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University of Oxford

THIRTY-FIFTH ANNUAL REPORT

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THIRTY-FIFTH ANNUAL REPORT OF THE IMPERIAL FORESTRY INSTITUTE ACADEMIC YEAR, 1958-59

Introduction. This year is marked by the retirement on July 31st, 1959 of Professor Sir Harry Champion who has held the Chair of Forestry at Oxford for nineteen years. During his time many developments have taken place. Not only was the present Imperial Forestry Institute building erected and occupied shortly after the war, but research work and facilities for advanced study have been greatly increased and improved. The reputation and unique position that the Department of Forestry now holds in the field of forest education in the Commonwealth is largely due to his foresight and energy. He is succeeded by M. V. Laurie, who will be the last of a long line of silviculturists from India to hold this post.

Students. The number attending courses throughout the year was forty-five compared with forty-nine last year.

Nine students were successful in the examination for the Forestry Honours degree. The classes obtained were four Seconds and five Thirds. Two of the men were Ghanians who have now returned to Ghana, one was a Singhalese who has now joined the Singhalese Forest Department and one was a New Zealander who has returned to join the New Zealand Forest Service. Two men obtained Beaverbrook Fellowships and have gone to the University of New Brunswick for a year, one man joined H.M. Overseas Civil Service, and has been posted to Tanganyika, one man has been awarded a D.S.I.R. Research Studentship, and the ninth man has obtained a post with the Foreign Office.

There were ten students in the Third Year, four from overseas.

The Forest Officers' course was attended by eleven officers from H.M. Overseas Civil Service. They came from Nigeria (3), Northern Rhodesia (2), North Borneo (1), Nyasaland (1), Sarawak (1), British Solomon Islands (1), Trinidad (1) and Uganda (1). Three Indian Forest Officers from the Forest Research Institute, Dehra Dun; Mysore and Bihar attended the course.

The four foresters sent by Overseas Governments (two from Eastern Nigeria and two from Sierra Leone) completed the two-year course and successfully sat an examination with the same range of subjects and standard of marking as is customary for a degree in Forestry.

An Iranian Forest Officer spent a year here.

Research Students. One research student submitted a thesis for the degree of D.Phil. Five students successfully submitted theses for

the Diploma in Forestry. The theses were entitled: (1) 'Timber Marketing Practices in Selected European Countries: A Comparative Study', (2) 'Modern theory and practice of thinnings in coniferous plantations', (3) 'A study of the decomposition of woodland leaf litter by direct examination', (4) 'Parasitism and hyperparasitism of the Loranthaceae in Ceylon', and (5) 'The introduction of conifers to Iranian forests'. Three students are working for the degree of D.Phil., and one for the B.Litt. degree.

Prizes. The Schlich Memorial Prize was divided between two Forest Officers this year—Mr. A. Beaton, Assistant Conservator of Forests, Uganda, and Mr. J. D. Chapman, Assistant Conservator of Forests, Nyasaland. The School of Forestry Jubilee Prize was awarded to J. G. Grevatt, who has since joined the Overseas Civil Service and been posted to Tanganyika Territory.

Instructional Tours: (1) *The Introductory Tour in Britain* for students starting the Final Honour School and others unfamiliar with British forestry was made as usual immediately before Michaelmas Term. The tour was conducted by Mr. T. E. Edwardson, accompanied on the first day by Colonel A. H. Lloyd, the second day in the Forest of Dean by Professor Champion, and throughout by Mr. F. White. Utilization visits were paid to Barnes Turnery Works at Cinderford, Parkend Mill, the Pine End plywood factory at Lydney, and Messrs. Gordons' thinnings mill at Llandovery. State forests visited were Dean, Tintern, Crumblands and Crychan. The private estate visited was Garnons near Hereford, by kind permission of Sir Richard Cotterell, Bt.

(2) *Western France.* The annual tour to Normandy, and the Landes was conducted by Mr. Edwardson, the party consisting of the Third Year students, two Indian Forest Officers, and one officer each from Australia, Ceylon and Iran. The usual forests were visited except that, as two years ago, Montfort was substituted for Bord and Louviers. At Alençon the utilisation visit was to an oak parquet mill near Bellême instead of to the impregnation works as the latter were on short time.

M. Jounet at Mimizan is actively engaged on an extensive programme of re-shaping of the damaged section of the littoral dune as a pre-requisite for regeneration of the protection belt of the maritime pine forests. He was sent a small supply of seed of sand-fixing plants kindly provided by Mr. N. B. Lewis of South Australia.

(3) *Eastern France and Switzerland.* The nine Fourth Year students together with the four West African foresters visited the forests in the Jura and Neuchatel during the Easter Vacation. The tour was conducted by Dr. E. W. Jones.

(4) *Postgraduate Tour in Great Britain.* This annual tour, demonstrating aspects of current developments in British Forestry was conducted by Mr. Edwardson and Mr. Gordon, the Professor attending for part of the time. The party consisted of ten forest officers of the

Overseas Civil Service, one Diploma student from Canada, two forest officers from India and one each from Australia, Ceylon and Iran. The area covered was Surrey, Hampshire and the Weald, the State forests visited being Micheldever, Queen Elizabeth Forest, Singleton, Gravetye and Bedgebury: a State nursery (Rogate) was inspected and formed a useful comparison with the private commercial nursery at Tilford of the Tilhill Forest and Advisory Company, whose managing director, Mr. A. E. Aitkins, demonstrated. The only private forest visited was Redleaf and a private sawmill at Robertsbridge was also on the programme. To the Forestry Commission, Mr. Aitkins, Mr. Hills of Redleaf and Mr. Stenning of Stennings sawmill, the Institute expresses thanks for the hospitality and excellent programmes.

(5) *Postgraduate Tour in Denmark.* Ten Forest Officers of the Overseas Forest Service, and three other Forest Officers, one from Australia, one from India and one from Iran, visited Denmark under the leadership of Mr. F. C. Osmaston and Dr. L. Leyton. Visits were paid to the Danish Forest Research Station at Springforbi, to the State Forests of Esrum, Aarhus and Palsgaard, to private forests at Gjorslev, Hvidkilde, and Frijsenborg, to the Royal Arboretum and Tree Improvement Station at Hørsholm, to the Soro Academy forest district, the municipal forest of Aarhus, to the Danish Heath Society Forestry Division at Kongenshus and the Dune management forests at Nymindégab. The thanks of the Department are due to all who helped to make the tour a success, and particularly to Mr. H. Frølund, the Director of the State Forest Service, Dr. E. Holmsgaard, the Director of the Danish Forest Research Station, Dr. S. Svach Larsen of the Royal Arboretum; Mr. B. Steenstrup, Director of the Danish Heath Society Forestry Division; Mr. P. Thaarup, Director of the Dune Management Directorate; Sir Edward Tesdorpf, owner of one of the private estates visited, and Count Aksel Ahlefeldt-Laurvig-Lehn, whose estate was also visited; also to Professor C. Mar: Moller who accompanied the expedition on its excursion to the heathland areas.

It was with the greatest regret that we learned of the death of Mr. Ulrich. Mr. Ulrich had been Director of the Danish State Forest Service until his untimely death, and had been a kind and helpful friend in organising the Institute's tours in Denmark—the last occasion being in 1952. All good wishes are extended to his successor, Mr. H. Frølund.

Land Use Course. In consultation with Mr. G. B. Masfield, Lecturer in Tropical Agriculture, Professor Champion organised a special course for senior forest officers for the study of land use, primarily from the forestry point of view, but also considering the agricultural side. The course consisted of a series of lectures by invited lecturers, followed by discussions. This occupied the first 10 days and was succeeded by a short tour in the United Kingdom where areas of reforestation, restoration of areas of opencast mining to forestry, and water catchment areas were visited. Three weeks were

then spent on the Continent visiting various afforestation and silvo-pastoral management centres in Switzerland, Italy and France. The tours were conducted by Professor Champion and Mr. J. J. MacGregor. The thanks of the Department are given to all those who helped to make the tour a success.

Utilization Course. Fourth year students spent one day in the various sections of the Forest Products Research Laboratory at Princes Risborough. Some of the Overseas Forest Officers also took the opportunity to visit the Laboratory on the same day. Special thanks are due to the Director and those members of the staff who gave the demonstrations.

Vacation Practical Work. Arrangements were again made through Mr. A. P. Leslie, an officer of the Ontario Department of Lands and Forests, for practical forestry work during the vacation and three students worked for a time in the Ontario forests. This experience is very valuable to the students and to the Institute, but it is increasingly difficult to arrange, owing to the difficulty Mr. Leslie is experiencing in obtaining 'work permits'. Similarly, only one student was able to go to Norway to work during this Long Vacation.

Excursions. During Trinity Term arrangements were made for Forest Officers to visit the following research centres and estates: Messrs. Wm. Mallinson's Timber Yards and Veneers, London; Alice Holt Research Station (Forestry Commission); the Directorate of Overseas Surveys at Tolworth; Cirencester Estate, the property of Earl Bathurst; Rothamsted Experimental Station; the furniture factory of Messrs. E. Gomme Ltd., and the Woburn Estate of the Duke of Bedford. The Fourth Year students joined the excursion to Cirencester, and the Third and Fourth Year students all joined the excursion to Woburn. The Fourth Year students also visited the Bridge Street Sawmills and seasoning kilns at High Wycombe, some National Trust property and Queen Wood, belonging to the Forestry Commission, near Watlington; they also visited the private woodland estate of Mr. Gerald E. H. Palmer at the Hermitage, Newbury. The Third Year students joined the Watlington excursion.

In addition to attending three of the above excursions, the Third Year students visited local woods for field study of silviculture and soils. Dr. Jones demonstrated.

Thanks are tendered to all who permitted students to visit their woods and works.

Discussions. During Michaelmas and Hilary Terms, weekly discussions of forest topics of general interest, selected by the members of the Forest Officers' course, were organised as usual. During Trinity Term, short papers on selected topics (usually the Forest Officers' 'Advanced Study') were presented by the same group, each paper being followed by discussion.

Seminars on Regeneration of Tropical Forests. Six seminars were held in Michaelmas Term under the Chairmanship of the Professor and Mr. W. A. Gordon.

Visiting Lecturers. The usual weekly series of invited lecturers in Hilary and Trinity Terms was given. These lectures are primarily for the postgraduate class and deal mainly with topics not fully covered by the staff of the Department. The lectures were followed by discussions.

The subjects and lectures were:

- Timber Imports From the Commercial Point of View.* Mr. E. H. Richardson of Messrs. Wm. Mallinson and Sons Ltd.
- Some Aspects of Home Grown Hardwoods in the Pulping Industry.* Mr. C. E. Budden of Sudbrook Pulp Mill Ltd.
- Some New Uses of Timber and their Problems.* Mr. B. Alwyn Jay, Timber Development Association Ltd.
- The Natural Durability of Timber and the Prevention of Fungal Deterioration.* Dr. W. P. K. Findlay of the Brewing Industrial Research Foundation.
- Working Plan Procedure.* Dr. F. C. Hummel, in charge of Management Branch, Alice Holt Research Station, Forestry Commission.
- Primitive Man in Relation to Forestry.* Professor F. E. Zeuner, Institute of Archaeology, Department of Environmental Archaeology, London.
- The Place of Herbicides and Arboricides in Forestry Practice.* Professor G. E. Blackman, Department of Agriculture, Oxford.
- Land Use Problems as Affecting Forestry.* Professor L. Dudley Stamp, recently retired from the London School of Economics and Political Science.
- The Examination and Interpretation of Aerial Photographs.* Mr. R. G. Miller, Forestry and Land Use Section, Directorate of Overseas Surveys, Tolworth.
- (1) *General Developments in Genetics and Tree Breeding.* Mr. J. D. Matthews, Forest Geneticist, Alice Holt Research Station, Forestry Commission.
- (2) *Practical Examples of the Application of Breeding Methods.* Mr. J. D. Matthews.
- Climatic Changes with Special Reference to Long-Term Variations.* Dr. R. P. Beckinsale, School of Geography, Oxford.
- General Aims and Methods of the Nature Conservancy.* Mr. E. M. Nicholson, C.B., Director-General, The Nature Conservancy.
- The Place of Syndicates in Private Forestry.* Mr. K. N. Rankin, of Messrs. Evans, Fripp, Deed & Co., Chartered Accountants.
- Forestry in Kenya.* Mr. E. J. Honoré, Chief Conservator of Forests, Kenya.

Assistance from other Departments, etc. Special courses in surveying and soil science were given to the Forestry students by Mr. D. F. Munsey of the Department of Surveying and Geodesy, and Dr. R. K. Schofield, and Dr. P. H. T. Beckett, of the Department of Agriculture. Mr. J. Fraser Scott, Assistant to the Reader in Biometry

and Mr. G. B. Masefield, the University Lecturer in Overseas Agriculture, also gave courses to both the undergraduates and post-graduates. The thanks of the Department are extended to all lecturers concerned and the Heads of their Departments.

Assistance to other Departments, etc. The Professor, with the assistance of Mr. Gordon, lectured on Colonial Forestry to the Overseas Administrative Cadets at both Oxford and Cambridge, the Overseas Agricultural Service Officers at the latter University also attending. Dr. Dimpleby prepared a course of lectures in ecology which he gave to the Honour Moderations class in the Botany Department: he also led a weekly full-day excursion during the summer term. The necessity arose owing to staff shortage in the Botany Department.

Mr. Edwardson gave the course of lectures in forestry in the Cambridge summer term to students of the Department of Estate Management in the absence, through illness, of the lecturer in forestry.

He also gave help to the Department of Entomology by making borings in oak in Wytham Woods to correlate leaf-caterpillar damage with reduction in girth increment.

Staff Tours. Mr. J. J. MacGregor, the Forest Economist, spent December, 1958 and part of January, 1959 in the Western Region of Nigeria. He was invited to go by the Ministry of Agriculture and Natural Resources, Nigeria, and has now prepared a draft report of his visit which he hopes to submit to the Chief Conservator of Forests, Western Nigeria, very soon. In June, Mr. White left for a ten months visit to Africa.

Research Field Station. The Yorkshire station at Wykeham has again been used by members of the research staff. Acknowledgement is made of the continued help given by the Silviculturist (North) of the Forestry Commission and by the Research Forester, Mr. Weatherell.

Scientific Societies, etc. Members of the staff have been active on the Council and Committees of various societies, as in previous years.

Senior Staff. Dr. A. Carlisle, who was appointed in May, 1957 to join in a programme of work on the hydrological relations of the forest, relinquished his post at the end of July. He has been succeeded by Dr. E. R. C. Reynolds.

Technical Staff. At the close of the year there were fifteen technical assistants working in the eight laboratories, the Photographer's and Artist's sections being staffed by two technicians, and the Workshops by three.

Secretarial Staff. There has been no significant change in the secretarial staff during the year.

WYTHAM WOODS

The restoration of the woodlands to a productive forest began in 1946 but the ten-year Working Plan, approved under the Dedication Scheme by the Forestry Commission, started in 1949 and was due to be revised in the present year. Mr. F. C. Osmaston carried out this revision of the Working Plan for the period 1960-69 and the revision was approved.

Changes in the plan included surrender of the greater part of Marley Wood and all compartment 8 for a Biological Reserve, and the acquisition of nearly 60 acres of mainly arable land. There was also an addition of 14 acres from an area near Wytham Abbey. 'Dedication' of these new areas is in progress.

The policy of planting or naturally regenerating 14 acres of forest yearly will be continued as far as labour conditions allow, but priority will be given to thinning and tending the 164 acres of plantations made since 1946, to thinning ash and sycamore pole stands, to improving rides and to utilization.

Very heavy rains during the winter months made the rides impassable by heavy vehicles for long periods, and delayed the extraction of felled timber. The very wet ground in the early spring also delayed planting. Rabbits and hares caused considerable damage to the young trees in the new plantation and the long summer drought added to the casualties.

The usual sales by tender of about one hundred and fifty mature trees were made while an auction sale of fence-posts and rails made a useful addition to the income. The lack of good cottages again made it difficult to recruit good woodmen but two of the older cottages were improved during the year.

The Oxford and Bucks Branch of the Royal Forestry Society of England and Wales visited the woods in July under the guidance of Mr. Osmaston.

BAGLEY WOOD

The annual prescribed planting programme was carried out, but thinning lagged behind programme, though fortunately the areas overdue for thinning are the older crops, particularly hardwoods. The planting programme continues to include a proportion of the difficult clay sites: mechanical drainage was fairly successful, but a sub-soiling device which avoids bringing large quantities of clay to the surface will be tried next.

A limited test of the arboricide 2, 4, 5-T was made to control regrowth from hardwood stumps in a young plantation, and to kill birch over-wood in a five-year old plantation.

The Deodar permanent sample plot was remeasured by Mr. T. Christie of the Management Branch, Forestry Commission Research Station, as a demonstration for the Fourth Year students.

Visitors to Bagley in the year included the Oxon. and Bucks. Division of the Royal Forestry Society of England and Wales.

SILVICULTURE

Dr. E. W. Jones continued in charge of this section, with one assistant. He gave the usual courses of lectures and practical work during the year, and spent a week with the Working Plan course in the New Forest in September. He also contributed to the course in Land Utilization in July, 1959.

Research has been concerned chiefly with the material collected in Northern Nigeria in March--July 1958. Most of the plant specimens which were collected have now been identified, though names are still awaited for many which were sent to other institutions for identification. The soil analysis is also nearing completion, so that it will soon be possible to prepare an account of the work.

Advantage was taken of the good supply of acorns in the autumn of 1958 to repeat an experiment comparing the resistance to desiccation of the acorns of sessile and pedunculate oak, and some of the stock of seedlings thus obtained have been used in a small pot-experiment to compare the reaction of the two species to acidity.

Dr. Jones has contributed sections describing soils and vegetation of Wytham Wood to the new Working Plan which has been prepared by Mr. F. C. Osmaston, and has also added information to his compartment descriptions.

Mr. D. C. F. Faile, working under Dr. Jones, attempted with considerable success to apply methods of macroscopic and low-power microscope visual examination, such as have been elaborated by Kubiena and Hartmann, to forms of humus in Bagley Wood.

ECOLOGY

The two courses of lectures, one in General Ecology to the Post-graduate course, and the other in Temperate Ecology, to the Third Year class, were given as usual by Dr. Dimbleby. In addition, an extra burden was taken on this year for the University Botany Department. The leaving of Dr. F. H. Whitehead at Easter meant that the Honour Moderations class, most of whom come on to read Forestry, would not receive instruction in ecology. Dr. Dimbleby therefore prepared a course of lectures and led a weekly full-day excursion during the summer term to cover this emergency. An ecologist, Dr. S. R. J. Woodell, has now been appointed to fill Dr. Whitehead's place in the Department of Botany.

Dr. Dimbleby was Chairman of Examiners for the Final Honour School of Forestry.

The final preparation of the account of soil research, has been delayed to include some new material from high altitude moorlands. This is involving a certain amount of re-shaping of the original account.

Two students have been undertaking small research projects for their Special Subjects. J. G. Grevatt used thermistors to study the temperature fluctuations in soils under different ecological conditions, and J. J. Lowe, also using thermistors, tested a method of measuring soil pF in the field by means of freezing point depression. Both these

projects were hampered to some extent by the unseasonable weather of 1958, but both gave results of value.

TREE PHYSIOLOGY AND FOREST HYDROLOGY

Courses of lectures were given by Dr. L. Leyton on Forest Soils and Tree Physiology and field classes were taken in Soil and Vegetation Studies.

As much time was spent on organizing the programme on forest hydrological research, work on nutrient relations on trees has been temporarily curtailed. The 1958 sand culture experiments with *Pinus radiata* seedlings supplied with mutually varying amounts of N, P and K were successfully completed and the responses in growth and in nutrient status are being analysed and written up for future publication. In the spring of 1959, a similar experiment was set up to study the nutrition and growth of *Pinus contorta*.

After the departure of Dr. A. Carlisle, the award of a grant from the Department of Scientific and Industrial Research enabled Dr. E. R. C. Reynolds to take over the hydrological research work. A comprehensive programme has now been worked out to study in some detail the various phases of the hydrological cycle in forest stands. Some progress has been made in working out a satisfactory technique for the measurement of throughfall and stem flow from precipitations; it has been found that because of the great variation in throughfall with position under the canopy, rather large errors (of the order of $\pm 10\%$) are associated with measurements from 20 standard 5 inch rain gauges distributed at random over an area of about $\frac{1}{2}$ acre; increasing the number of gauges to 40 reduces the error to about ± 6 per cent. but similar accuracy has been obtained with 20 troughs of dimensions 3 x 2 ft. Estimates of stem flow, based on 20 randomly selected trees, are associated with appreciably larger errors but over the period of investigation so far, stem flow accounts for only about 1 per cent. of the total rainfall reaching the ground. A number of gauges, with and without shields are being erected above the canopy to obtain a measure of incident precipitation. Preliminary experiments have also begun to measure the volume rate of sap flow in the stems, using a modified heat pulse technique: although much remains to be done in testing this approach, it has already shown that wetting of the canopy results in a marked drop in transpiration.

Dr. J. S. P. Yadav of the Forest Research Institute, Dehra Dun, India, has spent some months investigating the influence of different levels of drainage on certain physical and chemical properties of the heavy clay soils at Bernwood. He has found that draining significantly increases the control of water stable aggregates as a result of which the content of large pore spaces, the hydraulic conductivity (both vertical and horizontal) and the moisture relations have been improved. These physical changes are reflected in a higher rate of nitrification in the drained soils, a higher content of nitrogen and phosphorous in the needles of trees growing on the soil and better tree growth. The results have been submitted as a thesis for the Diploma in Forestry.

SOIL MICROBIOLOGY

A course of lectures on soil organic matter and soil organisms was given to Third Year students by Dr. W. R. C. Handley who remained in charge of this section.

In collaboration with Dr. Leyton, a short course on the study of soils in the field was given to Third Year students.

Study of the production of mineralised nitrogen and carbon dioxide by soil samples maintained under controlled conditions of temperatures and moisture in the laboratory, such that the original microfaunal and microfloral populations present under field conditions are maintained as far as possible, has continued. The indications at present are that observations must be continued for more than one year if a clear picture of any differential effects due to additions of leaf litter of various plant species is to be obtained.

Observations on the Isopod populations of various kinds of forest stand have been made by Mr. J. W. P. Martin. He has also carried out experiments to investigate whether *Oniscus asellus*, when allowed a choice, exhibits preferences for the litter of particular plant species as indicated by the amount of litter consumed.

Previous work in the Soil Microbiology Section showed that the leaves of some plant species contain unknown substances which are able to form stable complexes with proteins. It is considered that these substances unite with residual leaf proteins when the leaf dies, resulting in complexes which in the case of plant species associated with the formation of raw humus, are especially resistant to decomposition by microorganisms. This may result in much of the litter nitrogen being unavailable for use in further plant growth for a more or less long period of time under some conditions, e.g. in soils which are markedly base deficient. It therefore seems important to know the nature of the leaf substances which are able to unite with proteins. This knowledge would be preliminary to a more detailed study of the systems concerned in the breakdown of protein complexes in litter and the influence of environmental and other factors on such systems. Through the very much appreciated co-operation of Professor E. R. H. Jones and Dr. B. R. Brown, and generous financial support from the Forestry Commission, Mr. C. W. Love is carrying out an investigation of leaf protein precipitating substances in the Dyson Perrins Laboratory, Oxford. A preliminary account of Mr. Love's work will appear in the Forest Commission Report on Forest Research for 1958-59.

FOREST BOTANY

Mr. A. C. Hoyle continued to be Curator of the Forest Herbarium and Mr. F. White as Forest Botanist. In June, Mr. White began a ten months visit to Africa.

Teaching. Mr. Hoyle gave his usual courses in Systematic Forest Botany and in the Ecology of Dry Tropical Woodlands, and supervised collecting by students. Mr. White supervised the Advanced

Studies of two officers. Mr. J. D. Chapman prepared an account of the vegetation of Mt. Mlanje, Nyasaland with particular reference to *Widdringtonia whytei*, the Mlanje Cedar. Mr. W. G. Weeraratna submitted a Diploma thesis on Parasitism and Hyperparasitism of the Loranthaceae of Ceylon. Mr. A. A. Enti, Curator of the Ghana Forest Herbarium, received a refresher course.

Research and Advisory Work. (1) Mr. Hoyle continued to summarize the results of his work on *Brachystegia*; most of the straightforward species have now been illustrated by Miss Chandler; re-grouping of species has been found necessary in the light of recent concepts and a re-examination of character-combinations. Collections were named as received. Especially useful material came from Nigeria and Sierra Leone. (2) *Ebenaceae*. Less was achieved than in previous years because of other commitments, but Mr. White supervised the illustration of 10 new species drawn by Miss E. Erlbeck. (3) *Forest Flora of Northern Rhodesia*. By the end of June the first galley proofs and half of the 'revise' proofs had been corrected, but further progress was prevented by the Printers' Strike until after Mr. White's departure for Africa. Numerous duplicates of the collections made by Mr. White and Mr. Angus in Northern Rhodesia were sorted and distributed.

Visitors and Enquiries. Many visitors used the facilities of the Herbarium and consulted the staff on a great variety of subjects. Among those who worked for long or short periods were Mr. A. Angus of the Department of Agriculture, Northern Rhodesia, Mr. C. F. Onochie of the Forest Herbarium, Ibadan, Nigeria, Mr. D. B. Fanshawe, Silviculturist, Northern Rhodesia, Messrs. J. P. M. Brenan, J. B. Gillett, B. A. Graham and F. H. Hepper of Kew, Mr. J. H. Hemsley of the Nature Conservancy and Mr. J. Peal of the Forest Department, Nigeria. Enquiries from Forest Departments, the timber trade and private individuals, though fewer than usual, required considerable research, notably one on *Pinus* for the Forest Department, Union of South Africa.

Forest Herbarium. A larger amount of material than last year was received and efficiently handled by Mrs. E. M. Woodley, who mounted 2,536 sheets. The total received was 2,568 specimens, of which 1,304 were for identification, mainly from Forest Departments; 1,264 named duplicates were presented, mostly by the East African Herbarium, the National Herbarium, Pretoria, the Jardin Botanique de l'Etat, Brussels, and the Royal Botanic Gardens, Kew. Identifications totalling 542 were sent—to Northern Rhodesia (414), to Nyasaland (104) and Uganda (24). Duplicates distributed to other herbaria totalled 3,480, mainly from Northern Rhodesia and Nyasaland.

FOREST PATHOLOGY

Mr. W. R. Day continued in charge of the section, assisted by Mr. F. H. Jones (Chief Technical Assistant), Mr. D. K. Barrett and

Miss J. S. Palmer. The usual courses of instruction were given to the Honour School and a course in Forest Hygiene to the post-graduate students. As usual various exhibitions dealing with problems in Forest Pathology were given.

Research. (1) *Moisture saturation determination in main stems.* The work on Sitka spruce, mentioned last year, has been continued. It is hoped to report on this soon.

(2) *The fungus flora associated with bark necrosis on the main stems of spruce.* (a) Trials have been made by attempted isolations to see whether there is any consistent association of a particular fungus with the local extension of necrotic areas. The indications are that a mixture of mycelia is involved, sometimes one and sometimes another being dominant, as judged by frequency of isolation.

(b) The fungus commonly associated with this necrosis is *Nectria cucurbitula* and wound inoculations using perithecia were made into Sitka spruce main stems. An appreciable dying back of the bark occurred round the points of inoculation; but this happened also in the controls, round the point of wounding. Moreover, *N. cucurbitula* was not re-isolated from extending edges of the necrotic areas, in either case. This experience rather supports that obtained from naturally occurring necrotic areas. It is hoped to make further observations.

(3) *Root disease of spruce on heavy soil.* In Central Wales, an interesting decline in vigour of Sitka spruce, which had been planted some twenty years earlier on a heavy clay soil occurred. It was plain that poor aeration was largely responsible for failure to maintain a satisfactory root development. It was thought, however, that parasites might also be active and in particular possibly Phycomycetes and, using apples as media for isolation, *Pythium* species were isolated from the soil. Preliminary trials on Sitka spruce, Douglas fir and Corsican pine grown in water culture suggest that the *Pythia* are capable of acting as parasites. The plants used were all obtained from one nursery: later Douglas fir from the same batch as that of the experimental trees died and it was demonstrated that the bed was heavily infected with *Pythium*: the nursery soil is a sand which tends to become compacted. It is possible, therefore, that the experimental plants were already infected; but in any case, there seems to be no doubt that under some circumstances *Pythia* can cause a chronic disease which results in death of the finer roots and debility of the trees. This is an aspect of root disease that needs further investigation.

Soil moisture tensiometers have been used in this work, to obtain indications of relative effectiveness of drainage in different parts of the plantations affected. Full confirmation of the poor drainage conditions in the clay were obtained. Thanks are due to Dr. Schofield, Reader in Soil Science, who suggested the use of these and had them constructed.

(4) *Diseases of the crown in Black Pine.* Pre-examination of this matter was followed up with special reference to Allerston Forest, in eastern Yorkshire. Two aspects to this disease, quite apart from

infections, relate to soil conditions and to climate. Adverse soil conditions by reducing root development result in loss of foliage density; if severe, the trees may die. The directly acting adverse climatic factors affect buds and particularly terminal buds and, also, the last formed shoot. Observation has shown that terminal buds are commonly killed through injury at the base during the time of bud expansion. The anatomical evidence is that this injury is physical. The last formed shoots many also be cut back, either by killing of the tip, or by girdling lower down: again the evidence is that the injury has a physical cause. Recovery shoots are formed, but frequently these also are killed: this successive killing of growing points may result in the death of trees. Diagnosis is made difficult because the climatic and edaphic aspects may occur together and so cause confusion. Further careful observation is still needed.

(5) *Low temperatures and root growth.* It was stated in the Report for 1956-57, that when grown with their roots at 36° F., but crowns at 60° F., Sitka spruce developed roots normally, though root development of Japanese larch was inhibited. A similar trial has been made comparing Green Douglas fir and Corsican pine. The Douglas fir grew more slowly, but still satisfactorily. The growth of Corsican pine was, however, markedly retarded, though not to the same extent as previously recorded for Japanese larch.

Physiological differences such as these seem to be worthy of closer investigation and could enter into disease complexes such as that of Corsican pine, mentioned above.

FOREST ENTOMOLOGY

Mr. G. H. Thompson continued in charge of this section in which there were no staff changes. The usual undergraduate courses were given in Forest Zoology and Animal Ecology. One Fourth Year student undertook an entomological special subject.

Research. The sixth annual examination was made of ash and sycamore billets laid down in 1953 in Wytham Wood for the study of insect succession; 4 billets of each species were analysed. Approximately 50% and 25% of the bark, which in all cases was very loose, remained on the ash and sycamore billets respectively. The underbark fauna of both tree species consisted mainly of molluscs, worms, woodlice and collembola with some dipterous and other insect larvae. The wood of the sycamore was very decayed and soft and contained many worms and tipulid larvae, particularly on the ventral quadrants of the billets. Externally the surface of the ash appeared to be fairly hard but internal decay was considerable although less advanced than in the sycamore. No worms were in the wood but pyrochroid larvae were frequent and one elaterid larva was present.

Ecological studies continued on the alder woodwasp (*Xiphydria camelus* L.) and its parasites. The distribution of the woodwasp was investigated in the Forest of Dean and one small area of unhealthy alder was found where *X. camelus* occurred together with the four

parasite species so far known from the United Kingdom. This is the only place known to contain the complete complex of species. Work on the structure of the ovipositor and details of the mechanics of oviposition was continued on *Pseudorhyssa alpestris* Holmgren and *Rhyssella curvipes* Grav. and was extended to include *Xiphydria camelus* L. and *Urocerus gigas* (L.). The influence of temperature on the quadrant of prone billets (dorsal, lateral, ventral) from which *X. camelus* emerged, was studied. The fungus associated with *X. camelus* was finally identified in co-operation with the Mycology section of the Forest Products Research Laboratory at Princes Risborough, as *Daldinia concentrica*.

Miscellaneous. Exhibits were prepared for the Ashmolean Natural History Society colloquium in June and the 11th Congress of British Entomologists in July, both held at Oxford. Mr. Thompson gave one of the research talks held at the Bureau of Animal Population during the winter.

MANAGEMENT

Mr. F. C. Osmaston remained in charge of management in which there was no major change.

The first course for Third Year undergraduates included 24 lectures in Hilary and Trinity Terms, a tour (which also included silviculture) in Normandy and the Landes in March and five weeks practical work in the New Forest in September. The second course for Fourth Year undergraduates included 16 lectures in Michaelmas and Hilary Terms, two weeks practical work in the New Forest in March and a tour in the French and Swiss Jura in April.

The main course of lectures given by Mr. Osmaston was supplemented by Mr. T. E. Edwardson and Mr. W. A. Gordon who gave some lectures on aspects of management particularly applicable to Britain and tropical Commonwealth countries, respectively.

The practical work in the New Forest consisted in the preparation of a full working plan by each student for an area of 540 acres. The area provided considerable variation in both site conditions and growing stock. Problems to be solved included choice of species, conversion or retention of hardwood high forest, afforestation of heathland, choice of rotation and attainment of sustained yields as well as satisfaction of amenity demands. The practical work was in two parts. In September the basic data were collected.—For this work the students were grouped in field parties which involved sharing the basic data collected. Each student then individually wrote Part I of his plan and submitted it for criticism which he was permitted to embody in his final Part I. Objects of management were given to the students in March so that on their second visit to the New Forest each could finish his plan with full prescriptions in Part II, being able to check in the field both the previous field work and the application of the prescriptions.

Mr. Osmaston also gave to Fourth Year undergraduates in Michaelmas and Hilary Terms a course of lectures on Silvicultural

Systems, and to postgraduate forest officers three lectures on special points in management.

Supervision and assistance were also given to postgraduate students, particularly to a Burmese Forest Officer who was studying for a doctorate and submitted in June his thesis on modern methods of yield regulation and management and their application to Burmese teak forests.

Beside his tours in the New Forest, Mr. Osmaston took a class of postgraduate forest officers in June-July to Denmark.

Mr. Osmaston also began the revision of the working plan for the Wytham Woods which he restockmapped.

MENSURATION

Teaching. The customary undergraduate course, including practical work in Bagley, was given by Mr. Edwardson, who also gave a series of lectures forming the major part of a postgraduate course on selected points in mensuration and management, with emphasis on volume tables, inventory and the use of electronic computer programmes.

One undergraduate was engaged on a mensurational special subject, investigating the merits of the prism wedge for forest survey, basal area determination and as a dendrometer.

Mr. J. F. Scott (Unit of Biometry) again attended the enumeration part of the Working Plan course for a few days, and advised on design and analysis of data.

Mr. J. N. R. Jeffers (Forestry Commission) gave a talk on the Forest Officers class on the use of electronic computers in forestry.

Research. Use was made regularly of the Oxford University Computing Laboratory's new 'Mercury' electronic computer. Investigation continued on the possibility of setting up local 'tariffs' for the Dean oak: indications were that treatment not only obscured the effect of site, but had been so variable itself from place to place that the only solution appeared to be *ad hoc* grouping of oak stands apparently similar on field inspection.

A considerable amount of work was done in relating current volume increment to easily measured variables including current radial increment in pine cores. Multiple regression of volume increment per cent. with six other variables for the main conifers were calculated on the Oxford University Computing Laboratory 'Mercury' electronic computer and applied to conifer stands in the Forest of Dean.

Calculation of volumes by species and age-class and current increment was completed by late August for Part I of the Dean works plan revision.

Supervision was given to increment and allied advanced studies by A. Beaton (Uganda), C. J. Hadley (British Solomon Islands) and J. P. de C. Walsh (Northern Rhodesia). The Diploma studies on the practice of thinnings by N. B. Lewis (Southern Australia) were also supervised by Mr. Edwardson.

Miscellaneous. Mr. Edwardson carried out advisory work during the year, including tree preservation at Harlow New Town, valuation (Stanton St. John woods), and prepared one or two Dedication Plans for Chiltern and other estates.

AERIAL SURVEYS

The course of eight lectures in Michaelmas Term on photogrammetry and interpretation of aerial photographs was given to post-graduate students by Mr. D. F. Munsey of the Survey Department and Mr. F. C. Osmaston. Each lecture was followed by two hours practical work. Some fourth year students also attended the classes.

In addition Mr. R. G. Miller, Assistant Director, Forest and Land Use Section, Directorate of Overseas Surveys, Tolworth, gave a special lecture in Trinity Term on the use of aerial photographs in Forestry. This lecture was succeeded by a visit to the Directorate of Overseas Surveys where the whole process of map-making from aerial photographs was seen.

For the revised working plan of Wytham the aerial photographs taken in May, 1953, were cut into strips, arranged in stereo pairs and mounted in an album. Compartment boundaries will be marked on one of each pair of photographs. In this way a permanent record, arranged for easy stereoscopic viewing, to supplement the compartment histories has been made.

STATISTICS

By arrangement with the Reader in Biometry, Mr. J. Fraser Scott gave a course of lectures on elementary statistics for Forestry students.

Mrs. Allington's computing work has continued much as usual.

WOOD ANATOMY

Dr. L. Chalk continued in charge of the section with Mr. A. A. Shaw and Mr. P. G. H. Franklin as his assistants. The usual undergraduate and postgraduate courses were given. One undergraduate and two forest officers carried out research for special subjects and advanced studies respectively in this subject and there was one Diploma and one D.Phil. student.

Research. (1) *Tracheid length in Pinus caribaea Morelet.* Mr. S. H. Inchbold Stevens carried out the first of a series of investigations planned for this species, on material from British Honduras. Variation within the growth ring was first investigated in connection with sampling. The poor definition of the latewood and the frequency of false rings greatly complicated this problem. Although in general, length was found to be greatest in the latewood there were so many inexplicable variations that it was considered better to take a mixed sample from a whole ring than to limit the samples to any particular position in the ring. Variation outwards was studied at 14 ft. above

ground in three trees. Increase outwards appeared to be more closely related to distance than to number of rings from the pith.

(2) *The duration of the juvenile period in the wood of Grenadier apple trees.* As indicated by fibre and vessel member length. Mr. A. M. Loach investigated fibre length in two stems of apple grafted from the same clone on to vigorous and dwarfing root stocks, using one tree of each and two discs at different heights from each tree. The material was supplied through the courtesy of the Director of the East Malling Research Station. Within the growth ring fibre length increased to a maximum in the middle of the ring; comparison with the length of the vessel members suggested that this was primarily due to intrusive growth of the fibres. Variation outwards at any level appeared to be more closely related to distance rather than to number of rings from the pith.

(3) *Density variation in the timber of Ramin, Gonostylus bancana.* Mr. L. S. V. Murthy investigated wood samples from 20 trees representing three sites in Sarawak. The material was remarkably similar in density at 1 inch from the pith but, whereas the material from the Padang and deltaic mixed swamp showed a marked increase in density outwards, the large trees from the coastal swamp (which supply the commercial timber) remained stable at a lower density. The woods with the lowest density rather surprisingly showed a high percentage of fibres. Though the relative proportions of rays and parenchyma varied considerably, the total of the two tissues tended to remain relatively constant from the pith outwards on each site.

(4) *Radial strands of phloem in the xylem of Dactylocladus stenostachys Oliv.* Mr. L. S. V. Murthy investigated the small flecks or holes that form a characteristic defect in Jongkong timber. These proved to be radial strands of included phloem. Similar strands running axially are characteristic of some genera in this family, the Melastomaceae, but radial strands do not appear to have been recorded before. Seedling material showed that these strands originate a few cells out from the pith, from which they were separated by a zone of stone cells.

The Wood Collection. The most interesting addition during the year was a collection of about 270 woods from the Florida Keys from the Yale University School of Forestry (per Professor W. L. Stern). This contains many species and some genera new to the collection. A very valuable collection of microscope slides has also been received from this source during the last few years. Also of particular botanical interest was a small collection of woods from the Forestry Department of the Tanganyika Territory (per Mr. J. M. Bryce).

FOREST ECONOMICS

This section was in charge of Mr. J. J. MacGregor. Mr. F. E. Balman has been mainly concerned with the preparation of a Summary Report of the Economic Survey of Forestry on Private Estates. Owing to the uncertainty of the future of the grant the vacancy

created by the departure of Mr. T. W. Irvine at the end of July, 1958 was not filled until April, 1959, when Mr. R. C. Gregson was appointed. Miss J. M. Johnson has been responsible for secretarial work and the preparation of survey reports, and Mrs. Willoughby has also assisted part-time.

Teaching. Lectures and tuition in Economic Theory and Forest Economics were given to final year students. Seminars and study groups for forest officers were also arranged.

Research. The preparation of the Summary Report on Forest Costs has involved considerable analysis of statistics accumulated over the previous five years. At the same time data on prices of home-grown timber and on cost of forest operation on private estates have been collected.

Supervision. Supervision of two degree theses was undertaken: Mr. A. J. Grayson of the Forestry Commission on the position of hardwoods in Britain's forest economy is in preparation; and Mr. K. R. Walker of the Department of Political Economy at Aberdeen University obtained a D.Phil. degree for a study of 'The Competition for Land between the Forestry Commission and the Agricultural Industry in Great Britain: a study in economic policy.'

The Forest Economist also was a Director of Studies for Mr. Ilori, a Recognised Student, who was studying the development of agriculture in Nigeria. The Forest Economist acted as an examiner on the Principles of Forestry for the Department of Estate Management at Cambridge University.

Foreign Tours. At the request of the Ministry of Agriculture and Natural Resources, Nigeria, the Forest Economist spent December, 1958 and part of January, 1959, in the Western Region of Nigeria. A draft report of this tour was prepared in the summer of 1959. He also assisted the Professor in the organisation and conduct of the Land Use Course arranged for senior forest officers in June and July, 1959. This involved travelling in England and Wales, Switzerland, Italy and France.

Committees. In the summer of 1959 the Forest Economist became a co-opted member of the Economics Sub-Committee of the Timber Growers' Organization.

FOREST LAW, TAXATION AND ADMINISTRATION

British Forest Law, etc. Mr. W. A. Gordon gave a course of 20 lectures on British Forest Law, Land Tenure and Taxation to a class of ten students. Five took the subject in the Final Honour School of Forestry.

Mr. Gordon was an Examiner for the Final Honour School of Forestry.

Mr. Gordon also conducted two seminars for post-graduates on the Law of Evidence and Contract, and gave two lectures on the legal aspects of Forest Protection to the Third Year students.

Colonial Forest Administration. Mr. Gordon gave a course of 12 lectures to a class of fifteen graduates and undergraduates. Two candidates took this subject as their additional subject in the Final Honour School of Forestry.

FOREST UTILIZATION AND ENGINEERING

The usual undergraduate courses in Forest Utilization and in Forest Engineering were given by Colonel A. H. Lloyd. These courses consisted of thirty-six lectures, followed by practical road alignment on the Wytham Estate. Visits were made to see road and timber bridge construction in progress near Oxford while individual projects were prepared by the students. Plywood and wood-turnery factories were visited in the Forest of Dean and sawmills at High Wycombe. The students also spent a day at the Forest Products Research Laboratory. All students had previously carried out practical forestry work during the vacations either in Scandinavia or in Canada.

The Forest Officers attended a practical course in the maintenance and sharpening of saws and cutting tools in the Institute workshops. During the Easter Vacation many of the officers also undertook a special five-day practical course arranged with the Land-Rover School at Solihull. This was succeeded by a more general course on the petrol engine and car maintenance at the City of Oxford Technical College. Four officers who had selected sawmilling and timber utilization as their special subjects visited Messrs. Howard's sawmills at Southampton and Stenner's sawmill factory at Tiverton.

Visits were also made to Messrs. Mallinson and Sons timber yard in the London Docks and their veneer exhibition. A furniture factory in High Wycombe in which veneered chipboard was the main material used was also visited.

Colonel Lloyd continued to be a member of the Technical Committee of the British Standards Association and the Council of the British Wood Preserving Association.

FOREST PROTECTION

The usual course of lectures on Fire Protection and counter erosion were given by Colonel Lloyd. Three lectures on the legal side of forest protection were given by Mr. Gordon and economic aspects by Mr. MacGregor.

SURVEYING

In the absence of Dr. A. R. Robbins, the usual course in Surveying was given in the Trinity Term by Mr. D. F. Munsey of the Department of Surveying to the Third Year students.

LIBRARY

Miss Grace Guiney, Librarian for the past 33 years, retired on September 30th. She was succeeded by Mr. E. F. Hemmings whose

previous post of assistant in charge of catalogues was not filled. The catalogue work was split among members of the staff. To assist in this, and in the routine library work, Miss P. Beyer and Miss C. Littler were engaged as library clerks.

Mrs. Cloke, the Assistant Librarian, has concentrated on a number of special tasks which include the making of a locality and category index to the map collection. She also started to sort and classify older works which have been stored in the basement. A reclassification of Herbarium books has been completed, and books held in the sections by the staff are being reclassified. She has also begun to alter the present book cataloguing system in accordance with the standards suggested by the Library Association.

With the primary object of assisting the Librarian in his choice of books, a Library Committee, which meets fortnightly during term, was formed. Many matters outside book selection have been discussed, and certain beneficial changes in administration have resulted.

Shelves are being made along one side of the main corridor. When this work has been completed, it is proposed to return the Mahogany Room to its original role as a reading room. At present it is used as a work room for the Assistant Librarian, who would be more conveniently seated near the main catalogues.

The most serious threat to the new organization of duties came from the main catalogues. The number of cards for filing far exceeded anything the Library has had to cope with in the past. Forty drawers were added, and the whole catalogue was respaced. Many additional guide cards were inserted.

The Library Bulletin continued publication, and the *Basic List of Books for Forest Libraries* attracted considerable interest even outside its extensive circulation.

The Commonwealth Forestry Bureau's Centralized Title Service produced some 781,232 (679,128) cards and flimsies on the Multilith duplicating machine and distributed them to 95 (90) recipients.

The Stock-copy collection was increased by 165 items.

Translations were increased by 76.

New periodicals received 19 (12).

New Series, including Annual Reports, 51 (37).

Cost. During the year the Library expenses amounted to £3,756, (£4,464), £2,856 (£3,631) of which were on staff salaries and the balance on books, periodicals, binding and equipment.

Visitors. Mrs. Guthrie, Canadian Forest Service, spent two weeks learning the application of the Oxford Decimal Classification. Mr. Wells, Oxford City Librarian, brought a party to see the Library in January, and this was followed in May by a visit from the Ashmolean Natural History Society.

Other visitors included:—The Rt. Hon. J. Hare (Minister of Agriculture), Miss Frances Flick (U.S.D.A.), Dr. Bruce Campbell and

Mr. D. R. Wilson (British Trust for Ornithology), Miss O. Daly (Agricultural Institute, Dublin), Mr. G. Guerreiro (Portugal), Miss L. W. Verdcourt (Kenya), Professor Firat (Turkey), Professor D. J. Wort (University of British Columbia), Mr. J. A. White (U.S.A.), Mr. de Souza (Portugal), Dr. W. Schweers (Librarian, Hamburg), Mr. Hellen (Finland), Dr. W. Nyysönen (Finland), Mr. J. D. Irwin (University of New Brunswick), Dr. Fairbairn (Edinburgh). Many former students used the library throughout the year.

Grateful thanks are due to the many organizations and individuals who continue to give valuable works to the Library; mention can be made of only a few:— Professor Sir H. G. Champion, Dr. L. Chalk, Sir Herbert Howard, Dr. J. M. Huston, Dr. L. Leyton, Dr. Carlisle, Mr. R. H. Hide, Mr. W. E. Hiley, Maung Kyi, and Professor Firat. The Commonwealth Forestry Bureau gave the Library many important modern works.

STATISTICS

ACCESSIONS

Issues of periodicals	...	...	...	1095 (2000)
Current annual reports	...	...	...	169 (200)
Books	...	...	...	160 (155)
Maps	...	...	...	48 (46)
Miscellaneous (pamphlets, etc.)	...	...	...	2270 (1710)
				<hr/>
				3742 (4111)

LOANS

	<i>Staff</i>	<i>Bureau</i>	<i>Students</i>	<i>Visitors</i>
Periodicals				
circulation	2774 (2808)	—	—	—
direct	167 (223)	268 (500)	255 (187)	443 (281)
Books	191 (158)	39 (47)	924 (1030)	83 (80)
Miscellaneous	258 (246)	320 (305)	498 (490)	192 (509)
	<hr/>	<hr/>	<hr/>	<hr/>
	3390 (3435)	627 (852)	1677 (1707)	718 (870)
	Total loans = 6412 (6864)			

CATALOGUE CARDS

Subject	(Oxford) cards	18665 (16064)
Author	(Oxford) cards	9200 (7980)
	(Flury) cards	246 (105)
		<hr/>
		28,111 (24,149)

CORRESPONDENCE

Letters sent	...	...	1836 (1801)
Letters received	...	...	1018 (1041)

Sales of Institute Publications:—£230. 7s. 10d. (£72. 3s. 5d.).

PHOTOGRAPHIC SECTION

During the year the following major items were dealt with by the Photographer, Mr. Woodward:

Prints and enlargements	...	...	3957 (4276)
Negatives processed	...	...	763 (1016)
Photomicrographs and photos taken	...	...	374 (220)
Lantern slides	...	...	110 (56)
Maps mounted on hangers	...	...	— ( 378)

Other work included preparation of a stereoscopic album from aerial photos of Wytham Woods.

WORKSHOPS

Two metal workers, Mr. E. J. Howell and Mr. I. Abbott, and one wood worker, Mr. J. W. Howkins, continued to work in the workshops. In addition to the usual work of maintenance and modification of existing apparatus the more important equipment made included:

Six card index filing cabinets, two large Stephenson screens, an adjustable photographic table with a rising and falling platform, two Kjeldahl stands, extensions to the insectary and apparatus for determining water stable aggregates.

APPENDIX I

PUBLICATIONS

GENERAL

Original Publications

Forestry in Great Britain, the Commonwealth and Europe, by A. H. Lloyd, *Encyclopaedia Britannica 'Book of the Year' 1958*.

SILVICULTURE

Original Publications

The Storage of Acorns in Water, by E. W. Jones. *Forestry* 31: 163-66.

Reviews

Bestockungsaufbau und Baumartenwandel nordischer Urwälder, by R. Plochman. *Journal of Ecology* 47: 523-24 (E. W. Jones).

Cultivation of the Cricket Bat Willow, Forestry Commission Bulletin No. 17. *Empire Forestry Review* 37: 472 (E. W. Jones).

ECOLOGY

Original Publications

Excavation of a Round Barrow on Chicks Hill, East Stoke Parish, Dorset, by P. Ashbee and G. W. Dimbleby. *Proc. Dorset Nat. Hist. Arch. Soc. for 1958*, 80: 146-159.

The Effect of Earthworms in Soil Pollen Distribution, by Alan Ray (Edited by G. W. Dimbleby). *Journal of the Oxford University Forestry Society*, Fifth Series, No. 7: 16-21.

Reviews

The Study of Plant Communities (2nd Edition) by Henry J. Oosting, San Francisco. *New Phytologist* 56: 261-62 (G. W. Dimbleby).

Quantitative Plant Ecology, by P. Grieg-Smith, London. *Empire Forestry Review* 37: 364-65 (G. W. Dimbleby).

A Practical Guide to Plant Sociology for Forestry and Agriculturists, by F. R. Bharucha and W. C. de Leeuw, Calcutta. *Empire Forestry Review* 37: 365 (G. W. Dimbleby).

The Native Pinewoods of Scotland, by H. M. Steven and A. Carlisle, Edinburgh. *Empire Forestry Review* 38: 198-199 (G. W. Dimbleby).

TREE PHYSIOLOGY AND FOREST HYDROLOGY

Original Publications

Some Aspects of Forestry Research in Great Britain, by L. Leyton. *University of Toronto Forestry Bulletin* No. 5, pp. 19 University of Toronto Press, 1958.

Influence of potassium fertilizer level on red pine planted at various spacings on a potassium deficient site, by S. O. Heiberg, L. Leyton and H. Loewenstein *For. Sci.* 5: 142-53.

Afforestation and Water Supplies in Britain, by L. Leyton and A. Carlisle. *Mitt. Schweiz. Anst. f. Forst. Versuchsw.* 35: 51-56.

Coniferous litter amendments and the growth of Sitka spruce, by L. Leyton and J. Weatherell. *Forestry* 32: 7-13.

Measurement and interpretation of interception of precipitation by forest stands, by L. Leyton and A. Carlisle. Pub. No. 48: 111-19. *International Association of Scientific Hydrology*, Gentbrugge, 1959.

The influence of heather (*Calluna vulgaris* L.) on root growth in tree seedlings, by P. J. Pearman, (edited by L. Leyton). *Journal of the Oxford University Forestry Society*, Fifth Series, 7: 28-33.

Reviews

The Physiology of Forest Trees, Edited by K. V. Thimann, the Ronald Press Co., New York, 1958. *Nature* 182: 1698 and (different review) *Empire Forestry Review* 38: 88-89 (L. Leyton)

SOIL MICROBIOLOGY

Original Publication

Characterization of Polysaccharides isolated from Forest Soils, by B. Bernier. *Biochemical Journal* 70: 590-99.

BOTANY

Original Publications

A Revision of the African species of *Terminalia*, by M. E. Griffiths. *Journ. Linn. Soc. (Bot.)* 55: 818-907, 1959.

The Problem of the Species in Forest and Savanna Woodland, by A. C. Hoyle, *Mem. Soc. Brot.* 13: 11-12.

The Forest Flora of Northern Rhodesia (description of scope and contents of), by F. White. *Mem. Soc. Brot.* 13: 47-9.

A new *Entada* from Tropical Africa, by F. White. *Bol. Soc. Brot.* 33: 1-11.

A guide to the named variants of Scots pine, by A. Carlisle. *Forestry* 31: 203-24.

FOREST ENTOMOLOGY

Original Publications

On the final instar larva of *Pseudorhyssa alpestris* (Holmgren) (Hym., Ichneumonidae), by G. H. Thompson. *Entomologist's Monthly Magazine* 94: 276.

Onthotomicus (Ips) erosus (Woll.) (Col., Scolytidae) in the Forest of Dean, by G. H. Thompson. *Entomologist's Monthly Magazine* 95: 95.

PATHOLOGY

Original Publications

Variation in Susceptibility of European Larch of differing Seed Origin in Scotland to Injury by Experimental Freezing, by W. R. Day. *Scottish Forestry* 12: 143-46.

Observations on Eucalypts in Cyprus. I. The Character of Gum-Veins and Anatomical Indications for their Origin, by W. R. Day. *Empire Forestry Review* 38: 35-44. II. Root Development in relation to Soil Conditions, by W. R. Day. *Empire Forestry Review* 38: 186-97.

Cracking in the Main Stem of Noble Fir at Lethen, by D. K. Barrett. *Scottish Forestry* 12: 187-90.

Reports to Forestry Commission

Factors determining Health and Disease in Corsican Pine Plantations in Britain, by W. R. Day. Typed: 35 Pp. 1958.

Growth of Trees in Lennox Forest, by W. R. Day. Typed: 8 Pp. 1958.

FOREST MANAGEMENT

Draft for Forestry Commission

Notes drafted by W. A. Gordon for the historical chapter of the New Forest Working Plan.

MENSURATION

Original Publication

An investigation of the top height/Hummel tariff relationship in Norway spruce, by A. J. Hepburn (Edited by T. E. Edwardson). *Journal of the Oxford University Forestry Society*, Fifth Series 7: 22-27.

WOOD ANATOMY

Original Publication

The shrinkage of rays and fibres in wood, by L. C. A. de S. Wijesinghe. *Forestry* 32: 31-8.

ECONOMICS

Original Publications

The Preparation of Price Index Numbers for Forestry Products, by J. J. MacGregor. *Forestry* 32: 39-52.

Are Agricultural Marketing Methods suitable for Forestry? by J. J. MacGregor. *Quarterly Journal of Forestry* 53: 128-38.

Cultural and Silvicultural Tour of Italy, by J. J. MacGregor. *Journal of the Oxford University Forestry Society*, Fifth Series 7: 34-37.

Review

World Forest Products Statistics, 1946-1955. A Ten-year Summary (F.A.O.). *Forestry* 31: 233-34 (J. J. MacGregor).

FOREST UTILIZATION AND ENGINEERING

Reviews

Tractors for logging, Forestry Development Paper No. 1, 1957, by X. de Megille. *Empire Forestry Review* 37: 366 (A. H. Lloyd).

Tools and Equipment for Planting and Reforestation. Information Paper No. 3, 1957, by Professor P. Turpin. *Empire Forestry Review* 37: 366 (A. H. Lloyd).

Lumber, the stages of manufacture from sawmill to consumer, by N. C. Brown and J. S. Bethal. *Empire Forestry Review* 37: 365-66 (A. H. Lloyd).

Foresters' Engineering Handbook, by F. R. Huggard. *Empire Forestry Review* 38: 91 (A. H. Lloyd).

APPENDIX II

I. STAFF ENGAGED IN INSTRUCTION AND RESEARCH

- PROFESSOR SIR HARRY CHAMPION, C.I.E., M.A., D.Sc. (Oxon.),
Tropical Forestry, Forest Policy.
- L. CHALK, M.A., D.Phil. (Oxon.). Wood Structure and Properties.
- W. R. DAY, B.Sc., M.A. (Oxon.). Pathology, Forest Hygiene.
- A. H. LLOYD, O.B.E., M.C., T.D., M.A. (Oxon.). Forest Engineering and Utilization.
- E. W. JONES, M.A. (Oxon.). Ph.D. (Cantab.). Silviculture.
- G. H. THOMPSON, B.Sc., M.A. (Oxon.). Forest Zoology, Entomology.
- T. E. EDWARDS, M.A. (Oxon.), B.Sc. (For.) (Edin.). Mensuration, British Forestry.
- W. A. GORDON, M.A., Dip. Anth. (Oxon.), Bar. at Law (Lond.). Colonial Forestry, Forest Law.
- F. C. OSMASTON, M.A. (Oxon.). Forest Management, Aerial Survey.
- J. J. MACGREGOR, B.Sc. (Glasgow), M.S. (Wisc.), B.Litt., M.A. (Oxon.). Forest Economics.
- W. R. C. HANDLEY, M.A. (Oxon.), Ph.D. (Leeds). Microbiology.
- L. LEYTON, M.A. (Oxon.), Ph.D. (Leeds). Tree Physiology.
- G. W. DIMBLEBY, B.Sc., M.A., D.Phil. (Oxon.). Forest Ecology.
- A. CARLISLE, B.Sc. (For.) (Bangor), Ph.D. (Aberdeen). Forest Hydrology (Until 31st July, 1959).
- A. C. HOYLE, B.Sc., M.A. (Oxon.). Forest Botany and Ecology.
- F. WHITE, M.A. (Oxon.), M.A. (Cantab.). Forest Botany.
- E. R. C. REYNOLDS, B.Sc., Ph.D. (Lond.), D.I.C., A.R.C.S. Forest Hydrology

II. STAFF OF OTHER UNIVERSITY DEPARTMENTS

ASSISTING IN INSTRUCTIONAL WORK

- R. K. SCHOFIELD, M.A. (Oxon.), Ph.D. (Cantab.). Soil Science.
- D. F. MUNSEY, M.A. (Cantab.). Surveying and Aerial Survey.
- J. FRASER SCOTT, M.A. (Oxon.). Statistical Method.

III. OTHER STAFF

Secretary: Miss H. M. EDWARDS

Assistant Secretary: Miss I. BLAGROVE

Librarians: Miss G. GUINEY, until 30th Sept. 1958

Mr. E. F. HEMMINGS, from 1st Oct. 1958

Assistant Librarian: Mrs. M. CLOKE, M.A. (Oxon.).