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PROCEEDINGS
OF THE
BOARD OF FORESTRY

AT MEETINGS HELD AT

DEHRA DUN

BETWEEN THE

31ST MARCH AND 6TH APRIL 1910

WITH

APPENDICES.



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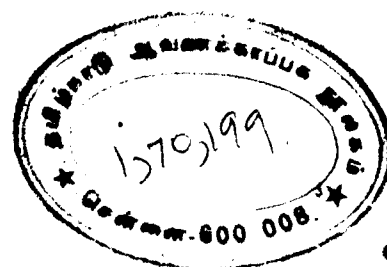
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**Proceedings of the Board of Forestry at meetings held at Dehra Dun
between the 31st March and 6th April 1910.**

Introduction.—The Board of Forestry, as approved by the Government of India, met for the first time at Dehra Dun on the 31st March 1910.

The orders of the Government of India constituting the Board and defining its functions are contained in Revenue and Agriculture Department Circular No. 2-F.-177-16, dated the 13th January 1910.
Vide Appendix A (a).

The pressing necessity for putting the work of the Imperial Forest Research Institute and College on a sound footing rendered it advisable for the Board to meet as soon as possible, and the favourable opportunity presented by the annual meeting of the Board of Control for the Forest College was taken advantage of.

Evidence of the great interest taken by the Government of India in Forest matters has not been lacking in recent years, and it was again proved by the attendance at several meetings of the first Board of Forestry of the Hon'ble Mr. J. O. Miller, C.S.I., the Member of Council in charge of Forests, and of the Hon'ble Mr. R. W. Carlyle, C.I.E., Secretary to the Government of India in the Revenue and Agriculture Department. An address delivered by the Hon'ble Mr. Miller and the Inspector General of Forests' reply will be found in Appendix A (b).

The Board was constituted as follows :—

- Mr. F. Beadon Bryant, Inspector-General of Forests, *President*.
- „ J. H. Lace, Chief Conservator of Forests, Burma.
- „ C. E. Brasier, Conservator of Forests, Central Circle, Madras.
- „ G. P. Millett, Conservator of Forests, Northern Circle, Bombay.
- „ L. Mercer, President, Imperial Forest Research Institute.
- „ H. Jackson, Conservator of Forests, Eastern Circle, United Provinces.
- „ C. P. Fisher, Conservator of Forests, Punjab.
- „ C. G. Rogers, Conservator of Forests, Berar Circle, Central Provinces.
- „ G. S. Hart, Conservator of Forests, Bengal.
- „ M. Hill, Conservator of Forests, Western Circle, Eastern Bengal and Assam.
- „ S. Carr, Assistant Inspector-General of Forests, *Secretary*.

The following is a list of the subjects which, with the sanction of the Government of India, were discussed by the Board :—

- I. Rules defining the general scope of the work of each Research Officer and the general lines on which Research work is to be conducted in future.
- II. The triennial programme of Research work for the period 1910-1913.
- III. The qualifications which candidates for direct appointment to the Provincial Service should possess in the event of the special two years' course of training being introduced.
- IV. Forest Engineering.—Should this subject be dealt with at the Imperial Forest Research Institute ; and if so, how.

- V. Suggested formation of a separate Imperial Cadre for the Imperial Forest Research Institute and College, on lines similar to those of the cadre of a province.
- VI. How can Research work in the provinces best be co-ordinated with the work being done by the Imperial Forest Research Institute.
- VII. How far the time of Research Officers should be taken up in analysing samples of forest soils sent them for examination, and under what rules this should be done.
- VIII. The necessity for an agent in England to answer enquiries regarding Indian Forest Products, to receive samples of timbers, etc., and to generally push the trade in forest products.
- IX. The standardization of the formation and management of sample plots.
- X. The standardization of tree measurements.
- XI. Research Institute publications, their scope, necessity and size.
- XII. Proposal that the constitution of the Board of Forestry be extended so as to include at least one Divisional Forest Officer from each province.
- XIII. Proposed institution of short staff courses for the more important subjects in order that any Imperial Forest Officer who wishes to pursue any branch of research can further his knowledge and ascertain the right lines to start upon.
- XIV. Proposal to hold an Imperial Forest Conference to discuss general subjects, to promote progress and to improve the efficiency of the Department.

I.—Rules defining the general scope of the work of each Research Officer and the general lines on which research work is to be conducted in future.

From time to time since the inauguration of the Imperial Forest Research Institute various rules have been drawn up for the conduct of work at this Institution, but they have proved unsatisfactory, mainly because they did not lay down the duties and responsibilities of each officer with sufficient precision. Rules designed to rectify this, and also to bring the Department as a whole into closer touch with the Research Institute, were discussed by a Committee of Forest Officers at Dehra Dun in March 1909 and recommended to the Government of India for adoption. Since then, these proposed rules have been circulated to all Conservators for opinion and criticism. They were modified in the light of the suggestions received and of further experience, and placed before the present Board for consideration. The amended rules and the Conservators' suggestions regarding those originally promulgated were fully discussed and, after consulting the Research Officers concerned, some further modifications were agreed to.

Resolved.—The Board recommends the rules given in Appendix B for the approval of the Government of India.

II.—Triennial Programme of Research Work for the period 1910 to 1913.

At the first meeting of the Board, it was proposed by the President that a sub-committee consisting of Messrs. Millett, Mercer and Hart and, as regards each subject, the Research Officer concerned, be appointed to consider the proposed triennial programme and submit proposals to the Board. This was agreed to. The proposals of the sub-committee were subsequently considered by the Board as a whole and the programme still further modified.

All the suggestions made by Conservators and other Forest officers consulted by them were discussed by the Board, but it is unnecessary to refer to them in detail. Some have been met by the alterations made in the programme, others are not of sufficient importance or are matters which it is quite impossible, owing to want of staff, to include in the programme for the next three years and which must, for the present at any rate, be investigated by the local officers concerned. The following may, however, be briefly mentioned:—

- (a) Suggested by Mr. A. M. Reuther, Chief Conservator of Forests, Central Provinces. "The influence of forests in India and Burma on the retention of moisture in the soil, the flow of streams, the precipitation and distribution of rain and on climatic conditions generally in relation to agriculture."

Mr. Reuther wrote as follows:—*"I consider it desirable that no more time be lost in beginning the enquiry on a sufficiently extensive basis, and in pursuing it steadfastly with the practical object of demonstrating the immense value of maintaining and promoting adequate density of the forests in India and Burma by protection against fire and by other suitable means, and with a view to securing by dint of such demonstration the introduction and development of practical measures for eliminating, as far as possible, adverse conditions such as excessive injury by cattle, avoidable disforestsments, and deterioration by injurious methods of forest management and of forest utilization."*

In many respects much practical evidence is already available, but much more is needed and the collection and effective marshalling of facts and adequate presentment is required."

The Board understand that the enquiry suggested is already being carried out by the Government of India. They agree with Mr. Reuther in regarding it as of the utmost importance, but they regret that it is quite impossible to include it in the programme of the Research Institute as at present constituted.

Mr. Reuther's further suggestions involve the whole question of the value of Forest administration and protection in India; the Board regret that they do not see their way to include them in the 3 years' programme under discussion.

(b) Mr. Fisher, Conservator of Forests, Punjab, suggested the inclusion in the programme of an enquiry into the grazing incidence per acre of horned cattle, sheep and goats in hill forests, compatible with the maintenance of hill sides in an afforested condition. Mr. Haines, Conservator, Southern Circle, Central Provinces, suggested an enquiry into the number of cattle that can be conveniently grazed in different types of forest without serious damage to the crop, and with reference to the proper nourishment of the cattle.

The Board agreed that the grazing question generally is one of the greatest importance and that in some places the very existence of the forests depends on the proper regulation of grazing. They considered, however, that, owing to the limited staff of the Research Institute, the investigations into the incidence of grazing in the different provinces must for the present be carried out by local officers, but that the Sylviculturist should give all possible assistance and should record and tabulate the results of the local investigations.

After a full discussion of the whole question the Board agreed that, in view of the circumstances, as many subjects as it is possible for the Research Officers to undertake have been entered in the triennial programme.

The Board then considered the additional establishment recommended by the President of the Research Institute (*vide* below), and are of opinion that this represents the minimum necessary, and that if it cannot be sanctioned the programme must be still further curtailed. If this is necessary, the time of the Research Officers will not be used to the best advantage.

Resolved.—The programme as amended (Appendix C) is recommended for the sanction of the Government of India, and the Board are convinced that progress in Research work will be greatly retarded unless the additional establishment recommended by the President of the Research Institute can be made available.

Establishment (excluding clerks and peons) considered necessary by the President to carry out the proposed programme.

President, Research Institute.

- | | | |
|------------------------|-----|--|
| 1. Draftsman | ... | (Already entertained.) |
| 1. Ditto, | ... | (Sanctioned but not entertained at present.) |
| 1. Photographic Artist | ... | (Entertained as sanctioned in 1909-10. Sanction not yet received for 1910-11.) |

Imperial Sylviculturist and Superintendent of Working Plans.

- | | | |
|------------------|-----|--------------------------|
| 2. Assistants | ... | } (Not yet entertained.) |
| 1. Deputy Ranger | ... | |
| 1. Duftri | ... | (Entertained.) |

Imperial Forest Botanist.

- | | | |
|------------------------|-----|--|
| 1. Herbarium Caretaker | ... | (Already entertained.) |
| 1. Artist | ... | (Now entertained as sanctioned in 1909-10. Sanction not yet received for 1910-11.) |
| 1. Mali | ... | (Not entertained.) |
| 1. Collector | ... | } (Already entertained.) |
| 1. Ditto | ... | |
| 1. Mounter | ... | |
| 1. Ditto | ... | |

Imperial Forest Economist.

- | | | | |
|--------------|-----|-----|------------------------|
| 1. Collector | ... | ... | (Already entertained.) |
|--------------|-----|-----|------------------------|

Imperial Forest Zoologist.

- | | | | |
|--------------|-----|-----|--------------------------|
| 1. Artist | ... | ... | } (Not entertained.) |
| 1. Assistant | ... | ... | |
| 1. Setter | ... | ... | } (Already entertained.) |
| 1. Do. | ... | ... | |
| 1. Collector | ... | ... | |
| 1. Do. | ... | ... | |

Imperial Forest Chemist and Assistant Chemist.

- | | | |
|-------------------------|-----|------------------------|
| 1. Scientific Assistant | ... | (Not entertained.) |
| 1. Laboratory Assistant | ... | (Already entertained.) |
| 1. Driver | ... | (Not entertained.) |

III.—The qualifications which candidates for direct appointment to the Provincial Service should possess in the event of the special two years' course of training being introduced.

The Board discussed the desirability of instituting a separate two years' course of training for candidates for direct appointment to the Provincial Service, and the qualifications which such candidates should possess before they are admitted to this course. The Board is in entire agreement with Resolution No. VIII of the Board of Control for 1909, which was as follows:—

“The Board considered the question as to whether an entirely separate two-years' course should not be given to Provincial Service probationers instead of the present arrangement of a third year's training in continuation of the Rangers' course. It was considered in every way preferable that there should be an entirely separate course for the candidates for direct appointment to the Provincial Service. This is the system in force at the Roorkee Engineering College and it would, it is thought, tend to encourage a better class of men to come forward than those hitherto obtained.”

The Board consider that in the interests of the Provincial Service it is essential that this separate course, in which a thorough training in Forestry and the allied sciences would be given, should be instituted as soon as possible. The Board are of opinion also that candidates for this course should possess high educational qualifications, but that, instead of educational certificates being accepted as sufficient proof of a good education, no candidate should be admitted who has not satisfactorily passed a special qualifying or entrance examination designed to show that he has received a good general education and possesses a thorough knowledge of English, and is consequently in a position to follow the College course with advantage. The subjects of the examination should not be numerous and need include only English and elementary mathematics (including arithmetic, mensuration, algebra, trigonometry and geometry). Only candidates nominated by Local Governments should be required to undergo a period of practical training in the forests for at least 6 months before being

admitted to the College. Candidates should not be less than 18 or more than 22 years of age when they enter the College.

IV.—Forest Engineering—Should this subject be dealt with at the Imperial Forest Research Institute; and if so, how.

In discussing this subject the Board considered a letter * addressed to the Inspector General of Forests by Mr. Caccia, when President of the Research Institute, in which the necessity for an expert engineer is dealt with.

*Appendix D.

Some of the members of the Board also brought forward instances in their own experience in which the advice of an engineering expert would have been of the greatest assistance in deciding on the best method of mechanical transport to adopt, in facilitating the erection of suitable works, or in preventing defects of design or construction which have resulted in the partial or complete failure of more or less extensive engineering projects, and consequent waste of money.

Mr. Rogers stated that at a Forest Conference held at Nagpur in 1908, a resolution was passed recommending the appointment in the Central Provinces of a specially trained Forest Officer to enquire into the question of transport.

† Appendix D.

This was referred to in an editorial in the "Indian Forester" for May 1909.†

After a full discussion, the Board agreed that there can be no question but that the services of an expert Forest Engineer would be extremely useful in many cases. They doubt whether one such officer will eventually be sufficient for the whole of India and Burma, but experience will soon show whether this is the case or not.

Resolution.—The Board consider that the subject of Forest Engineering can for the present be best dealt with at the Research Institute, and in order that the subject may be put on a satisfactory footing they recommend that an expert engineer should be appointed on the Research Institute cadre. The Board agreed that a trained engineer would be more suitable than a Forest officer for this appointment, and that special training or experience in Forest Engineering in Europe and America should be regarded as an essential qualification for the appointment.

In Appendix D are some memoranda drawn up by some of the members of the Board, indicating a few instances in their provinces in which the services of a Forest Engineer could be employed with advantage.

V.—Suggested formation of a separate Imperial Cadre for the Imperial Forest Research Institute and College, on lines similar to those of the cadre of a Province.

The President of the Research Institute represented that the formation of a separate Imperial Service cadre is expedient because:—

- (a) Experience not only at Dehra but in other countries has shown that, in order that research and education work may be really efficacious, it is essential that continuity of appointment be assured, and that as a general rule the incumbents of the various posts should remain permanently in them, this having been admitted and given effect to in both France and Germany.
- (b) It is often extremely difficult to obtain suitable Forest Officers for these posts, owing in some cases to such not being always available, and in others to Local Governments and Administrations being unwilling to depute the men asked for, and sometimes even being desirous of recalling men after they have been a comparatively short time at Dehra.

The President also expressed the opinion that it would be expedient to form subsequently a Provincial Service cadre on similar lines, but that action in this direction might be postponed pending the orders of Government on the proposal to create an Imperial Service cadre.

The Board discussed this question at considerable length. It was agreed that it is necessary that a separate cadre should be sanctioned for the Research Institute and College, but that certain of the Research appointments could better be held by trained experts in the respective subjects than by Forest Officers, and that difficulties might be experienced in bringing such officers on to an Imperial Service cadre. The Board considered that one cadre should be formed for the Research Institute and College, on which all the appointments sanctioned, whether of the Imperial or Provincial Forest Service, or of specially trained experts, should be borne.

The final conclusions arrived at are embodied in the following Resolution:—

In the opinion of this Board it is desirable that—

- (i) A separate cadre be formed for the Research Institute and College on lines similar to those of the cadre of a Province, with allowance for leave vacancies.
- (ii) Once officers join this cadre, and prove suitable for research or educational work, their services should as a rule be retained on it for the greater part of, if not their entire, service; officers of the Forest service should be paid their incremental pay, with local allowance, until such time as any officer below them on the general list is appointed substantively or temporarily to the administrative grades, and they should then be granted the pay of such officer, with or without local allowance;
- (iii) The officers on this cadre who are employed as Instructors should be encouraged at the same time to take up some special branch of research, so that they may qualify themselves to replace, at least temporarily, the Research Officer in this branch;
- (iv) This cadre should be recruited—
 - (a) By transfer from Provincial cadres;
 - (b) By direct appointment of experts who are not members of the Forest Department, on average pay which would generally be lower than that of officers of the Forest Department and which would thus be a certain set-off against the additional expenditure entailed by the proposal that Forest Officers on the new cadre should draw the pay of administrative grades, on their seniority and efficiency rendering them eligible for such.
- (v) The cadre should be constituted as follows and should be gradually formed as circumstances and funds permit:—
 - 1. President of the Research Institute and Principal of the College.
 - 2. Imperial Forest Sylviculturist (to include Working Plans branch).
 - 3. Assistant to Sylviculturist.
 - † 4. Imperial Forest Botanist and Mycologist.
 - 5. Imperial Forest Economist.
 - † 6. Imperial Forest Chemist.
 - † 7. Imperial Forest Zoologist.
 - † 8. Assistant to Zoologist.
 - † 9. Imperial Forest Engineer.
 - 10. Instructor No. 1, Provincial Service Class.
 - 11. Instructor No. 2, Provincial Service Class.

- *12. Instructor No. 3, Rangers' Class.
- *13. Instructor No. 4, Rangers' Class.
- †14. Instructor No. 5, to assist with the Ranger Class.
- †15. Instructor No. 6, to assist with the Ranger Class.
- †16. Provincial Service Officer in charge of Ledgering and Forest publications.

The appointments marked * should as a rule be held by Imperial Service Forest Officers; those marked † by Provincial Service Forest Officers and those marked ‡ by experts trained in the special subjects.

- (vi) The early appointment of the Imperial Service officers required for the education of the Provincial Service and Rangers' classes is of the greatest importance. These officers are urgently required in the interests of education and the efficiency of future members of the Provincial and Subordinate Forest Services, and their appointment should have precedence before all other considerations. (It may be noted that the increase in Imperial Service Officers suggested is chiefly in the cause of education and for the benefit of the Provincial and Subordinate Services.)
- (vii) The following posts should, as opportunity offers, be filled by experts in the various subjects, and not necessarily by Forest Officers:—
 - The Imperial Forest Botanist and Mycologist.
 - The Imperial Forest Chemist.
 - The Imperial Forest Zoologist.
 - The Imperial Forest Engineer.
- (viii) The Botanist should also be a specialist in Mycology and the diseases of trees, as prevention of damage to forest crops due to fungoid or other diseases is considered to be of greater importance than systematic Botany, so far as Forestry is concerned. Some notes by members of the Board, showing the damage done to forest crops by fungoid and other diseases, appear in Appendix E.
- (ix) The assistant Sylviculturist should, if possible, be an Imperial Service Officer.
- (x) The Board would be glad to see a Provincial Service Officer appointed as assistant to the Zoologist, but if any reduction has to be made in the suggested staff, they consider that this post can be dispensed with more easily than any other.

VI.—How can research work in the Provinces best be co-ordinated with the work being done at the Imperial Forest Research Institute?

Copies of a note and a set of proposed rules for affiliating Provincial Research officers in Sylviculture and Working Plans with the Imperial Forest Research Institute, which had been drawn up by Mr. R. S. Troup, the Imperial Sylviculturist, together with a draft Resolution prepared by Mr. Rogers were placed before the Board. It was generally agreed that the future progress of research in some subjects, and especially in Sylviculture and Working Plans, must depend in a great measure on the amount of assistance that local officers may be able to afford. The special research officers can do a great deal, but their work must be supplemented by local investigations, the results of which should be collated and recorded by the special research officers. The Board were of opinion that in some provinces, if not in all, it will be found advisable to appoint provincial research officers to work in collaboration with the staff of the Research Institute. This is a matter for Local Governments and Administrations to decide, but the Board hoped that it

may occasionally be possible for selected local officers to be put on special duty, or relieved of a portion of their ordinary work, in order that a particular investigation may be carried out.

The Board recognized that the results of many local investigations and much useful information are buried in local records and thought that steps should be taken to examine these records, and to bring together such of the available information as is reliable, with view to placing it on record in a convenient and uniform manner.

The conclusions arrived at are summarized in the following resolution:—

The Board are of opinion that local research work is, and always must be, of the greatest value in connection with the economic and scientific development of Indian forests, and they consider that it is imperative to enlist the sympathy and cordial co-operation of local officers in research work of all kinds.

They recognise that a great deal of research work of much value has been done in the past and is now being done by local Forest officers, especially as regards:—

- (i) The sylviculture of the more important trees and crops,
- (ii) The collection of statistical data,
- (iii) Minor forest produce of economic value,

and they consider that immediate steps should be taken to collect such of this information as is reliable and place it on record for the benefit of the department as a whole.

They agree that much of the information collected locally in the past cannot be utilized owing to the great differences in the manner of carrying out investigations and experiments, but they consider that it is essential that the work of the special research officer should be very largely supplemented by local research if adequate progress is to be made. They strongly recommend that local officers should be encouraged by every possible means to continue original work on the lines adopted at the Research Institute, not only in the subjects for investigation included in the 3 years' programme approved by the Board, but in other subjects of importance locally, e.g. information regarding the more important trees and forest crops, and other matters affecting Forest management.

In order to give practical effect to this recommendation, the Board consider that Local Governments and Administrations should be asked to assist by—

- (i) Encouraging selected officers to place on record, in a convenient form, all that is known of the most important forest trees, as well as any facts of an interesting nature that have not hitherto been published.
- (ii) Affording facilities in special cases to local forest officers to collaborate, within their province, with the special research officer in any particular investigation.
- (iii) Publishing the information collected by local officers in the same form as has been adopted for the publications of the Research Institute.

The Board wish to enlist the sympathy of Provincial Administrations, and the active co-operation of local officers, in research work, but they do not in any way wish to lay down what investigations should be undertaken by local officers. They consider that, in order to allow of the results of local investigations being fully utilized and to prevent duplication of work, local officers engaged in any investigation should be encouraged to keep in touch with the Research Institute.

VII.—How far the time of Research officers should be taken up in analysing samples of forest soils sent to them for examination, and under what rules this should be done.

The President of the Research Institute represented that little or no inference can be drawn from the chemical analyses of soils, and that such analyses

have been carried out for a long time for agricultural soils without any authoritative decision having been come to. Also that, if any analysis of soils be undertaken, it should rather be a physical analysis restricted to the Sal bearing areas, this being the main species under investigation during the next three years; and that such physical analysis would deal with, *inter alia*, the aeration, the consistency and texture, absorption capacity, nitrogen supply, and possibly bacteriology of the soil. It is, however, quite possible that, owing to the want of laboratory facilities, this physical analysis would make slow progress.

Resolution:—The Board are of opinion that the Chemist's time is fully occupied with more important work, in connection with forest products of economic and commercial importance. He cannot generally, at present, spend much time in analysing soils but with the President's sanction he should assist Forest officers by doing so in special circumstances.

VIII.—The necessity for an agent in England to answer enquiries regarding Indian Forest products, to receive samples of timbers, etc., and to generally push the trade in forest products.

The following note by the Inspector-General of Forests formed the basis of the discussion on this subject:—

"So far as I am aware there is no Government agency in England to assist the quasi-commercial departments in bringing their goods to the notice of likely purchasers. This is a great drawback in the case of the Forest Department at any rate, and we find it very difficult to get into touch with the trade in Europe. The only way we can do this is through agents who absorb a considerable proportion of the profits. There are many valuable woods and a great variety of minor forest products for which a demand would surely be forthcoming if properly put forward in London. Our large stores of Padouk are lying unused in the Andamans. We hope shortly to be able to produce tannin extracts from sal and mangrove bark, of good commercial quality. But I think we shall never get them on the European market without special assistance in London.

I should like to see a Government Forest agent appointed, to whom consignments of forest products might be sent for sale. He would be in direct touch with our Imperial Forest Economist, and under the orders of the President, Research Institute, or perhaps the Secretary of State. He would be kept informed of what we had to sell and endeavour to book orders for it. He might suitably be a retired Forest Officer, and I think the appointment of such an agent would lead to considerable business and increased revenue. At present enormous quantities of valuable forest products are being wasted because they are not properly known."

The Board understand from a note written by the Economist that the present method of sending samples of forest products to commercial firms in Europe, for valuation and report, does not in practice work well. Commercial firms have their own ends to serve and do not always give the necessary information in their reports. Nor, when making enquiries regarding timber, etc., do they always give sufficient details to enable the Economist to meet their wishes and supply the information they require. Again when forest products have to be tested or experiments on a commercial scale carried out, the Economist has usually to apply to some expert in England for information as to the best firm for the purpose, or for assistance in making the necessary arrangements. The Board consider that an agent in England, who could personally interview commercial firms, supply information regarding (a) markets for various forest products, (b) the best firms to deal with for any particular purpose, and obtain estimates for plant required for tramways, monorails or other engineering projects, or for forest industries, would supply a much needed want.

After discussing the question the following Resolution was agreed to:—

The Board are of opinion that, following the example of commercial firms, the appointment of an agent in England is desirable, and that he might be paid

partly by commission on the results obtained. The agent should be in close touch with the Imperial Forest Economist.

IX.—The Standardization of the formation and management of sample Plots.

A note on the establishment and upkeep of sample plots by Mr. R. S. Troup, the Imperial Sylviculturist, and extracts from a Circular addressed to all his Divisional Officers by Mr. G. S. Hart, Conservator of Forests, Bengal, together with a draft resolution by Mr. Hart, were placed before the Board and considered.

After discussing the matter, the following Resolution was agreed to:—

That it is very desirable to obtain uniformity in the upkeep and management of experimental plots. The Board considered Forest Pamphlet No. 8.—"The collection of Statistical Data relating to the principal Indian Species"—and are of opinion that the control of sample plots established for the purpose of collecting data regarding the rates of girth (or diameter) and height growth of selected type seedling trees and coppice shoots of various species may be carried out by local officers, the work to be done in each Circle being fixed by Conservators. They recommend that Forest Pamphlet No. 8 be brought to the notice of all Chief Conservators and Conservators, who should be invited to adopt the lines suggested and the forms detailed in the pamphlet, so far as these are suitable to local requirements. The actual forms to be used in each case should be decided by Conservators, in communication with the President of the Research Institute.

Annual measurements are not necessary. Quinquennial measurements will be sufficient, and these should be communicated to the Imperial Sylviculturist by the Conservator concerned.

The Board are of opinion that the more detailed investigations relating to volume increments, and in plots taken over by him all measurements, should be left to the Sylviculturist, local officers being made responsible for the maintenance of the plots in proper order.

The Board desire to lay stress on the necessity for the proper maintenance of all experimental plots.

X.—The Standardization of Tree Measurements.

The following note by the Sylviculturist formed the basis of the discussion on this subject:—

"In the November number of the 'Indian Forester' of 1909, page 607, attention was drawn to the advisability of standardizing the measurements of trees, not only as regards the method of measuring (girth or diameter) but also as regards the size classes to be adopted.

2. *Girth and Diameter measurement*.—In the great majority of Indian Working Plans the size classes are recorded by girth and not by diameter measurements. In a few plans, notably some of the older Burma plans and one plan in Oudh, diameter measurements were recorded, but in the marking of trees for felling a girth limit not corresponding to any of the diameter measurements, is taken; this is obviously liable to result in error to a considerable extent. As girth measurements are almost invariably employed in forest operations in India, it is proposed that girth measurements only, and not diameter measurements, should be recorded in working plans in future: whether the measurements be made with a tape or with callipers graduated to read girth measurements is immaterial.

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3. *Standardization of size classes.*—The question of standardizing size classes is a more difficult one. The most general classifications adopted in India and Burma respectively are as follows :—

					INDIA.	BURMA.
					(Girth).	(Girth).
I Class ...	...	...	...	...	6 ft. and over	7 ft. and over.
II " ...	...	...	...	...	4½ ft. to 6 ft.	6 ft. to 7 ft.
III " ...	...	...	...	...	3 ft. to 4½ ft.	4½ ft. to 6 ft.
IV " ...	...	...	...	...	1½ ft. to 3 ft.	3 ft. to 4½ ft.
V " ...	...	...	...	...	Under 1½ ft.	Under 3 ft.

One of the main defects of any such classification is that trees of intermediate girths are not considered: for instance, if trees are sylviculturally and economically mature at 5 ft. girth a special sub-class would have to be created for such trees. This seems to indicate that 6" or 1 ft. girth classes would be of more use for general application than classes of the present wider limits. On the other hand, it might be difficult to overcome local usage and introduce any such change.

4. The "Indian Forester" proposes adopting the Indian classification noted above, and adding another class for mature trees, to be called "M" class, which will represent the exploitable size and will differ in different working plans. This, however, does not get over the fact that the introduction of a separate series of dimensions on the same system would lead to great confusion: thus a I class tree in Burma is a 7' tree, and if the class was changed to 6', the change would prove a fruitful source of error.

5. If any change is to be made, therefore, it would seem necessary to discard the class numbers (I, II, III, etc.) and employ letters, such as the following (in the case of 6" girth classes) :—

A Class	...	...	...	...	0—6" girth.
B "	...	...	...	...	6"—1' "
C "	...	...	...	...	1'—1' 6" "

and so on.

An alternative would be to denote the classes according to their dimensions thus :—

Sapling class	...	...	...	...	0—6" girth.
6" class	...	...	...	...	6"—1' "
1' "	...	...	...	...	1'—1' 6" "
1½' "	...	...	...	...	1½'—2' "

and so on.

6. The question of height classes is also raised in the "Indian Forester". Until the height measurements to be undertaken by the Imperial Sylviculturist are further advanced, however, it would be premature to lay down rigid rules on the subject, which might have to be altered in the light of future experience.

7. These questions have been raised with a view to arriving at some decision after discussion at the forthcoming Forest Conference. The questions for decision are :—

- (1) Are girth classes to be adopted universally in working plans, in preference to diameter classes?

- (2) Are the existing girth classes, which differ locally, to be retained, or are new standard ones to be adopted for general use?
- (3) In the latter case, what system of classification should be adopted?
- (4) Are height classes to be standardized now, or should this be left till further experience is gained?

Mr. Fisher advocated the introduction of diameter classes, but the majority or the members of the Board were of opinion that any advantage there may be in the use of such classes would be more than counter-balanced by the necessity for altering nearly all the existing working plans, and the confusion that would inevitably result from the change. The following Resolution was passed :—

The Board recommend that girth classes be retained, the measurements being taken with callipers, graduated to correspond with the girth classes, when data for working plans are being collected.

They consider it impracticable to standardize girth classes throughout India, and that the question of height classes may remain in abeyance until further experience has been gained.

XI—Research Institute publications; their scope, necessity and size.

The following note was submitted to the Board by the President of the Research Institute :—

"That the size of the memoirs of the Institute is unsuitable. The Board of Forestry is also asked to consider—

- (i) whether memoirs are a suitable and necessary form of publication; if not that they be abandoned for the present; if it is deemed advisable to retain them, the Board is asked to consider whether the size and shape of the Agricultural memoirs is not more suitable;
- (ii) whether small publications, such as leaflets, could not be more suitably inserted in the "Forester", as such do not generally appeal to a large class of readers."

After a discussion, the Board agreed that no change in the size of the "memoirs" is desirable but that this form of publication has not always been used for the purpose for which it was originally intended. Mr. Troup's work on Indian Woods and their uses, for example, should have been published in as compact and handy a form as possible and not as a memoir.

It was also agreed that some modification of the orders in force regarding the scope of the "memoirs" is required, e.g., the results of a full investigation, and not merely the results of a partial investigation regarding any particular enquiry, should alone be regarded as suitable for publication in this form.

Resolved.—That in the opinion of this Board—

- (1) The size and form of the "memoirs", "records" and "pamphlets" are suitable, but the "leaflet" series may be discontinued.
- (2) Amendments are desirable in the existing orders regarding the scope of the "memoirs" to ensure that publications in this form are confined to works of importance, giving the results of full and original investigations.
- (3) The "pamphlets" should in future be called "bulletins".

XII.—Proposal that the constitution of the Board of Forestry be extended so as to include at least one Divisional Forest Officer from each province.

This proposal was submitted by Mr. Clutterbuck, Officiating Conservator of Forests, Western Circle, United Provinces, with the following explanatory note :—

"The assistance of the Forest Department as a whole in the work of the Institute depends chiefly on Divisional Forest Officers and their subordinates, and such assistance will it is believed be more readily ensured if Divisional Forest Officers are given direct representation on the Board, *c. f.*, paragraph 5 of Inspector General of Forests' Circular No. 1-367-3, dated 17th January 1910."

Resolution.—It is agreed that the Board, as constituted by the Government of India, is sufficiently large and representative for present purposes.

XIII.—Proposed institution of short staff courses for the more important subjects, in order that any Imperial Forest Officer who wishes to pursue any branch of research can further his knowledge and ascertain the right lines to start upon.

In support of this proposal Mr. Clutterbuck submitted an explanatory note, pointing out that in order that the work of research may successfully progress it is necessary that there should be, in the various provinces, officers in sympathy with and interested in the various branches of research. He suggested that, as out-door work in most parts of India is usually more or less in abeyance during the rains, when the Research Officers are generally in Dehra Dun, Forest officers could be spared from their provinces to attend short courses of about three months during this period without inconvenience, and that much advantage would result, not only to the officers themselves but to research and general progress.

After discussing the proposal the Board resolved as follows :—

The institution of separate staff courses is at present out of the question inasmuch as the sanctioned staff has already more work to do than can be properly carried out. The Board are of opinion, however, that it would be of great advantage if selected Forest officers are allowed to visit Dehra Dun for such periods as Local Governments and Administrations think desirable, during which time these officers could study any particular subjects in which they desire to carry out research work. In such cases the officers of the Research Institute should afford all assistance it is in their power to give.

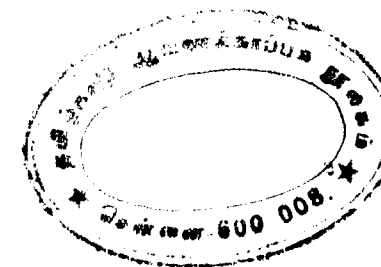
XIV.—Proposal to hold an Imperial Forest Conference to discuss general subjects, to promote progress and to improve the efficiency of the Department.

In an explanatory note submitted with this proposal Mr. Clutterbuck suggested a number of subjects suitable for discussion, and proposed that the conference be held at Allahabad between December 1910 and February 1911, during which period the United Provinces Exhibition will be open.

After discussing the proposal it was agreed that the time has hardly come for a general conference of Forest officers.

Resolved.—A large number of subjects have been discussed by the present Board, and it is considered advisable to wait some time before inviting Forest officers to attend such a conference as that suggested.

APPENDICES.



APPENDIX A (a).

Circular No. 2-F.—177-16, dated Calcutta, the 13th January 1910.
 From—R. W. CARLILE, Esq., C.S.I., I.C.S., Secretary to the Government of India, Department of Revenue and Agriculture,
 To—All Local Governments and Administrations.

In this Department's Circular No. 19-F.—177-2, dated the 19th July 1909, a proposal to constitute a Board of Forestry on the same lines as the Board of Agriculture was circulated for the consideration of all Local Governments. The proposal has been unanimously approved by the Local Governments, and the Government of India have accordingly decided to appoint a Board of Forestry to hold its first meeting in April 1910.

2. The Board will for the present be composed of the following members, provided that their services can be spared :—

- | | |
|--|----------------|
| (I) The Inspector-General of Forests to the Government of India | ... President. |
| (II) A Chief Conservator or Conservator from each province where officers of this rank are stationed, to be nominated by the Local Government or Administration. | } Members. |
| (III) The President of the Imperial Forest Research Institute | |
| (IV) The Assistant Inspector-General of Forests | ... Secretary. |

The Governments of Madras and Bombay will each be at liberty to depute a Revenue Officer as Member of the Board if they desire to do so. The Inspector-General of Forests may invite officers other than members of the Board to attend the meetings and to assist the Board in its deliberations on subjects on which they may be specially qualified to advise.

3. One of the chief functions of the Board will be to advise on the management and work of the Imperial Forest Research Institute at Dehra Dun, and the Government of India trust that the constitution of the Board will serve to bring officers from all provinces into close touch with the work which is being carried on there and that the Institute will thus in an increasing degree command the interest and active support of the Department. The Board will also deal with any general problems connected with Forestry, whether scientific or administrative, which may be referred to it for advice. It is not intended, however, that the Board of Forestry should exercise any executive control over the Research Institute or College or the Forest Department generally, or that it should in any way interfere with the functions of Local Governments. It will be a purely advisory body and will deliberate only on such questions as are specially brought before it by the Inspector-General of Forests who will, with the sanction of the Government of India, draw up a programme for its meetings.

4. Any resolutions that the Board may pass will be submitted, by the Inspector-General, to the Government of India for information and orders; and Local Governments will ordinarily be left to take any action on them which they may think necessary. In no case will action be taken by the Government of India on any recommendation of the Board until the Local Government concerned has been consulted.

5. The first meeting of the Board will be held at Dehra Dun, but it will not necessarily meet there every time, and it will be convened on each occasion at such time and place as may be fixed by the Inspector-General of Forests with the approval of the Government of India. After a time and place for holding a meeting has been fixed, the Inspector-General will make the necessary arrangements directly in consultation with Local Governments.

APPENDIX A (b).

THE HON'BLE MR. MILLER'S ADDRESS.

"It has been a matter of great satisfaction to me to be able to accept the suggestion that was kindly made that I should be present at this the first meeting of the Forest Board. I was glad to come here both out of interest in the work, and because of the certainty of learning much at this meeting of representatives of the Forest Service from all the large provinces. There has been a great extension of the system of conferences in recent years in all branches of Indian work. The improvement of communication has facilitated such meetings, and while they undoubtedly interfere with the administrative duties that are always pressing more heavily upon public servants of all classes, there can be no doubt that they do an immense amount of good. It is beneficial for all of us to get away from the routine of work, to learn what is being done in other Provinces, to make or to receive suggestions. Work is always far better done, and with far less strain to the individual when he is above and ahead of it, and not below it or struggling to keep abreast. There are times in the experience of

most of us when the number and complexity of the affairs to be dealt with in the day seem to make it hopeless to grapple with them, when small matters assume an exaggerated importance, and when the larger matters of policy are apt to be left out of sight; when, to take a forest metaphor, the wood cannot be seen for the trees. One benefit of these conferences is to bring the larger questions into prominence and to relegate details to the position they deserve. It is a consolation to find that difficulties such as we have ourselves experienced are of universal occurrence; it is a help to know how they have been dealt with elsewhere; and perhaps, a satisfaction to be able to point out how one has successfully surmounted them oneself.

I am very glad that the various Governments have been able to spare your services for the time required for this meeting and that so many of you have been able to come to Dehra on this occasion—some from great distances and at a trying time of year. We cannot hope to have you very often here, but I am glad that at this stage we have been able to induce you to come to see what is being attempted at the Forest Institute, to give us your advice as to how we can make that work most useful to the Department at large, and to obtain, I trust, with the permission of the Governments concerned, your sympathy and co-operation in its future development.

A layman had need to walk warily in addressing a body like this in its own home and on its special subject. There would, however, be a great drying up in the flow of speech in this world if we only dealt with subjects that we knew in all their details; and some degree of technical ignorance may be held to be compensated for by a large amount of interest and of acquaintance with the main features of your work. Still an outsider may be allowed to feel some diffidence, which is not diminished by the fact that I am speaking to what I believe to be a very homogeneous service. No doubt all experts are like doctors and disagree at times, but speaking generally, the Forest Service seems to me to be one in which, notwithstanding the dispersion of its members in the solitudes of the country, and in spite of difference in the methods of its recruitment at different times, there is a remarkably strong fellow feeling and unanimity of purpose. Possibly, this may be, in some degree, due to that very isolation in which the most of you must pass the greater part of the earlier years of your service; and to a feeling that the aims and objects of your work are not in all cases fully appreciated by the layman, and that even statesmen and administrators do not always realise fully the great ideals and conceptions that forestry sets before itself for the distant future.

Whatever the cause may be, the fact has impressed itself on my mind that there is an essential solidarity in the feelings and aims of the Forest service, which is not only shown in matters relating to this country, but which appears in the sympathetic interest that you extend to forest problems in all parts of the world, regarding them in Germany and France with the reverence of a pupil, and in America and England with the considerate benevolence of an elder brother. Your magazine shows how very wide is the outlook and how cosmopolitan are the interests of Indian forestry; and I am glad to think that in recent years there has been a more general recognition of the exceedingly important place that Indian forestry has already taken, and some realisation of the still more important position that it must inevitably attain both in future developments inside the country and in its influence beyond Indian limits.

It is perhaps superfluous, in addressing you, to refer to statistics with which you are well acquainted, but as some outside interest may be taken in your proceedings here, I should like, just for a moment, to indulge in a little of that statistical comparison which is so popular at the present time. The latest statistics of the Inspector-General give the total area of State forests as amounting to 240,000 square miles, which is very nearly twice the area of Great Britain and Ireland. But these figures give a somewhat exaggerated view of the extent of our actual forestry operations. More than half of this area is unclassed forest, that is to say, it has not been brought under definite regulation; the operations have not been reduced to a system; it is even uncertain how much of the area may ultimately be retained as forest, and what part of it may be made over to meet the purely agricultural needs of a growing population. We shall be on surer ground if we confine ourselves to the areas that have for the present been reserved or placed under a definite system of conservation, which amount to 94,000 square miles, and which considerably exceed the area of England and Wales and Scotland combined. It may be said, therefore, that your duties primarily extend over an area exceeding that of the United Kingdom excluding Ireland, and that you have, in addition, a share, which varies from place to place, in determining the management and the future destiny of a further and much greater area.

In the conservation of this great property you have many problems to face—scientific, commercial, economic and administrative. The formation of this Institute shows the great importance which the Government of India attach to scientific work, which must go hand in hand with commercial exploitation, if that is to be so carried out as to enable the State to work its property to the greatest advantage. I will return to the Institute later, and will in first place refer very briefly to some of the more general economic and administrative aspects of the forestry question in this country, where the forest officer requires not merely technical skill and knowledge, but a broadminded outlook on men and affairs. He has to appreciate the bearing of his operations on the administration of the country: he has to keep in touch and co-operation with officers of other departments and especially with revenue officers, he may have to organise and manage large forces of labour, and he should also at all times cultivate a

If his experience had extended to India, he would perhaps have substituted "Wealth to the soil" for "Health to the sick"; for we are accustomed in this country to hear doubts expressed as to the healthiness of irrigation, but never any as to its wealth-creating powers.

Time prevents my referring at length to the local benefits of forestry to agriculture in the case of the tracts classed as Minor Forests and Pastural Areas in 1894. I would only say here that the greatest care is necessary in enforcing restrictions that tell against the interests of the often primitive populations in the neighbourhood of our forests. The man is to be envied who succeeds in getting these people on his side in making them realise that their own interests are bound up with the forests, and so securing their constant co-operation. That is the aim that should always be before us : It may be difficult of attainment, but it is being attained in fuller measure as our forests are developed and the needs and wants of the population are more fully studied and better understood. Liberal treatment to the people near the forests—as liberal as is possible with due regard to conservation—for the supply of grazing and of the many petty wants to which the forests minister—that is the policy that should be adopted. When it is a case of dealing with the agricultural population further off, then it may be the case that forestry best subserves the interests of agriculture by more purely commercial methods. We can give to the people in the immediate neighbourhood of the forests, liberal treatment on a scale that cannot be adopted for the agricultural population generally without risk of eventual ruin to the forests themselves.

Passing from these general remarks I now come to matters more closely connected with the work of this meeting. While it has been felt for some time that a Forest Board, such as that which has been doing such good work for agriculture, would prove most useful in developing forest policy, the actual initiation of this Board is to be found in the conclusions arrived at by an influential committee of Forest officers, who met at Dehra in March 1909 and passed a Resolution in which a set of rules for the guidance of work at the Research Institute was formulated for the approval of the Government of India. In that Resolution it was proposed that the programme of work at the Institute should be a triennial one, that all Conservators should be consulted as to the matters they would wish to see taken up, and that the programme should be approved by a Forest Board, consisting of representatives from all Provinces with the Inspector General of Forests at their head. This appeared to the Government of India to be an excellent proposal, and before they approved the suggested rules, they desired to hear what the Forest Board had to say about them. The chief subject with which the Board has had to deal at this, its first meeting, has no doubt been the programme and work of the Research Institute, which was founded in 1906 after long and strenuous efforts on the part of your late Inspector General of Forests, Mr. Eardley-Wilmot. Since then progress has been rapid, notwithstanding that work has been much handicapped by the fact that suitable buildings and laboratories are still not available, and that the demands of education have taken up much of the time of Research Officers. The education of Forest Officers, certainly of the Provincial, and also for some time to come of the subordinate, service, at any rate as far as Upper India is concerned, must be closely connected with the Research Institute. When the Institute was started it was intended, in the interest of research, that the education of the Rangers should be carried out chiefly by Provincial Service Officers, and no special arrangements were made for the training of men for direct appointment to the Provincial Service. This was, however, found to be unsatisfactory, and during the past year it has been necessary to employ two Imperial Research Officers, the Forest Chemist and the Forest Zoologist on educational work, Provincial Service Officers being appointed, temporarily, to carry on research work in these branches. It is recognized that this arrangement is only a make-shift and should not be allowed to continue, and I trust that the Forest Board will be able to put forward a reasonable proposal for dealing satisfactorily with both education and research. But I am unfortunately obliged to add the warning that we must cut our coat according to our cloth, and that at the present time the cloth at the disposal of the Government is somewhat limited.

As regards buildings there has been considerable difficulty in deciding upon the best site, and as to the most suitable form that the various buildings should take. I am glad to say that a definite and satisfactory policy has now been decided upon, and I have every hope that satisfactory buildings on a good and roomy site will be constructed with the least possible delay.

Notwithstanding these difficulties, the Research Institute can already point to a good record of progress. A very fine Herbarium has been got together, consisting of the old Saharanpore Herbarium, amalgamated with that of the Forest College. This has been well arranged and properly housed at Chandbagh, and will, it is hoped, prove one of the most valuable in India. The economic collections have been re-arranged and added to, and a good beginning has been made towards the formation of a representative collection of injurious forest insects. These collections have been gradually got together during the past 30 years or more, and many Forest and Research Officers, past and present, have contributed towards them. They cannot be properly arranged until the new buildings are ready for them, but they will form the nucleus of a valuable economical and entomological collection. A large number of investigations has been instituted, most of which must, from their nature, require some time for examination before reliable conclusions can be published. Of these may be mentioned the enquiry into the best method of treating the Teak forests of Burma so as to combine the benefits

"Who hung with woods you mountain's lofty brow,
From the dry rock who bade the waters flow,
Not to the sky in senseless torrents tost,
Nor in proud falls magnificently lost,
But clear and artless pouring o'er the plain,
Health to the sick and solace to the swain."

of fire protection with satisfactory natural reproduction, the investigations into the determination of the height, diameter and volume growth of individual trees at various ages, the preparation of yield tables for the various important Indian species, and the enquiry as to the suitability of the uniform method of treatment for our Indian forests, and the effects of fire conservancy on the growth of the various grasses. All such enquiries must take many years to bring to a definite conclusion, but a good beginning has been made. Many enquiries of economic importance are in progress, such as the improvement in the manufacture of lac, the preparation of tannin extract from the bark and fruits of Indian trees, the antiseptic treatment of timbers, especially for railway sleepers, and the manufacture of wood and bamboo pulp for paper. Many important works have been published and more are in the press, whether in the shape of manuals for educational purposes, such as the Manual of Sylviculture, the Manual of Forest Botany by Mr. Hole, of Forest utilization by Mr. Troup, of Forest Engineering by Mr. Rogers, and the Revision of D'Arcy's Forest Working-Plans by Mr. Caccia; or giving the results so far as they have gone, of investigations undertaken, such as the many interesting publications on Forest Insects by Mr. Stebbing, the notes on the selection system in Indian forests, and on the collection of statistical data by Mr. Caccia, the publications on Indian Woods and their uses, and on the prospects of the match industry in India by Mr. Troup, the chemical treatises by Mr. Puran Singh, and the Forest Floras of Chota Nagpur by Mr. Haines. Many other useful publications have been issued, but I have perhaps said enough to show that the Research Institute is making excellent progress and that Mr. Mercer and the past and present research officers are to be congratulated on the results obtained.

There is one point on which I wish to lay some stress, this is the care that must be exercised before giving the results of your investigations to the public. There is a tendency in young Institutes to endeavour to justify their existence by premature publications of Research work, by premature I mean publication on insufficient data or before results have been proved to be commercially successful. The public is often critical and it is unwise to afford opportunities for adverse criticism. I would therefore impress upon you the need there is for caution before publishing results. "*Pestina lente*" is an excellent motto to bear in mind especially as many investigations take years to carry to a successful issue.

There seem to me now to be three main points in which improvement is to be aimed at. First in the laying down of a definite line of research in each branch. So far I understand nothing very definite has been decided on as to the lines which research in Sylviculture and in the preparation of Working-Plans for instance should follow. This is a matter of some difficulty and it is one in which the deliberations and recommendations of the Forest Board should prove most valuable.

The next point is the co-operation of the Forest Department, as a whole, in the work of the Research Institute. There is some reason to fear that the Research Institute has not hitherto enjoyed the full appreciation and confidence of the Department in the work which it is carrying out. Demands for assistance and information made by research officers on local officers already fully occupied, are sometimes looked on as irksome addition to existing duties. But they are unavoidable if the Institute is to fulfil its purpose. The Institute must always be to a considerable extent dependent on local officers for information and support. Too much stress can hardly be laid on the importance of research work and on its influence on the treatment by forest officers of the important estates committed to their charge, and on the development of these estates on correct, scientific and practical lines. I look confidently to the Forest Board, drawn as it is from all provinces and likely to have so much influence in the management of the Institute, to secure the whole-hearted support of the Department for the work that is being done at Dehra, and to give the officers employed there useful guidance as to the most suitable and most practical field in which to employ their energies.

The third point is the question of the arrangements by which we can best enable the research officers to carry out the programme of research approved by the Board. At present we cannot look for large grants; the financial position is too unsatisfactory, but as it improves I hope we shall be able to employ a suitable staff to do full justice to the work both of the Institute and the College.

I do not propose on the present occasion to make more than a brief reference to the Dehra Dun Forest College, but it must of course always be closely connected with the Research Institute.

For the present the education of the Rangers required for the greater part of India must continue to be given at the College, special Imperial Instructors being appointed for them when possible. The classes are too large at present and we hope to be able to reduce them so that they should not exceed 40 in the near future.

There can be no doubt of the soundness of the opinion expressed by the Board of Control in 1909, that an entirely separate course of education should be organized for the candidates for direct appointment to the Provincial Forest Service. This service is being considerably improved in pay and prospects. In return it may be expected that a better stamp of men will come forward and the Government must arrange to provide them with the best education in forestry and allied subjects that can be given. The present idea which appears to me to be sound is to give these candidates a special two years' course at the Institute,

distinct from the College which will probably be reserved for the training of rangers. The Institute will be equipped with lecture rooms, museums and laboratories and will afford every opportunity for a higher forest training. There will thus be a distinct line drawn from the start between the controlling and subordinate services.

I have had many proofs of the value attached to the training given at the College here in forestry, and we may look forward to a time when the influence and importance of the two Institutions at Dehra will be still more widely recognised, and their value to the country still more thoroughly appreciated. It is research rather than training that is the principal topic before us to-day; but they must go together, and it is the training to which I would personally attach most importance at the present stage of development. It is an inspiring task to take part in fitting the youth of this land for an honourable career that opens out the prospect of doing much actual and practical good to the country, both in their every-day work and in the opportunities they have of explaining the beneficent objects with which the restrictions of forestry are designed, and so assisting in the creation of a public opinion that will facilitate the further progress that is essential. It is well to place your ideal high, and I see no reason why the Dehra Dun College and Institute should not hereafter take a high rank in the forestry schools of the world, and be a recognised centre of scientific forestry of which the whole Department may be proud.

THE INSPECTOR-GENERAL'S REPLY.

On the conclusion of Mr. Miller's address, Mr. Beadon Bryant replied as follows:—

"MR. MILLER—GENTLEMEN.—I believe that I am expressing the views of all present, and of the Forest Service generally, when I say that we are extremely gratified that the Hon'ble Member in charge of the Revenue and Agriculture Department of the Government of India has been able to come here to Dehra, and to be present at this meeting of the first Forest Board. It shows clearly the interest that the Government of India takes in the work that we Forest officers have to do, and encourages us to believe that that work is appreciated. We have, I am sure, all listened with much interest to Mr. Miller's address. I think he is correct in giving the Forest Service credit for a strong *esprit de corps* amongst its members. It seems to me that this may be due to the fact that our Forest officers have one main object before them throughout their professional career, *i. e.*, the conservation and proper treatment of the forest resources of the country, and that their strong belief in the vital influence that this conservation exercises on the general prosperity of the country has not always been shared by those in authority over them or by the community by which they are surrounded. Happily of recent years matters have much improved in this respect, and it is now, I am glad to believe, generally recognised by Government and by a large section of the public that the protection of the forests should be an essential feature of the administration of this or any other country.

If full advantage is to be made of our forests, they must be managed scientifically, and though continuous efforts have been made in this direction for the past 40 years, during which time a regular recruitment for India of officers trained in Europe has been in force, it must be acknowledged that our knowledge of sylviculture, as it should be applied to our Indian species of trees, is still very defective. There are many unsolved problems in every branch of forestry waiting to be solved and on their solution depends, to a great extent, the future welfare of our forests, and the substantial increase of revenue which may confidently be expected from them. The formation of the Research Institute in 1906 was a notable step in the right direction and showed clearly the interest which the Government of India took in scientific forestry and the importance which they attributed to it. To-day we see Forest officers from all the provinces called together by the Government of India to discuss important forest questions, and in particular the work of the Research Institute; and this, which is I trust the first of many such meetings is, I think, a step in advance from which I anticipate a general improvement in the work of the Institute, and a more general sympathy throughout the Forest Service, and the country generally with that work.

"I may say that since the Institute was started, the staff have had a great many difficulties to contend with. They have been constantly and are still short-handed. They have no proper accommodation for their laboratories, experiments and economic collections; they will be glad to know that their difficulties are recognised and that the progress made in spite of these difficulties is nevertheless considered satisfactory. They will be particularly glad that suitable buildings and a full staff may now be said to be in sight.

"I think we shall all agree in the three main points in which Mr. Miller considered improvement is to be aimed at. The Forest Board will recommend definite lines of research, and put forward rules for the conduct of work which will, I trust, amongst other matters, ensure the co-operation of the Forest Service, as a whole, in the work of the Institute. They will also recommend, for the sanction of the Government of India, the Imperial staff they consider necessary both for education and research, with assistants subordinate to that staff. As regards this latter point, I should wish to say that until a complete staff of specially selected officers is made available for teaching the Rangers and Provincial Service Classes, and until proper arrangements are made for filling the posts sanctioned for Research experts, success will not be obtained either in education or in research. Moreover a Research Officer, without

subordinates to carry out his orders, is like a captain of a ship without a crew. Without an establishment under them, they cannot do themselves justice and the programme of work approved by the Board cannot be carried out. Our demands will not be extravagant; and in this connection I would desire to remind the authorities that the Forest Department can show a net surplus revenue of some 120 lakhs of rupees, and I hold that the expense incurred on a full educational and research staff at Dehra is, in the long run, certain to result in a largely increased revenue; from this point of view alone, the Dehra College and Institute deserves liberal treatment. Gentlemen, I will conclude by again thanking Mr. Miller in the name of the Forest Service generally for being present at this Forest Board and for the interesting address he has been good enough to deliver to us."

APPENDIX B.

Rules and Regulations defining the general scope of the work of each Research Officer, both educational and research, and the general lines on which such work is to be conducted at the Imperial Forest Research Institute, Dehra Dun.

I.—Educational.

As a general rule no Research Officer will be employed on educational work in connection with the Ranger classes. The Instructors in charge, who should be Imperial Service Officers, are responsible for the lectures and practical work in camp of these classes, and for the formation of adequate sylvicultural, zoological, botanical and economic collections required for the practical illustration of the lectures given by them, although the advice of Research Officers regarding the formation and arrangement of such collections should be freely asked for and given. The educational duties of Research Officers will generally be confined to lecturing (including laboratory instruction) to the Provincial Service probationers, each in his own subject.

II.—Research.

The main object of the work to be carried out at the Research Institute is to obtain results which will be of practical utility to Government and to the public; and it is of the greatest importance that this should be constantly borne in mind by all Research Officers. The investigations and experiments carried out will incidentally lead to additions to scientific knowledge but, important as these may be, it is the practical results which are of the greatest importance.

In all publications, therefore, the fullest practical details must be given. This is more especially necessary in connection with the commercial utilization of forest produce, in order that those interested may be able to judge whether it is likely to be profitable for them to invest capital in the industry dealt with in any particular publication.

III.—Rules for the conduct of Research Work.

A.—GENERAL.

1. The programme of research work to be undertaken by the different branches of the Research Institute will be drawn up for three forest years at a time for all important subjects requiring protracted investigation and continuity of action for their elucidation.

2. One year prior to the commencement of every three-year period, each Research Officer will address all Conservators,* asking them if there is any investigation they wish him to make during the coming three years' period. On receipt of their replies, each Research Officer shall draw up his periodical programme, indicating all the proposals which have been made by Conservators and giving full reasons for wishing to exclude any such proposal from his programme.

The programme must in all cases be drawn up in sufficient detail to clearly define each officer's responsibility in respect of every item of work, so that co-operation for a common end among Research Officers may be secured and duplication of work prevented.

These programmes and explanations will be submitted to the President, Forest Research Institute, who will place them before the Board of Forestry with his opinion. The Board will decide what shall be entered in the combined three-year programme. The programme, as approved by the Board, will be submitted for the sanction of the Government of India, and shall, when sanctioned, be circulated to all Conservators for information. These officers may, however, forward at any time suggestions regarding any investigations in the sanctioned programme, or may propose supplementary investigations to the President, who will be at liberty to lay such before the Inspector General of Forests; but no new item not approved by the Board of Forestry may at any time be introduced into the programme of work sanctioned by the Government of India without the Inspector General's sanction. The above does not preclude a Research Officer making any minor investigation (provided that the same does not interfere with his sanctioned programme) on any subject that may attract his notice when on tour or otherwise.

* In provinces where there is a Chief Conservator, that officer will be addressed and not individual Conservators. Similarly, whenever the words 'Conservator' or 'Conservators' appear in these rules, they must be understood to mean the Chief Conservator in provinces where such an appointment exists.

Nothing in these rules is to be taken as precluding local officers from undertaking any investigations that they may wish to carry out. The results of such investigations may be published by the local officers direct, or at their request by the President of the Research Institute, subject to the sanction of the Inspector General of Forests. Notice of any investigation being locally carried out should be given to the President, with the object of preventing duplication of work.

3. The programme so sanctioned shall be binding on the officers of the Research Institute, who will be responsible for the actual execution of the work prescribed. They shall be assisted as far as possible by Conservators in the collection of necessary specimens and materials and the supply of all available local information. The work to be undertaken shall follow a definite sequence as laid down in the periodical programmes, and experiments once initiated shall be carried to a definite conclusion and the results published for the information of all concerned. If required to do so, the Research Institute will defray all charges in connection with the collection and supply of materials.

4. On the 1st January in each year, the President of the Research Institute shall submit to the Inspector-General of Forests a statement* showing what has already been carried out in the sanctioned periodic programme, and what it is proposed to carry out during the coming forest year, together with proposals regarding the inclusion of additional items (see Rule 2 above). On the 1st July of each year, the President shall submit to the Inspector-General of Forests a revised annual programme prepared in the manner prescribed for the statement to be submitted on the 1st January, together with a programme of the tours proposed for the various officers.

This annual programme and the programme of tours shall, on approval by the Inspector-General, be circulated for information to all Conservators by the President, and special assistance asked for on their part where this is required.

5. Research work will be carried out by Research Officers and their assistants under their special orders, except in so far as they may be able to obtain assistance from local officers, whose services will be acknowledged in any publication that may issue.

6. With the exception of the Imperial Sylviculturist and Superintendent of Working Plans and the Imperial Economist, the most important duty of each Research Officer consists less in the collection and collation of information which already exists or which has been reported to him on the authority of others, and for the accuracy of which he can give no guarantee, than in the investigation of unsolved problems and in the discovery of new facts. At the same time all reliable available information should be got together and made full use of.

Each Research Officer is required to place permanently on record in any form, ledger or otherwise, which may be approved by the President, all useful information, observations and notes collected by him in the course of his investigations, and which must admit of his successor taking up the work at the point where he has discontinued it.

* All data collected will be at the disposal of all Forest Officers. Conservators may call for any information they may require, and this will be supplied by the President so far as possible.

It is hoped that Conservators will communicate any matters of interest to the President.

7. The results of investigations will usually not be published until the investigation is complete. In the case of a protracted investigation, it will be permissible at any time to publish the results so far obtained.

8. If the advice of a Research Officer or his services for a short period are required by any Conservator, application should be made to the President who will endeavour to meet the Conservator's wishes in this respect.

9. Research Officers will be responsible for the upkeep of the Research Institute collections connected with their particular branch of work. These collections will always be accessible to Forest Officers and others, with the permission of the President, and Research Officers will give any help they can to persons desirous of inspecting them.

B.—SPECIAL.

Sylviculture and Working Plans Branch.

1. The main work of the Sylviculturist and Superintendent of Working Plans will come under one or other of the following heads:—

- (a) The study of the more important Indian trees and types of forest, with the object of determining the effects of various factors on their development and reproduction, and deciding on the best method of treatment to apply in order to secure a given object.

*NOTE.—This is required for consideration by the Board of Scientific Advice.

- (b) The collection and collation of statistical and other data regarding the chief Indian trees and types of forest. The preparation of yield tables and the collection of data for fixing the exploitable size and age, as well as the possibility in forests under the different silvicultural systems.

- (c) The collection of information regarding the practical methods of preparing working plans with the object of ascertaining the best methods applicable in India, and the standardization and simplification of such work as far as possible.

2. In connection with the work detailed above, certain experimental areas and sample plots will be taken over or established, with the consent of the Conservator concerned, in such localities and in such a manner as may be necessary for the elucidation of any problem or for the compilation of statistical or other information. The actual upkeep and maintenance of these plots will rest with the Divisional Forest Officers concerned, care being taken not to throw any considerable amount of work on any one Divisional Forest Officer. The measurements and observations in such plots will be made by the Superintendent of Working Plans and his assistants. It is not intended that this rule shall interfere in any way with the upkeep of sample plots by local officers, which should be continued as heretofore.

Zoology Branch.

1. The Zoologist is required to study systematically the effect, beneficial or otherwise, exercised by animals on the development and reproduction of Indian forests, with the object of discovering the measures which can be undertaken, with the greatest prospect of success, to encourage the development of useful species and to destroy those which are injurious. As insects are probably of most importance from a forest point of view, the Zoologist will specialise in Indian Forest Entomology.

2. The most important work of the Zoologist at present must be the formation of a good reference collection of insects of importance from a forest point of view, correctly named as far as possible and carefully kept up in the Research Institute. The system of classification in force at Pusa should be followed.

This collection should be extended by asking Forest Officers to assist by sending specimens, by collecting from outside sources and by exchange. Conservators will, if they desire this, be supplied with materials for collection for distribution to their staff, together with copies of printed instructions; all contributions will be welcomed and should be sent by the collector direct to the Forest Zoologist, together with an account of when and where obtained, damage done and any other interesting details that may be forthcoming. The name of the collector will invariably be recorded. All insects received should be placed in the collection at once and their receipt acknowledged.

A list of experts and specialists should be kept up, showing the group or family in which each specialises, in order that the Zoologist may know to whom to send insects with a view to getting them named.

3. The Zoologist should be in communication with experts in India and elsewhere, in order to obtain and afford information.

Botany Branch.

1. The principal work of the Botanist and Mycologist consists of studying the botany, including the diseases, of forest plants of economic importance, and the factors that govern their distribution and their reproduction from a physiological point of view. The Botanist will not undertake the general systematic study of forest fungi, but he will study the life history of fungi which are exceptionally injurious to the trees of greatest economic importance.

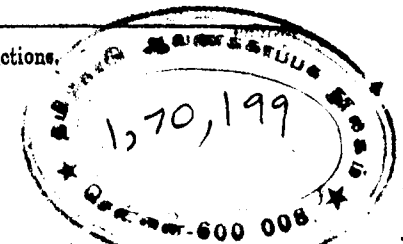
2. The Botanist will not himself undertake the preparation of local floras. Such work must be left to local officers; but he will always be ready to assist local officers to the best of his ability, especially during his tours in any locality for which a flora is under preparation.

3. The Botanist will hold charge of the Research Institute Herbarium, and will maintain it in an efficient condition and endeavour to extend it and make it as complete as possible, especially as regards species of forest importance. This, together with the connected Botanical Reference Library, will always be available for reference by officers of the department and others obtaining permission from the President to inspect it; the Botanist will give any help he can to any officers who may visit Dehra for this purpose.

4. The Botanist will help officers of the department by identifying specimens to such extent as may be feasible, and by giving advice on general botanical subjects and on the most suitable lines to adopt for local forest experiments.

*NOTE.—Mr. Lefroy has kindly supplied specimen instructions.

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Economic Branch.

1. The duty of the Economist is to make a special study of the best methods of rendering forest produce of all kinds available at such cost as will enable a trade in them to be possible, and to keep in touch with the commerce of India with the view of fostering and meeting the demands for forest products.

2. When an investigation has been sanctioned and taken up, a circular will be issued by the Economist stating the investigation to be made, the end in view and the assistance required from local forest officers, and including a summary of the existing knowledge of the subject.

3. No experimental work on a commercial scale will be carried out by the Economist. His duty will be to collect all possible information and place this at the disposal of all interested parties, either by publication or by letter. Should any experimental plant be erected by Conservators or others, the Economist's advice and assistance will be at their disposal to such extent as may be feasible.

Chemistry Branch.

1. The work to be undertaken will comprise chemical research work required for (a) the creation and improvement of the commercial demand for forest products, (b) the chemical research work required for the solution of various forest problems in connection with the food and nutrition of forest plants, the rotation of forest crops, etc., which may involve the analysis of soils, of plants, water-cultures and so on, as laid down in the sanctioned programme.

2. The Chemist and Assistant Chemist will work either jointly or independently as the President may decide. In the latter case, independent investigations will be assigned to each and the Assistant Chemist will then correspond direct with the President, with Conservators, etc.,—and keep his files and cases separate from those of the Chemist.

3. The work of the Chemist and Assistant Chemist as defined in Rule 1 above is intimately connected with that of the Economist, Botanist and Sylviculturist, and should be done in communication with these officers. The periodic programme of the Forest Chemist shall be drawn up in consultation with the other members of the Research Institute who may require his assistance in their investigations. In cases of this nature, the results will generally form part of the publication of other separate investigations, unless for any special reason the President decides otherwise.

IV.—Tours and Procedure.

1. Research Officers may, with the approval of the President, pay visits to localities where they may require to collect information or study any particular problem, either in connection with their own investigations or in cases where local officers desire their advice or assistance.

2. When the initiation of an investigation has been approved, the President of the Research Institute will address the Local Government concerned in order to obtain their assent to any proposed tour, assistance in carrying it out, and permission for the Research Officer to conduct correspondence on the subject with the local officers. When such permission has been accorded, the Research Officer may, subject to any restrictions which the Local Government may in any case think it necessary to impose, correspond direct with Conservators in connection with such investigation. He may also, with the Conservator's special permission, conduct such correspondence direct with Forest Officers subordinate to the Conservator. The Research Officer will report to the Conservator the date of his actual arrival in the province.*

3. The President of the Research Institute will correspond direct with the Inspector General of Forests in connection with sanctioned investigations. No official or demi-official correspondence with the Inspector General of Forests or the Government of India is permitted on the part of other members of the Research Institute. No files may be removed from the offices without the consent of the President.

4. The offices of members of the Research Institute will be inspected annually by the President, who shall embody in his annual report the results of his inspection.

* Note.—In the case of a visit by a Research Officer to the Madras Presidency, he will acquaint the Board of Revenue with the date and objects of his visit, and will also report to that authority his actual arrival in the province.

APPENDIX C.

Programme of work to be carried out at the Imperial Forest Research Institute, Dehra Dun, during the three Forest years 1910-11 to 1912-13.

Programme of work to be carried out by the Imperial Forest Research Institute, Dehra Dun, commencing 1910-11.

Part I.—Investigations into certain matters connected with the Sal tree (Shorea robusta) by all members of the Research Institute.

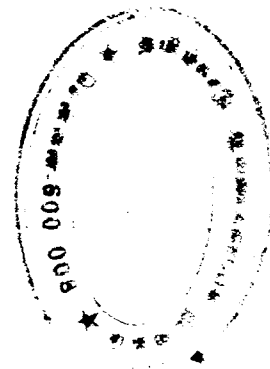
Serial Number.	Subjects and details of investigations.	Officer by whom investigations will be carried out.	Localities in which investigation will first be taken in hand.	REMARKS.
1	The conversion of an irregular Sal Forest into a regular Sal forest, experiment to be carried out on a practical scale, a careful working scheme being prepared for the Thano Experimental area.	Sylviculturist and Superintendent of Working Plans.	Thano Experimental area, Dehra Dun District, U. P.	It is recognized that owing to the prevalence of frost in the Thano forest, it will be necessary to extend the experiment to other localities, where more favourable climate conditions exist, in order to obtain conclusive results.
2	Experiments to ascertain the best methods of ensuring natural regeneration of Sal; severity of cuttings to bring it about, and the degree to which young Sal will stand shade.	"	"	...
3	Methods of artificially cultivating Sal and assisting natural reproduction to be tested, and experiments made.	"	Thano Experimental Station, Dehra Dun, U. P.	The experiments under this head being carried out in Kheri Division, U. P., and elsewhere, will be visited and the results obtained there will be tested in Thano, as well as such other experiments as may suggest themselves. Other experimental stations may also eventually be started in Sal localities where special difficulties are being encountered.
4	The effect of age of tree on fertility and abundance of seed; the frequency of seed years; the effect of environment on the same.	"	"	Notes will be collected from all Sal forests visited, and reliable information obtained from other sources will be utilized.
5	Sal coppice experiments and fertility of coppice seed.	"	Gorakhpur Division, Gonda Division, and other U. P. Sal coppice areas.	

6	Investigation of effects of drought, fire, frost and grazing.	"	For drought and fire: Kheri Division, United Provinces. For frost: Siwalik Division. For grazing: Bahraich Division.	
7	Rate of growth of Sal :— (i) Rate of girth and height increment in high forests. (ii) Yield Tables for Sal high forest and coppice.	"	(i) Siwalik Division ... (ii) Gorakhpur Division ... Wherever uniform crops are found in the United Provinces.	It will be impossible to obtain data applicable to the Sal region as a whole, and consequently it is considered that (i) at any rate should be left to local officers to investigate in areas in which the Sylviculturist is unable to take the initiative. The investigation as regards (ii) should be undertaken by the Sylviculturist.
8	Thinnings in uniform Sal crops; the age at which they should be commenced; their intensity, and the proper density to be maintained in crops of different ages.	"	"	
9	Effect of subterranean water level and of geological formation (and soil drainage) on Sal development.	"	Kheri Division ...	It is hoped that this investigation in the Central Provinces, especially as regards geological formation, will be undertaken by local officers.
10	Collection of notes and information regarding other matters relating to Sal, including the companions associated with it in natural forests.	"	"	
*11	The pollination of the flowers and distribution of the seeds of Sal. Description and illustration of fruit, seed, process of germination and the seedling.	Botanist	Most of these investigations will be carried out at the Research Institute, short tours being arranged as required.	Note.—The items marked with an asterisk will first be taken in hand.
*12	Study of the conditions favourable and unfavourable for successful germination and early development. This will include among other things the determination of the most suitable physical conditions of the soil.	"	.....	For the purposes of these investigations analysis of soils selected by the Botanist will be carried out by the Chemist. The method of analysis to be adopted in each case will be decided by the Botanist and Chemist in consultation.

Programme of work to be carried out by the Imperial Forest Research Institute, Dehra Dun, commencing 1910-11.

Part I.—Investigations into certain matters connected with the Sal tree (Shorea robusta) by all members of the Research Institute.

Serial Number.	Subjects and details of investigations.	Officer by whom investigations will be carried out,	Localities in which investigations will first be taken in hand,	REMARKS.
*13	The dying back of seedlings and its causes. How does dying back interfere with the normal development of root and shoot, and does it induce decay in the mature stem?	Botanist.		
*14	Study of grasses characteristic of Sal forest with special reference to— (a) Preparation of descriptions and illustrations, enabling the various species to be easily recognised. (b) Their relation to Sal, their competitive action, excretion of poisonous substances, increasing damage by frost, etc. (c) Their value as indicators of soil suitable or unsuitable for Sal. (d) Their economic value in preventing erosion, as fodder plants and in other ways. (e) Effect of fire and grazing upon them. (f) Best method of propagating or increasing the proportion of the more valuable species.	„ ...	.....	This investigation is in progress.
15	Study of the diseases of Sal, whether caused by fungi or otherwise.	„ ...	Wherever found in Sal forests.	
16	Technical properties of wood— (a) To carry out experiments with regard to the shearing, crushing and bending strength of wood of seedling and coppice origin, respectively; seasoned and green— (i) Grown in the hills, (ii) grown in the plains. (b) To test the fissibility of wood of seedling and coppice origin, grown in the hills and plains, seasoned and green— (i) Vertically and tangentially. (ii) „ and radially. (iii) Horizontally and tangentially. (iv) „ and radially. (c) The time taken for Sal to season under various conditions, and the best methods of seasoning, with special reference to the liability of the timber to crack, warp and shrink. (d) The specific gravity of timber of (i) seedling, (ii) coppice origin, grown at various altitudes and on different soils and aspects. (e) The relative properties of wood when felled at different times of the year.	Economist ...	Research Institute and Sibpur Engineering College.	It is proposed to send the wood to Sibpur for testing, provided the Sibpur authorities can undertake the work.



Programme of work to be carried out by the Imperial Forest Research Institute, Dehra Dun, commencing 1910-11.

Part I.—Investigations into certain matters connected with the Sal tree (*Shorea robusta*) by all members of the Research Institute.

Serial Number.	Subjects and details of investigations.	Officers by whom investigations will be carried out.	Localities in which investigations will first be taken in hand.	REMARKS.
17	Durability— Investigations regarding— (a) The life of Sal timber when used (i) under cover; (ii) in the open; (iii) under water. (b) The life of Sal sleepers. (c) The effects of iron fastenings on Sal sleepers. (d) The effect of various antiseptic solutions on Sal timber.	Economist ...	.....	
18	Uses to which the products of Sal can be put— (a) Major, e.g. timber. (b) Minor, e.g., resin, oil, bark tanning extracts and fibre.	„ ...	.....	
19	The calorific value of wood when used as (i) fuel, (ii) charcoal.	„ ...	.....	
20	Supply of and market for Sal— (a) Enquiry as to the actual annual out-turn of Sal timber— (i) from Government forests; (ii) from private forests, so far as the principal markets are concerned. (b) General note on past and present prices of Sal timber. (c) The available annual supply of Sal sleepers and the past and present prices of the same. (d) Past and present prices of minor products, and possibility of improving the demand. (e) Forecast of the Sal trade.	„	.....	
21	The study of all insects which cause serious damage to, or which are beneficial to the Sal tree or its timber.	Zoologist ...	.....	Note.—With regard to Sal insect pests a considerable series of investigations have already been undertaken, and the results have been published or are under publication. The Botanist and Sylviculturist will be able to render considerable assistance in this study.
22	A special enquiry into Sal bark tanning extracts	Chemist ...	.....	

NOTE.—It is recognised that the general restriction during the next three years of investigations regarding the Sal to the United Provinces may not be advantageous from the point of view of acquiring data applicable to this species throughout India, but, owing to the paucity of the staff sanctioned for the Sylvicultural Branch of the Institute, it is considered that this cannot be avoided at present. As soon as the necessary staff is forthcoming investigations should be extended to Bengal, Eastern Bengal and Assam and the Central Provinces.

Programme of work to be carried out by the Imperial Forest Research Institute, Dehra Dun, commencing 1910-11.

Part II.—Investigations into various subjects by the officers of the Imperial Forest Research Institute.

Serial Number.	Subjects and details of investigations.	Officer by whom investigations will be carried out.	Localities in which investigations will first be taken in hand.	REMARKS.
1	The Uniform and Group Methods of Working Forests. Enquiries will be made as to the suitability of these two methods, or modifications of them, in Indian forests.	Sylviculturist and Superintendent of Working Plans.	Forests under these methods of treatment, or which it is proposed to put under them, may be visited, e.g., the Chir forests of the United Provinces, the Teak forests of Burma (Tharrawaddy and Mohnyin) and the Sal Forests of the Kumaon Division, United Provinces.	
2	Compilation of Statistics of Plantations of various species and enquiries, if necessary, into any difficulties met with in the propagation of any particular species, including an enquiry as to the best density to be maintained at different periods. This is in progress for several species, but before anything reliable can be published visits to many of the plantations concerned will be found necessary.	"	... The United Provinces.	
3	Investigation into the best Methods of Cutting and Working Bamboos. Detailed experiments will be carried out in specially demarcated plots.	"	... Siwalik and Ganges Divisions, United Provinces.	
4	The Cultivation of trees for the Growth of Lac Experiments, which have been commenced, will be continued with reference to the best methods of (i) preparing trees for the reception of lac and (2) working prepared trees in rotation.	"	... Siwalik Division, United Provinces	This will be carried out in conjunction with the Economist.
5	Sylvicultural Notes on various Species ... The collection and collation of statistical and other data regarding the chief Indian trees and types of forest, commencing with Deodar, Pinus excelsa and Pinus longifolia. The preparation of yield tables and the collection of data for fixing the exploitable size and age as well as the possibility in forests under the different sylvicultural systems.	"	... The United Provinces	... The progress of this enquiry must depend to a great extent on information communicated by local officers.
6	Study of teak, including the factors favouring the rapid germination of the seed and the development of the young plant; the dying back of seedlings, the mode of origin of coppice shoots, the structure of young and old seedling and coppice plants and pollination of the flowers.	Botanist	... ..	A quantity of plants of various ages and of coppice shoots collected in various forests in the Central Provinces are now in hand. A preliminary pamphlet on teak coppice is in the Press and others will follow as the material collected is worked up. Germination experiments have also been commenced.

Programme of work to be carried out by the Imperial Forest Research Institute, Dehra Dun, commencing 1910-11.

PART II.—Investigations into various subjects by the officers of the Imperial Forest Research Institute.

Serial Number.	Subjects and details of investigations.	Officer by whom investigations will be carried out.	Localities in which investigations will first be taken in hand.	REMARKS.
7	Detailed systematic study and description of all forms of forest plants of economic value, when such is required owing to the commercial importance of the species and to the fact that the existing classification and description are unsatisfactory and confusing.	Botanist.		
8	The study of the fungoid diseases affecting the Blue pine in the Punjab and the Casuarina in Madras. Also of the spike disease of sandal in Madras.	"		
9	An Experimental Botanical Garden will be laid out and maintained in good order.	"	... Dehra Dun, United Provinces.	
10	Wood, Bamboo and Grass Pulp— (a) Woods, bamboos and grasses suitable for the manufacture of pulp, and the available supply. (b) Suitable sites for factories. (c) The financial aspect of the business.	Economist	... India and Burma generally.	
11	To keep under observation and encourage the match business in India, which is already started but which is still not firmly established.	"		
12	Antiseptic Treatment of Woods— To carry out experiments with various antiseptic processes, with special reference to the use of important inferior species for Railway sleepers.	"		
13	Investigations into the physical properties and seasoning powers of various woods.	"	...	For details see items 16 and 17 in Part I.
14	Enquiry as to the use of and the possibility of putting certain gums, resins and oleo resins on the European markets.	"	...	In communication with the Reporter on Economic Products.
15	Investigations to be carried out with regard to the disposal of products obtained from the destructive distillation of woods.	"	...	In conjunction with the Chemist.
16	Enquiry as to the commercial value of certain oil-seeds.	"	...	In communication with the Reporter on Economic Products.

Programme of work to be carried out by the Imperial Forest Research Institute, Dehra Dun, commencing 1910-11.

Part II.—Investigations into various subjects by the officers of the Imperial Forest Research Institute.

Serial Number	Subjects and details of investigations.	Officer by whom investigations will be carried out.	Localities in which investigations will first be taken in hand.	REMARKS.
17	Investigations regarding woods suitable for— (i) Packing cases. (ii) Tea boxes. (iii) Opium chests. (iv) Paving blocks. (v) Railway rolling stock. (vi) Carriage building. (vii) Harbour construction. (viii) Other miscellaneous purposes, such as pencils, pipes, hair brushes, fishing rods, veneers, cooperage, etc.	Economist.		
18	Description of the woods at present little known in the market— Yearly a number of woods will be examined and information collected on each species likely to prove of commercial importance, with a view to bringing them to public notice.	„ ...	.....	This work will be in continuation of a series of articles already published.
19	Resin tapping of conifers and enquiry into the possibility of improving the present system of distillation.	„ ...	.....	In conjunction with the Chemist.
20	Enquiry into the subject of useful fibres.	„		
21	Enquiry as to the use, if any, of Strobilanthes Spp., e.g., the flowers contain an oil.	Economist ...	.....	...
22	Enquiry as to the suitability of various tan barks, especially Terminalias and Oaks.	„ ...	.....	In conjunction with the Chemist.
23	Enquiry into the best method of disposing of rosin, including the preparation of a list of the industries in which it is used, with the names of the firms engaged in these industries.	„ ...	.....	...
24	Enquiry into the most profitable method of disposing of lac.	„ ...	.....	In conjunction with the Chemist.
25	Preparation of a satisfactory reference collection of insects for the Research Institute.	Zoologist ...	.....	This collection should be confined to insects of practical importance from a Forest point of view.
26	Investigation regarding the lac insect	„ ...	.....	This investigation will be carried out in conjunction with the Agricultural Research Institute at Pusa.

Programme of work to be carried out by the Imperial Forest Research Institute, Dehra Dun, commencing 1910-11.

Part II.—Investigations into various subjects by the officers of the Imperial Forest Research Institute.

Serial Number.	Subjects and details of investigations.	Officer by whom investigations will be carried out.	Localities in which investigations will first be taken in hand.	REMARKS.
27	Rusa grass oil, to study the causes of differences between the two varieties, Motia and Sophia, and the possibility of the conversion of Sophia-oil into Motia-oil.	Chemist ...	.....	In communication with the Reporter on Economic Products. <i>Note.</i> —These investigations will be carried out chiefly in the laboratory of the Imperial Forest Research Institute.
28	The commercial possibilities of the manufacture of Shellac by various processes (In hand.)	„ ...	.....	In conjunction with the Economist.
29	Distillation of <i>Blumea Balsamifera</i> on a commercial scale (In hand); and of <i>Cinnamomum glanduliferum</i>.	„ ...	.....	
30	Oil yielding forest seeds, their oil value and the determination of the constituents of various oils.	„ ...	.....	In conjunction with the Economist, and in communication with the Reporter on Economic Products.
31	Destructive distillation of Indian woods, including the manufacture of Ethyl Alcohol.	„ ...	.....	
32	Manufacture of decolourised Mangrove extract on a commercial scale.	„ ...	.....	
33	Decolourisation and clarification of Indian Colophony. (In hand.)	„ ...	.....	
34	Distillation of miscellaneous fragrant grasses, e.g., khas oil, and the investigation into the properties of the essential oils obtained from them.	„ ...	.....	
35	Examination of the resins of the principal conifers in connection with the production of turpentine.	„ ...	.....	
36	Investigation regarding the best season for the collection of myrabolams so as to obtain the greatest yield of tannin.	„ ...	.....	
37	Enquiry regarding collection and utilization of the milk of <i>Dichopsis Elliptica</i> .	„ ...	...	

APPENDIX D.

Letter No. 2298-15, dated 3rd December 1909, from A. M. F. Caccia, Esq., M.F.O., F.Z.S., President, Imperial Forest Research Institute, to the Inspector General of Forests to the Government of India.

I have the honour to address you regarding the necessity of increasing the staff of the Imperial Forest Research Institute by the addition to it of an appointment to be held by a duly qualified Forest Officer or Engineer, who would specialize in *Forest Engineering*.

That the introduction of better and cheaper methods of transporting forest produce is a subject of the greatest importance, leading, as it does, to the working of areas and species hitherto untouched, will be readily admitted and it is quite impossible for any one who has not studied in detail the various systems and methods of forest transport in use in different localities to decide which would be the most suitable and the cheapest to adopt under any given set of conditions.

An expert in Forest Engineering would thus be of the greatest value to the Department generally, not only on account of the work he could do at the Research Institute in combination with the Forest Economist, in connection with all questions concerned with the economical exploitation of commercial products, but also on account of the valuable advice he could give local forest officers who might be desirous of introducing improved methods of transport.

That the Department generally recognises the necessity for such an officer will be seen by referring to the "Indian Forester," Volume XXXV, page 245, where a resolution passed at the Forest Conference held at Nagpur in 1908 is commented on in an editorial.

I have recently also received a letter from the Conservator of Forests, Punjab, in which he hopes that we may be able to give attention to this subject of transport at the Research Institute and it is believed that the Punjab and possibly also other Provinces have already approached you on this subject of obtaining the services of a specialist in Forest Engineering to give advice on local transport schemes.

2. The subject of transport would of course form only a portion of the duties of the specialist now asked for, as he would be required to deal also with buildings, wells, tanks, canals, erosion schemes, demarcation, etc., in so far as these are concerned with forest management. He would also give a course of instruction in his subject to the students at Dehra Dun.

3. I request, therefore, that you will, if possible, obtain the necessary sanction for this appointment.

Editorial in the "Indian Forester" for May 1909, Volume XXXV, pages 245 et seq.

THE IMPORTANCE OF FOREST ENGINEERING.

We are well aware that it is very easy for any one to maintain that a certain appointment is essentially necessary for the progress of their Department, but it seems always to be a very difficult matter to obtain sanction for a new appointment, however obviously necessary it may be. The case in point is the appointment of an officer as Specialist on Forest Engineering—an appointment which we consider is, in the immediate present, perhaps more urgently required than any other special post in the Department, for while the existing research appointments are more concerned with future developments, the Forest Engineering expert is required to elucidate all the problems for the facilitation of the transport of our products, which would find a ready market now if we only knew how to arrange economically for their exploitation.

The necessity for such an officer has been recognised at the Forest conference recently held at Nagpur, where one of the resolutions passed was as follows:—(Resolution on the Allapilli Monorail Tramway, dated 26th November 1908). "II.—That this Conference agrees that the question of transport is one of great importance that has not received sufficient attention in these Provinces in the past. III.—That the appointment in these Provinces of a specially trained Forest Officer to enquire into the conditions and possibilities of divisions where the local officers consider the existing transport arrangements are insufficient or might be improved, is urgently required."

It seems needless to state that what applies to the Central Provinces, applies with still greater force to several other provinces where the forests are more valuable and the means of communication more backward.

At present, Forest Engineering is tacked on to the Economic Branch of the Research Institute. The officer in charge of that branch, if he is to carry out research work in order to

CENTRAL PROVINCES.

Berar Circle.

1. Laying out of a proper system of cart roads for export of forest produce in the Betul Division.
2. Enquiry into scheme for laying down a tramway to allow timber and fuel in mixed teak forests of Punasa Range being brought down to the nearest railway.
3. Preparation of tanks for watering of cattle in forests.

Southern Circle.

4. Determination of most economical means of transport of timber in the North and South Chanda Divisions to allow of teak forests being worked at a profit.

Generally.

To study the question of extraction of timber and fuel with a view to decreasing the cost of carriage, which at present is too great to allow of the majority of the forests being worked at a profit.

NOTE—I am unable to enumerate all the work which exists for the Forest Engineer in the Northern and Southern Circles.

DEHRA DUN,
The 4th April 1910. }

C. G. ROGERS,

Conservator of Forests, Berar Circle,

Central Provinces.

BENGAL.

(Addressed to the Inspector General of Forests.)

The case as regards the appointment of a Forest Engineer is different. You are aware of the great importance of improved facilities for transport in the valuable sal forests of the Singhbhum District, and of the fact that it will be quite impossible for the Department to provide those facilities without expert advice and assistance. In the Darjeeling District, also, engineering works in the form of wire ropeways are bound to force themselves to the front within a few years. Very many tea gardens, the station of Darjeeling and the troops located in the District are mainly, and indeed often entirely, dependent on the Government forests for their supplies of timber, firewood and charcoal. I am convinced that we shall soon reach the point where we shall be compelled to replace the existing transport by carts, men and animals, by more modern and up-to-date methods. All works of this kind will involve expert assistance which will cost very much less to obtain if we are able to rely on an Engineer with expert knowledge of his profession as applied to Forestry.

G. S. HART,

Conservator of Forests, Bengal.

Eastern Bengal and Assam.

Although I cannot say that there is any immediate necessity for such an appointment in the province of Eastern Bengal and Assam, it is quite likely that in the near future his services would be required, e.g., for making dams and other works on the Sirneswari river to render this river suitable for the extraction of timber from the Garo Hills. Possibly wire-ropeways and slides may be found advantageous in the hill forests of the Eastern Circle.

The advice of an expert engineer in our ordinary works (roads, buildings and bridges) would often be sought if the services of such a man were available.

M. HILL,

Conservator of Forests, Western Circle, Eastern Bengal and Assam.

APPENDIX E.

Notes indicating the damage done to Forest crops by fungoid and other diseases.

Burma.

I think a Mycologist attached to the Forest Institute would be of little practical utility as far as Burma is concerned. I should say that our principal species, the teak, is singularly free from fungoid diseases. A cankerous growth has been noticed in a few plantations in the Katha District, but it appears to be very local. Of course there are many fungoid diseases which attack the Para rubber and we have the large plantation of it at Mergui, but there are so many people in the Straits and Ceylon who are interested in working them out and suggesting remedies that it is hardly necessary for the Forest Department to take action in the matter.

(Sd.) J. H. LACE,

Chief Conservator of Forests, Burma.

Madras.

1. During the years 1905 and 1906 between four and five hundred acres of casuarina plantations in the Nellore District were killed by this cause, while numerous groups of trees and scattered trees were killed by the same cause in the Districts of South Arcot and Nellore. It also attacked the plantations of private owners and did much damage. This fungus not only kills the tree but reduces greatly the calorific value of the wood as firewood. The wood so affected, instead of burning with a bright flame, only smoulders like an inferior firewood.

2. In nearly all the plain forests of the Madras Presidency, numerous undergrowth species are attacked with fungoid disease but *Randia dumetorum* seems more liable to it than any other. This species is killed in many instances by it. This is, however, probably due to the fact that the goat relishes the leaves and young shoots of this shrub probably more than any other, consequently the wounds caused by the daily browsing of the goat afford fruitful means of spread of fungus. Sheep also eat the leaves of this species.

3. The spike disease in Sandal, although not proved to be of fungoid origin, may be so and evidently requires close study by a Mycologist. The ravages caused by it are immense in Mysore and in the Coimbatore District and it is gradually spreading to the Salem and North Arcot Districts. It kills a tree in a comparatively short time after attack.

C. E. BRASIER,

Conservator of Forests, Central Circle,

3rd April 1910.

Madras.

The Punjab.

I. *Trametes pini*.—Thousands of acres of P. Excelsa forests are attacked by the *Trametes pini* in the Simla hills, and the attack is so serious that the areas affected are likely to be denuded of all tree growth, whereby the water supply of the Sutlej and Jumna rivers is likely to be seriously affected. We have spent much money in felling and burning thousands of trees in these areas, but some better way of dealing with the pest is urgently required. The Pusa authorities have given us what help they can, but they have not time to do much. A Mycologist is urgently required.

2. The *Trametes pini* now seems to be attacking the deodar, and Mr. Hole to whom I applied to identify the fungus has had to apply to Pusa for help. A Forest Mycologist is wanted.

II. *Unknown fungus*.—Many deodar are dying in Kulu from an attack by a fungus or a beetle. I have obtained help from the Lyallpur scientists; but they cannot send a man to study the pest on the spot, with the result that we have not yet found out the cause of the evil. In the meantime the attack is not being controlled, and is spreading. A Mycologist is wanted.

2. There are believed to be other fungi attacking the hill forests, but no study of them is feasible, and in the meantime they are very likely getting a hold of the forests from which it may be impossible to dislodge them. It is only too likely that this is happening considering how exploitation works, consequent on the more intense working, which has been in progress for the last few years, filling the forests with dead wood.

III. *Shisham fungus*.—In Changa Manga the existence of a fungus which attacks the *Shisham* has been known for ten years or so. It has not yet been identified, nor has any serious attempt at identification been made: consequently it has not been controlled. When there is a whole-time Divisional Forest Officer in Lahore we may be able to deal with it, obtaining help from Pusa or Lyallpur. In the meantime it is spreading, and may seriously affect the fixing of the crop rotation when the Working Plan is revised. A Mycologist is clearly wanted.

3rd April 1910.

C. P. FISHER,

Conservator of Forests, Punjab.

Bengal.

At the recent meeting of the Board of Forestry it was resolved that the main duty of future incumbents of the post of Forest Botanist should be the study of the diseases of forest trees rather than systematic botany. It is not easy to give instances how this would be of particular benefit to the Bengal Circle, for our valuable forests are comprised principally of Sal, Sundri and the numerous miscellaneous broad-leaved species of the Eastern Himalayas. No doubt these species all suffer to some extent from fungoid disease, but as far as I know no instance has yet been noticed of any general and dangerous attack, such as is common in the coniferous forests of Northern India. At the same time I am convinced that the view adopted by the Board of Forestry is correct. It is ridiculous that the Botanist should spend his time endeavouring to ascertain the exact number of different species of a genus which is, or may be, of no practical importance to Forestry in India, instead of studying the diseases which affect species of real economic importance.

G. S. HART,

Conservator of Forests, Bengal.

Berar Circle, Central Provinces.

Fungus attacks to be investigated.

1. *Fungus on Babul (Acacia Arabica)*.—This fungus was reported to be doing a great deal of harm by Mr. Fernandez 6 or 7 years ago. At present the damage done is not very serious and does not seem to be on the increase.

2. *Leaf Mould on Teak*.—The leaves of the teak trees are in some localities (part of Betul and Melghat) covered with a white mould which must prevent assimilation and in consequence decrease the volume of wood formed annually.

NOTE—I do not know what fungi in the Northern and Southern Circles do serious damage.

DEHRA DUN ;

4th April 1910.

C. G. ROGERS,

Conservator of Forests, Berar Circle,

Central Provinces.

Eastern Bengal and Assam.

As far as I am aware there is not much damage being done to the forests of the province of Eastern Bengal and Assam by attacks of fungi, but it is quite likely that diseases due to fungi are in existence and should be investigated.

On general grounds and in view of the immense amount of damage that is being caused in other Provinces the appointment is I think fully justified.

M. HILL,

Conservator of Forests, Western Circle,

Eastern Bengal and Assam.

