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THE HARVARD FOREST

A Unit in the Graduate School of Arts and Sciences of
HARVARD UNIVERSITY

A member of the Botanical Group, which includes the Arnold Arboretum, the Gray Herbarium, the Bussey Institution, the Atkins Institution of the Arnold Arboretum, the Farlow Herbarium and Library, the Botanical Garden, the Botanical Museum, and the Maria Moors Cabot Foundation for Botanical Research.

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GENERAL INFORMATION

The Harvard Forest, as a unit in the Graduate School of Arts and Sciences of Harvard University, offers only graduate instruction in forestry. The student may carry on his work entirely at Petersham or in part at Cambridge, depending upon the subject of specialization, the degree for which he is a candidate, and the stage which he has reached in his studies. Graduates of forestry schools who desire to continue their professional training ordinarily become candidates for the Master in Forestry degree, which is granted upon the completion of one academic year of acceptable work.

At Petersham the work is very largely biological in character, with special emphasis on silviculture and certain of the natural sciences

which underlie and support it. Candidates for the M.F. degree specializing in one of these subjects ordinarily spend the entire academic year at Petersham. Those specializing in forest economics spend part of their time at Cambridge, where courses in economics are given by the Department of Economics and the Faculty of the Graduate School of Public Administration.

Instruction and facilities for research at the Forest are also available to candidates for the degree of Master of Arts or Doctor of Philosophy who undertake studies in botany, zoölogy, physiology, or economics which bear on forest culture or utilization. Candidates for these degrees must meet the requirements of the Department or Division of the Faculty of Arts and Sciences concerned, both for admission to candidacy and for securing the degree.

Instruction in forestry in the University was first offered in 1903. The professional degree of Master in Forestry has been granted since 1907, the same year in which the forest property in the town of Petersham, Massachusetts, was acquired through a generous gift by John S. Ames, '01. This acquisition filled an indispensable need for a place where instructors and students might work together in the forest throughout the year.

Petersham is situated in the north central part of the state, about seventy miles west of Cambridge and a few miles south of Athol, the nearest railroad station.

BUILDINGS AND EQUIPMENT

The headquarters of the Harvard Forest are located three miles north of the village of Petersham on a state highway, and consist of three new, fireproof buildings containing facilities for advanced study. Shaler Hall, the Administration Building, contains offices for the staff, classrooms, library, laboratories, and year-round living quarters for students and research workers. Meals are served in the building.

The library contains about six thousand volumes in forestry and related subjects. It receives regularly the major forestry periodicals, both American and foreign, as well as material issued by the federal and state governments. The collection is particularly strong in early European forestry periodicals. In addition, the student may use the Harvard University libraries in Cambridge.

The laboratories are equipped for physical and chemical determina-

tions on plant materials and soils. Facilities are available for growing tree seedlings in pot cultures and soils, under varying solar radiation intensities. Equipment for the measurement of radiation is unusually varied and complete.

Connected with Shaler Hall is the Fisher Museum of Forestry, which houses the forest model collection and other exhibits of interest to laymen as well as to forestry students. The twenty-three models present in three-dimensional miniature the history and silvicultural treatment of the local forests.

THE FOREST

The Forest was acquired to serve as a field laboratory and experimental tract for instruction and research in forestry and allied subjects, and for the demonstration of forest practices. It has been under continuously intensive management longer than any other forest in America. It comprises 1970 acres of upland, 116 acres of forested bog, and 206 acres of water, marsh, and other non-forested areas, a total of 2292 acres. The three separate blocks into which the Forest is divided are in turn subdivided into twenty-eight compartments, and the compartments into some five hundred stands.

Well represented within the Forest are the complex and diverse conditions of tree cover, soil, and topography characteristic of central New England. The extremely varied composition of the forests in this region is due in the main to their location in a transition zone marked by the overlapping of the northern forest and the central hardwood forest, and to the peculiar history of the use of the land. One hundred years ago at least three-fourths of the town of Petersham was cleared and in agricultural use. In the middle of the last century much of it was abandoned for this purpose, and natural reversion to forest generally took the form of pure white pine stands on the former fields and pastures. As these "old field" stands became merchantable, they were cut to supply the needs of local wood-using industries. Following clear-cutting, hardwoods took over the ground, and it is this stage in the succession which is best represented at present. Some of these ensuing hardwood stands have reached cordwood size and already have been cut for fuelwood, thus giving rise to a third generation since farm abandonment. Examples of all of these stages, as well as remnants of the original forest, are to be found in or near the Forest.

A wide variety of silvicultural operations is carried on yearly in the Forest, in which students participate under the guidance of staff members. Because the hurricane of 1938 destroyed most of the older stands, cultural treatments for a number of years to come will be centered on the establishment of new stands and the improvement of young and middle-aged stands which escaped severe damage. A continuous record system is maintained, which includes statements of time and costs for all silvicultural operations and accounts of products harvested.

Not all of the Forest is given cultural treatment. Some areas are set aside as representative cases in forest history or condition, because of their special value as places to study the ecological basis for the practice of silviculture. Other areas, in the form of sample plots, are reserved for purposes of contrast with the surrounding treated stand.

A wildlife sanctuary, maintained in coöperation with the Massachusetts Department of Conservation and adjoining woodland owners, provides an opportunity to study the relation of wildlife to forest management. At Winchester, New Hampshire, the Forest has a 20-acre tract of virgin timber which, though severely damaged by the hurricane of 1938, is of great interest to students of forest ecology. At Hamilton, Massachusetts, the Forest owns 100 acres of some of the oldest and most varied plantations to be found in the region.

THE DEGREE OF MASTER IN FORESTRY

Candidates for the degree of Master in Forestry must possess a bachelor's degree in forestry from a school of recognized standing, or equivalent academic training. The degree is conferred upon the satisfactory completion of work equivalent to four full courses, which includes a thesis or report embodying the results of original work.

For all candidates for the M.F. degree, the first several weeks of the academic year are spent at Petersham in receiving general instruction in local forest history and succession, and in the culture, protection, use and economic importance of the local forests. Following this period of orientation, candidates will continue their studies either at Petersham or Cambridge. At Petersham, special instruction is offered in silviculture and protection, forest tree physiology and forest soil science. At Cambridge, instruction is offered in forest economics, forest ecology, forest tree genetics and other phases of biology applied to forestry.

Instruction wholly at Petersham. Two general methods of instruction, the research project method and the case method, are available to students at Petersham.

The research project method of instruction is especially suitable for students desiring to fit themselves for research or teaching in forestry. Following completion of the period of general instruction, the student will devote most of his time to one or more research projects under the direction of the staff. Under this method of instruction, the thesis forms the major test of the student's ability, and the basis for the final grade.

A wide variety of research projects may be undertaken. The Forest has been under intensive management for over thirty years, and hundreds of stands have received silvicultural treatment. Successional stages in forest history are well defined, and remnants of the original forest still exist. These conditions provide unusual opportunities for investigations in silviculture and forest ecology.

Continuing research projects in tree nutrition and growth offer another field of concentration. The relation to tree growth of such environmental factors as light and soil nutrients and such adjunct biological factors as symbiotic fungi on the roots (mycorrhizae) is being investigated. Some of the studies in tree breeding supported by the Maria Moors Cabot Foundation for Botanical Research are conducted at Petersham.

In the field of forest protection, the student may benefit through participation in the experimental work being carried on jointly with the Division of Forest Insect Investigations and the Division of Forest Pathology of the U. S. Department of Agriculture.

The case method of instruction is designed especially for students planning a career in specialized professional practice in silviculture. Representative stands which have been under treatment for a number of years, either in the Forest or other local ownerships, are studied as cases illustrating forest history and the application of silviculture. The cases are taken up in the same order as that generally followed by text books of silviculture, that is, the several standard reproduction methods first, followed by the intermediate treatments. Each case is assigned for reading, then examined in the field, and its various aspects discussed with the instructor. The cases also serve as material for short original studies and for actual silvicultural treatment by the students.

The study of cases in silviculture extends over a period of about

four months, after which the student will be assigned the problem of analyzing and making a written plan of treatment for a tract of forest containing a number of stands and a variety of conditions. Ordinarily, this assignment will require from two to three months for completion.

Throughout the year students participate in cultural operations designed to cover the full range of silviculture, in field trips off the Forest, and in seminars and special assignments. Included are special studies of insect pests and tree diseases which influence silvicultural practice, visits to wood-using industries, and seminars conducted by invited lecturers. Participation in these activities is required of students specializing in silviculture, and optional for students specializing in other subjects.

Instruction partly in Cambridge. Two general curricula in Cambridge, biology and economics, are open to students from the Harvard Forest who are candidates for the Master in Forestry degree.

Instruction in various fields of biology which bear on forestry is given in Cambridge by the Department of Biology, with which the Harvard Forest is affiliated. The candidate following this curriculum usually is required to take course work in Cambridge throughout the year, to prepare a thesis and, in addition, to spend a minimum of six weeks at Petersham for purposes of general instruction in forestry. To meet the last-mentioned requirement, the student ordinarily will be expected to report at the Forest in advance of the usual academic year. The course of study will depend upon the individual student. Of special interest is the work in forest ecology, available under the staff of the Arnold Arboretum.

Work bearing on forest economics is given in Cambridge by the Department of Economics and the Graduate School of Public Administration. In this curriculum, also, the student is required to take course work in Cambridge throughout the year, to prepare a thesis, and to spend the minimum of six weeks at the Harvard Forest before the beginning of the usual academic year, for purposes of general instruction in forestry.

In many cases the student taking full-time course work at Cambridge will be unable to complete his thesis by the end of the year, and the granting of the degree will be withheld until such time as the thesis is in acceptable form.

COURSES GIVEN AT PETERSHAM

The following courses in biology are conducted at the Forest:

BIOLOGY 120. Forest Practice and Research. Lectures, conferences, field and laboratory work. Mr. CLINE, Asst. Professor GAST, Mr. LUTZ, Mr. SPURR, and other Members of the Department of Biology.

General instruction in the history, culture, protection, use and economic importance of local forests will occupy approximately the first six weeks. Thereafter the student will undertake specialized study in silviculture and protection, forest tree physiology, forest soil science, or such other forestry subject as may be arranged in collaboration with other Members of the Department of Biology.

This course may be taken in units of full courses to a maximum of four, according to individual arrangement.

Candidates for the degree of Master in Forestry will register in this course. Biology 120 ordinarily is open to graduates of an approved professional course only, but in exceptional cases may be taken by students who satisfy the staff that they have had equivalent academic training.

BIOLOGY 20. Research in Forestry. Mr. CLINE, Asst. Professor GAST, Mr. LUTZ, Mr. SPURR.

COURSES GIVEN AT CAMBRIDGE

Students from the Harvard Forest may take any graduate course for which they are qualified and which fits into their general curriculum.

In biology, the following courses are among a number which are likely to be of interest to forestry students: Problems and Methods in the Study of Vegetation (Biol. 19), General Ecology (Biol. 22), The Principles of Genetics (Biol. 11), Plant Cytology (Biol. 15), Outlines of Economic Botany (Biol. 16), Plant Physiology (Biol. 32), Comparative Morphology and Development of the Vascular Plants (Biol. 118), Biometry (Biol. 111), and Insects in Relation to Human Welfare (Biol. 119).

BIOLOGY 20, Research in Biology, is offered properly qualified students as an opportunity for pursuing investigations in botany, zoölogy, paleontology, and physiology under members of the Department of Biology at Cambridge.

In economics, instruction in the following courses is participated in by members of the Forest Staff:

ECONOMICS 179. (A Seminar offered by the Graduate School of Public Administration). Agricultural, Forestry, and Land Policy. Tu., 2-4. Professor J. D. BLACK with the assistance of the staff of the Harvard Forest.

ECONOMICS 20. Direction of Doctoral Dissertations. Members of the Department of Economics jointly with Director CLINE of the Harvard Forest.

Other economics courses most likely to be of interest to forestry students are: Economics of Agriculture (Econ. 171), and Commodity Distribution and Prices (Econ. 107). Also available are such courses as Introduction to Economic Statistics (Econ. 21), Accounting (Econ. 26), Public Finance (Econ. 51), Economics of Production (Econ. 106), Labor Problems and Labor Movements (Econ. 181), and Principles of Money and Banking (Econ. 141).

SCHOLARSHIPS

BLISS FUND (1917). Established by Mrs. William H. Bliss of New York, "to be applied to the establishment and support of scholarships in the Division of Forestry." Grants are awarded to graduate students undertaking studies in forestry or allied fields under the major direction of the Harvard Forest staff. A recipient of an award who is not specializing in forestry will register in Biology 120 for a minimum credit of one full course. *One or more, from an income of \$1,050*

UNIVERSITY SCHOLARSHIPS (1933). Four of \$150 each for candidates for the degree of Master in Forestry.

BLODGETT SCHOLARSHIP (1937). A gift of \$500 per year for a period of five years from Mr. John W. Blodgett, Jr., of Grand Rapids, Michigan, to be awarded to a graduate student who is pursuing his studies at the Harvard Forest, or in the field of forestry in related departments of the University.

For further information on admission or scholarships, address the Director, Harvard Forest, Petersham, Massachusetts. Scholarship applications to be considered in the first assignment should be received before February 20; applications made later will be considered in the event of resignations.

FEES AND EXPENSES

The tuition fee is that of the Graduate School of Arts and Sciences, \$400. There is an annual instrument and transportation fee of \$10. Lodging in the dormitory at Petersham ranges from \$2.25 to \$3.50 per week, depending upon the size of the room. Board is charged at cost, currently about \$6.50 per week. The dormitory rooms are furnished, with the exception of linen and blankets, these to be provided by the occupants.

A bond of \$500 must be filed with the Bursar. Term bills are payable quarterly.