdom of Hanover, who will undertake the general direction of their studies and practical training.

During the first year the candidates will be placed with an executive Forest Officer in charge of a forest district (Oberförster), where they will serve their apprenticeship in the practical work of a forester, and at the same time receive instruction in the science of forestry. The Director will from time to time see them, and they will occasionally accompany him on his tours of inspection.

During the second year the candidates will live at Hanover, where they will continue their studies in the different branches of the science of forestry, as well as in surveying and engineering, in so far as may appear requisite for a forest Officer in India.

They will occasionally accompany the Director or others of the principal forest officers, on their journeys of inspection, and will from time to time be sent to different forest districts, to become acquainted with the different kinds of forests and the various methods adopted for their management. Should such hereafter appear expedient, the time assigned to Hanover may be spent at a forest school, as may be arranged by the Director.

The whole cost for maintenance and instruction during their studies in Germany has been estimated at 100 thalers per month, or 180*l.* per annum. This includes all remuneration paid for instruction.

During the course of training arranged as here described in France or Germany, the candidates will be expected to conduct themselves throughout in a proper and gentlemanlike manner; to obey the injunctions of the officers and professors appointed to instruct them; to use due diligence in the practical work and in their studies, and zealously to improve every opportunity for learning that may be offered them. Candidates who do not conduct themselves in a proper and gentlemanlike manner, or who do not show satisfactory progress in their studies, will be removed from the list of candidates on the report of the officer entrusted with the general direction of their studies.

To those candidates whose conduct and progress are satisfactory, Her Majesty's Secretary of State engages to pay a stipend at the rate of 60*l.* for each half-year during the two years of their studies abroad. This stipend will be paid half-yearly on the recommendation of the Officer entrusted with the general direction of the studies and training of the candidates in France or Germany.

After completing the course prescribed abroad, an examination will be held by the officers and professors entrusted with the instruction of the candidates. Those who give proof of a satisfactory progress in the subject in which they had been instructed will be nominated junior assistants in the Forest Department in India.

Within a month of his nomination each nominee must sign a covenant in the form appended hereto, describing the terms and conditions of his appointment, and must embark for India when required to do so by the Secretary of State in Council, who will provide for the expenses of the passage. Any nominee not embarking when required will forfeit his appointment. Otherwise he will be allowed pay at the rate of Rs. 250 (which is about the equivalent of 25*l.* in English money) a month from the date of his signing the covenant.

On arrival in India the nominee will be required to report himself to the Government of India or to the Government of Bombay or Madras, in case he should be sent to one of these Presidencies, and he will then be posted to such part of the forests as the service may require.

On joining his post the nominee will become entitled to all the rights and privileges in respect of pay and promotion accorded to officers of the Forest Department by the rules and regula-

tions for the time being, and to leave of absence and retiring pensions under the leave and pension rules of the Uncovenanted Service for the time being. No rise of pay or promotion will, however, take place previous to his passing an examination in such one of the native languages as may be prescribed by the Government under which he is serving.

ORDER.—Ordered, that the above be forwarded to all Local Governments* and Adminstrations, in continuation of Public Works Department Circular No. 6 F of 1867.

Ordered also, that a copy be forwarded to Dr. Brandis for information.

(Signed) C. H. DICKENS, *Colonel, R. A.,*
Secy. to the Govt. of India.

William McFeers C. E.,
Offg. Asstt. Secy. to the Govt. of India.

* Madras, Bombay, Bengal, North Western Provinces, Punjab, Oudh, Central Provinces, British Burmah, Mysore, Coorg, Hyderabad, Rajpootana, and Central India.