disease resistant chestnuts will be distributed for reforestation to replace the large number of trees which have been killed by the devastating blight along the Atlantic seaboard. The trees include black and Japanese walnuts, butternuts, sweet hickory, shagbark, shellbark, bitternut, pignut hickory, Chinese, Korean, Japanese and European and Turkish filberts and hybrids of many varieties and species. The cost of transplanting was made possible through emergency conservation funds.

UNDER the will of Mr. Reginald Radcliffe Cory, of Wareham, who died on May 12, leaving an estate of the gross value of £221,809, a substantial residue of the property is left to the University of Cambridge for the general interests of the botanical gardens. Mr. Cory directed that the income from £30,000 of the residue should be expended in the upkeep of the botanical gardens and the payment of salaries of those employed in, or in connection with, the gardens.

ACCORDING to the *Museum News*, the Museums Association of Great Britain has made the following allotments, from the Carnegie Corporation grants, to colonial museums in the Empire: one thousand pounds to the Cyprus Museum, Nicosia, Cyprus and the Barbados Museum and Historical Society, Bridgetown, Barbados; five hundred pounds to The Museum, Georgetown, British Guiana (in addition to twenty thousand pounds for library and museum extension) and to the Nelson Museum, Antigua; four hundred pounds to the Achimota College Museum, Accra, Gold Coast; two hundred pounds to the Rhodesian Museum, Bulawayo, S. Rhodesia; The Queen Victoria Memorial Library and Museum, Salisbury, S. Rhodesia; St. John's Co-Cathedral Museum, Valetta, Malta, the Library and Museum Committee, Falkland Islands, and the Museum of the Mauritius Institute, Port Louis.

A NEW journal, entitled *The Botanical Review*, edited by Drs. H. A. Gleason and E. H. Fulling, of the New York Botanical Garden, the first number of which appeared this month, has been announced. The preliminary announcement states that "No original research will be presented, but each article will collate, summarize and evaluate all recent important work on the topic." The advisory editors are: *Paleobotany:* Professor R. W. Chaney, University of California; *ecology:* Professor W. S. Cooper, University of Minnesota; *anatomy:* Professor A. J. Eames, Cornell University; *mycology:* Professor R. A. Harper, Columbia University; *taxonomy:* Dr. F. W. Pennell, Philadelphia Academy of Natural Sciences; *cytology:* Professor L. W. Sharp, Cornell University; *genetics:* Professor E. W. Sinnott, Columbia University; *psychology:* Professor Gilbert Smith, Stanford University; *pathology:* Dr. N. E. Stevens, U. S. Department of Agriculture; *morphology:* Professor R. B. Thomson, University of Toronto, and *physiology:* Professor S. F. Trelease, Columbia University.

THE program of the fifty-third course of popular medical lectures being given by Stanford University School of Medicine on alternate Friday evenings, from January 4 to March 15, is as follows: "Brain Activities," Dr. James M. D. Olmsted; "Poliomyelitis," Dr. Harold K. Faber; "Dinitrophenol in the Control of Obesity," Dr. Maurice L. Tainter; "Quinine: The First Hundred Years," Nathan Van Patten, director of University Libraries; "Present-Day Relationships Between Medicine and Industry," Dr. William P. Shepard, and "Growth and Development in Infancy," Dr. Mary H. Layman.

DISCUSSION

THE DUTCH ELM DISEASE, GRAPHIUM ULMI, IN CONNECTICUT

THIS fungous disease was first found in Connecticut in the fall of 1933. A short account of it, up to the first of April, 1934, was published in Bulletin 358, page 305, of the Plant Pest Hand Book of Connecticut. Since then the finding of over 50 infected trees in the state and especially in Old Lyme, some fifty miles from the center of the infected area near the New York state boundary, from where the fungus apparently first spread into Connecticut, has aroused outside interest. Information concerning the disease and its control, therefore, has been requested, especially from the New England states.

A good many people believe that if the disease is not eradicated in Connecticut it will spread generally throughout New England, where many of the most valuable elms in this country are found and cause serious injury or death of the same. Certain of these people also believe that Connecticut, with its fewer infected elms and with a quicker start for control after its discovery than was the case in New York and New Jersey, has a better chance to stop its further spread into new territory to the east and north.

So far the only method tried by the government or the states, for either eradication or control, is the cutting down and burning of infected elms. Just how effective this will finally prove remains to be seen. So far, judging from results obtained in New Jersey, it does not seem to be entirely efficient either as regards cost or control, since large sums of money have been spent and there were still left standing at the

end of 1934 more infected trees than those known to have been infected at the end of 1933, despite the many trees removed in both 1933 and 1934. No one knows, moreover, how many undiscovered trees became infected in 1934 in New Jersey, New York and Connecticut; in fact, it seems that effort, so far, has been to follow up the disease at a slower rate than it advanced ahead of the control method applied.

As a result of our studies and experience with this and other tree diseases, the authors of this article believe that the time is now past when either this fungus or its insect carriers can be eradicated in the United States. We are, furthermore, of the opinion that the general destruction of infected trees and those dead or dying from other causes in the infected region of these three states and especially of forest trees, particularly in swampy land, may not be the best or most economical way of dealing with this trouble.

We believe that eventually the problem will result in a cheaper and a more practical way by limiting protection to our city, residential and highway trees. This may include better care of such trees against other injurious troubles and search for some new method for control of this one but limiting destruction of the trees, whether infected or not, until their usefulness is past their prime and especially by obtaining more complete information concerning trees sickly from other causes as to how important a factor they may be in the spread of the Dutch elm disease.

In the meantime we countenance the U. S. Government's rather ruthless and expensive plan of doubtful eradication or at best possible control by cutting down all dead and dying trees in the infected area up to the end of the summer of 1935, when more certain evidence should then finally decide how effective this plan has been. The extra money recently appropriated by the U. S. Government and that already supplied by the states, or to be supplied by them, should be sufficient to carry out this plan.

So much for general statements. The preliminary investigation of the Dutch elm disease in Connecticut, which up to the end of 1933 was entirely a matter of the botanical department, has now been assigned by the director to the departments of forestry, entomology and botany, chiefly according to their various interests.

Beginning soon after the first of August, three crews (each with two practical tree workers, previously engaged by the U. S. forces under Mr. L. R. Fate in the Greenwich-Stamford section, and each with an auto to aid in the scouting) were employed by the station to make a somewhat hurried survey of the state outside of the infected district in Fairfield County. The first of these crews took in Fairfield outside of the government surveyed area and the rest of the state east to the Naugatuck River and north to the Massachusetts line. The second crew scouted from this line east to the Connecticut River; while the third crew took the rest of the state east of the Connecticut River to Rhode Island. These crews worked until the end of September. As a result of their and the Government's inspections every one of the 169 towns of the state was visited, but only one infected tree was found outside of the known invaded area—the one at Old Lyme.

In the meantime Mr. Fate, of the U. S. Department of Agriculture, continued his careful search of the five invaded towns and their adjacent free towns in Fairfield County, but with a reduced force because of decreased Government funds. His final results for the year 1934 showed 56 infected trees in this area. Our department has verified about 40 per cent. of the elm trees, reported by the U. S. Department of Agriculture to Mr. Fate, in this infected area, embracing the towns of Greenwich (36 infected trees), Stamford (9), Darien (8), Norwalk (1) and Fairfield (2). However, in the last town we failed to obtain cultures from the two young trees reported there, though at least three attempts were made from one of them but always with negative results so far as *Graphium Ulmi* was concerned.

With the single old tree found outside of the area in Fairfield County located by the station's scouts—namely, about 50 miles distant at Black Hall, Old Lyme—not only were cultures obtained from the twigs, the old diseased bark and the wood (later verified by the U. S. Department of Agriculture), but also the fruiting stage of the Graphium was found more abundantly in the dead bark than in any other tree in Connecticut to date. The foreign beetle carrier, *Scolytus multistriatus* Marsh, was not present in this tree or apparently in its general region. However, a native beetle and its larvae, *Hylurgopinus rufipes* (Eich.), determined by the station's entomological department, was present.

These two stages of Hylurgopinus and mites, also present, were found to be local carriers over the infected bark, since all of them taken from the bark were able to transfer the Graphium to media in Petri dishes. Furthermore, the mature beetles were found to be possible carriers of the disease to healthy trees, since when placed in test-tubes with healthy twigs of elm the latter became infected the same as has been shown before with *Scolytus multistriatus,* the common carrier here.

The Hylurgopinus beetles for this experiment were taken from the infected bark in the Old Lyme tree and carried in bottles to New Haven and then placed in test-tubes with local healthy elm twigs that had

been previously sprayed with alcohol and burned to kill most of the adhering spores of saprophytic fungi. In some 20-odd cases in different tubes, the coremial stage of *Graphium Ulmi* appeared on at least 75 per cent. of the twigs. In about a dozen different tubes, where such beetles from dying elms not killed by the Graphium were used, the fungus did not appear on any of the twigs. This does not mean, however, that such beetles might not carry the disease from diseased trees to those dying from other causes.

Our experiments, however, indicated that the *Hylurgopinus rufipes* is a probable carrier in nature. How much this beetle injures the young twigs in the early season we do not know, but in our experiments the beetles chewed the bark and even at times entered somewhat out of sight in the twigs. It is, however, up to the entomologists to show what injury this beetle does to the elm twigs in the early summer. It is also up to them to demonstrate how commonly beetles go from infected trees to those dying from other causes. If this can be shown as a common occurrence, then there is a more definite reason for getting rid of such non-infected trees, as far as control of the fungus is concerned. In Europe besides *Scolytus scolytus* and *S. multistriatus, S. sulcifrons* has recently been claimed as a carrier of *Graphium Ulmi* to elms in Italy.

The station's scouts, in the state outside of the infected area in Fairfield County, reported over 50 dead or dying elms showing tunnels of either Hylurgopinus or Scolytus. We examined practically all these, and as many more with or without beetle tunnels, for indications of *Graphium Ulmi* in the dead bark, but in no case was this found. However, we did find in some of them a saprophytic Graphium, with spores finally dark in mass, and in one or two cases what seemed to be the immature asco stage of it. So far the asco stage of *Graphium Ulmi* has not been found in nature in this state; however, in cultures, imperfect developments of it have been seen rarely in certain test-tubes.

This survey of dead elms is valuable in what it may show later when *Graphium Ulmi* invades this free territory. A less extensive but similar examination in the infected Greenwich-Stamford area also failed to reveal the fruiting stage of *Graphium Ulmi* on the dead or dying bark of elms dying from other causes. Both inspections were made about the same time in the fall. Further observations, however, need to be made before we can be sure of the value or uselessness of removing dead trees or limbs, dying from other causes, as a means of limiting the direct spread of *Graphium Ulmi.*

We have been able in a fair number of the cases tried to produce the coremial stage of *Graphium Ulmi* by spraying pure cultures of the spores on the inner bark of the elm in moist chambers. So far, apparently, the healthy bark has given better results, though we have had some infections on beetle-injured, rotting bark.

Dr. L. B. Arrington was temporarily hired for superintending the tree survey work for the station and proved very satisfactory. All the infected trees found in Connecticut have been removed and destroyed. This eradication has been done under the direction of W. O. Filley, the station forester. Just how effective this apparently complete control work has been remains to be seen when possible new or undiscovered infections show next summer.

G. P. CLINTON
F. A. MCCORMICK

CONNECTICUT AGRICULTURAL EXPERIMENT STATION

THE BELGIAN NATIONAL RESEARCH COUNCIL

AT a time when the support of scientific work and the place of science in national planning is a subject of discussion, the sixth annual report of the Belgian *"Fonds National de la Recherche Scientifique"* is especially interesting. This foundation, with a capital of approximately $6,000,000, was started in 1927 by contributions from many private and industrial sources under the enthusiastic support of the late king. To form an estimate of the relative importance of the foundation, the reader should multiply the figures in this review by fifteen, the ratio of the populations of the United States and Belgium. Of the income of $350,000 in 1933, about half was devoted to subsidies in aid of pure scientific and scholarly investigations (philosophy and letters as well as law are included). The industries were, however, not neglected, as grants of $55,000 were also made in aid of twelve projects. In general the foundation expected the industry interested to contribute half of the cost of the investigation on the theory that "a business man is apt to think that what costs him nothing is not worth much."

The $175,000 devoted to pure science was distributed in a manner that has many novel features. Forty per cent. or $70,000 was given for the equivalent of our national research fellowships. These fellows, 68 in number, are appointed for two-year periods, which are renewable up to six years. The stipend increases from $1,000 to $1,200, and the number of fellows shows a gradual and natural decrease for successive years of tenure (20, 16, 12, 8, 8, 4).

The policy guiding the foundation is stated as follows: "To endeavor to assure the continuity of scientific effort in our country, and to provide for the