

Committee on Buildings and Grounds  
Landscape and Planting, 1938-1946.

C  
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P  
Y

March 6, 1946

Mr. John Shearer  
140 Alexander Street  
Princeton, New Jersey

Dear Mr. Shearer:

Thank you for your letter of March 4 giving the estimate for work to be done on Institute trees.

Professor Morse, Chairman of the Standing Committee has approved the estimate i.e. \$135.00 for spraying the 32 Elm trees and \$100.00 for spraying the 176 Pine trees, and also the pruning of Elm trees at Olden Manor for \$1.85 per man hour.

We wish the trees protected and if a second spray is required, please do so, but notify this office when you do.

I hope that you will stop in the office to see me sometime when you are in this locality.

Very sincerely,  
INSTITUTE FOR ADVANCED STUDY

Bernetta A. Miller  
Director's Office

THE INSTITUTE FOR ADVANCED STUDY

SCHOOL OF ECONOMICS AND POLITICS

PRINCETON, NEW JERSEY

February 26, 1946

Memorandum to Professor Morse:

In accordance with the telephone conversation which Veblen and I had with you yesterday afternoon, Veblen telephoned Mr. Bamberger last evening and obtained his approval to proceed with the planting on Faculty hill, at a cost to the Institute not to exceed \$1800.

I have drafted a letter to the Ribsam Nurseries for your signature authorizing them to proceed with the work at the earliest possible moment.



Edward M. Earle

THE INSTITUTE FOR ADVANCED STUDY

SCHOOL OF ECONOMICS AND POLITICS

PRINCETON, NEW JERSEY

February 26, 1946

Memorandum to Professor Morse:

In the course of discussions with Mr. Wister and Mr. Lenker of the Ribsam Nurseries, it developed that the red pines in front of the Institute building, as well as some of those in the woods, are afflicted with a blight and that they will die unless sprayed this spring and regularly thereafter. May I suggest that arrangements be made with John Shearer, 140 Alexander Street, Princeton, to see that these trees are protected, as they represent a very substantial investment.



Edward M. Earle

February 26, 1946

R. K. Ebsam Nurseries Inc.  
Box 100  
Trenton, New Jersey

Gentlemen:

This will authorize you to proceed with the planting outlined by Mr. John Wlster, our landscape architect, and specified in detail in your letter of February 25 and the attached ground plan.

It is understood that in selecting the 100 pines from the Institute woods you will choose trees not merely with a view to their value to you but also with major consideration to the value which their removal will have to the elimination of over-crowding, and hence to the general improvement of the woods.

Yours very truly,

Marston Morse  
Chairman of Standing Committee

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MEMORANDUM

February 26, 1946

The conferences with Professor Veblen, Mrs. Aydelotte, Miss Miller, Albert, Professors Earle, Riefler and Panofsky with regard to an assistant for Albert have led to the following conclusions:

The relations between Albert and Mr. Morrall do not appear to be very clearly defined. The Standing Committee hesitates accordingly to take any action which would permanently affect these relations. However, the need for having work done on the Institute grounds seems to warrant hiring an assistant for Albert on a temporary basis until Dr. Aydelotte returns.

It is also understood that Albert will notify Miss Miller of any major arrangements which he makes with Shearer or Morrall to do work on the Institute grounds so that a record may be kept and in case of large operations an estimate can be had in advance if necessary.

The arrangement with Mr. Wister to do landscaping and planting up to a total outlay of approximately \$1,800 has been approved.

HARSTON MORSE  
Chairman of the Standing Committee

Copy to Professor Veblen  
Miss Miller  
Mrs. Aydelotte

C O P Y

Phone 2-5525

R. K. RISSAN NURSERIES, INC.

Landscape Contractors  
Box 100 - Trenton, N. J.  
Pine Knoll Nurseries  
Old Princeton Road

February 25, 1946

Institute for Advanced Study  
Princeton, N. J.

Proposal for Planting as Outlined by John Wister, Landscape Architect.

AREA "A"

1 - Mercer Road Screen

- 4 White Pines 6-8' and 5 White Pines 8-10' (replacing dead Spruces and to fill in gaps in spruce rows.)
- 18 Red Pines 3-5' BB (replace poor ones and fill in where missing.)
- 31 Red Pines 3-5' BB (planted on inside of border - changing outline of border.)
- 50 Hemlocks 2-2½' BB (planted on inside of border - changing outline of border.)
- 10 Douglas Fir 2½-3' BB (planted on inside of border - changing outline of border.)

2 - Along Drive end in Corner Near Woods

- |            |    |                      |            |             |
|------------|----|----------------------|------------|-------------|
|            | 3  | White Pines          | 6-8'       | BB          |
|            | 1  | Red Oak              | 8-10'      | BB          |
|            | 4  | American Holly       | 4'         | BB          |
| Group 1    | (1 | Pin Oak              | 8-10'      | 1½" cal. BB |
| East       | (1 | White Pine           | 6-8'       | BB          |
| Corner     | (3 | Red Pines            | 3-5'       | BB          |
|            | (2 | Dogwoods             | 4-5'       | BB          |
| Group 2 by | (1 | Ash                  | 6-8'       | BB          |
| Fire Plug  | (3 | White Pines          | 6-8'       | BB          |
| Group 3    | (1 | Scarlet Maple        | 2-2½" cal. |             |
| S. West    | (3 | Red Pines            | 3-5'       | BB          |
| of Plug    | (2 | Oxydendron           | 4-5'       | BB          |
| Group 4    | (3 | Dogwoods             | 4-5'       | BB          |
| West of    | (3 | Dwarf Spreading Yaws | 1½-2'      | BB          |
| Circle     | (1 | Pin Oak              | 8-10'      | BB          |
|            | 1  | Tulip Tree           | 7-8'       | BB          |
|            | 1  | Pin Oak              | 8-10'      | 1½" cal. BB |
|            | 1  | Sweet Gum            | 8-10'      | BB          |
|            | 1  | Sugar Maple          | 8-10'      |             |



AREA "B"

Group 1	(3 White Dogwoods	4-5'	BB	
Opposite	(1 Sugar Maple	8-10'		
Circle	(2 Red Pines	3-5'	BB	
Group 2	(1 Pin Oak	8-10'	BB	1½" cal.
Along	(3 White Pines	6-8'	BB	
Drive				
Group 3	(1 Ash	6-8'	BB	
	(3 White Dogwoods	4-5'	BB	
	(1 Oxydendron	4-5'	BB	
	(1 White Pine	6-8'	BB	
	1 Sweet Gum	8-10'	BB	
	1 Scarlet Maple	2-2½" cal.		(own transplanted)
	2 White Dogwoods	4-5'	BB	
	1 Oxydendron	4-5'	BB	

Circle Planting

3	White Dogwoods	5-6'	BB
3	Red Stem Dogwoods	2-3'	BB
3	Vaccinium	2-3'	BB
2	Wrightii Viburnum	2-2½'	BB
5	Dwarf Spreading Yew	1½-2'	

Total for above including all labor, materials and supervision  
 for planting. . . . . \$1,793.35

Credit of 100 Pines (\$125.00) these to be transplanted  
 from over-crowded areas of pine blocks. . . . . 125.00

Total. . . . . \$1,668.35

Terms - Net

Submitted by DANIEL M. LENKER



June 7, 1944

E. G. Brewer, Esq.  
Agricultural Research Administration  
503 Main Street  
East Orange, New Jersey

Dear Mr. Brewer:

I have your letter of June sixth and look forward eagerly to the visit of your representative. We have on the Institute grounds a great many beautiful elms, and I am extremely worried about possible inroads of the Dutch Elm Disease. It will be a great satisfaction to us to have your experts working on the problem here.

Yours sincerely,

Frank Aydelotte

FA:KK

UNITED STATES DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH ADMINISTRATION

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

503 MAIN ST., EAST ORANGE, N. J.

DIVISION HEADQUARTERS

JAPANESE BEETLE QUARANTINE  
DUTCH ELM DISEASE CONTROL  
GYPSY & BROWN-TAIL MOTH QUARANTINE

June 6, 1944

*was letter  
with ref*

Director, Institute for Advanced Study  
Princeton, New Jersey

Dear Sir:

Within a few days representatives of this office will call upon you to discuss work we would like to conduct on your property near Princeton, New Jersey. The enclosed statement outlines the type of work we have in mind.

The purpose of this letter and enclosure is to acquaint you in advance with the objective and proposed methods of work so that you may consider our request prior to your interview with our representatives.

Very truly yours,

*E. G. Brewer*

E. G. Brewer, In Charge  
Dutch Elm Disease Erad.

Enclosure



## DUTCH ELM DISEASE CONTROL - EXPERIMENTAL PLOT

During the past several years, the Federal Government has conducted a large scale program throughout this area to keep the Dutch elm disease under control. This work now has been discontinued. A program, essentially experimental, is being launched in an effort to determine methods of controlling the disease within local areas and thus prevent the loss of high value ornamental elms. In order to carry on such a study, it is important that we have the cooperation of all property owners within these local areas. This vicinity has been chosen for one of our study areas and we find that your property falls within it. We would appreciate your permission to allow us to conduct our studies on your land.

The experiment, in so far as your property is concerned, will involve the killing of 2 percent of your non-ornamental elm trees this summer, and 4 percent annually for the next four years. These elms are intended as breeding material for the elm bark beetles which are present in, or which may come into this area; the elm bark beetle is the agent mainly responsible for the spread of the Dutch elm disease. The beetles which infest these elms and their offspring will be destroyed by one of two methods. The tree may be killed by means of small doses of poisonous chemicals, sufficient to kill the beetles and their offspring. This is the method we prefer to use. The tree may be killed by simply cutting and it will be removed and destroyed following the period of infestation and before the offspring can emerge. This method is less desirable to us because it will entail removing and destroying all such material within a short limited period. In addition, where an elm stand does not lend itself to the killing of trees, chemically treated or untreated elm material will be brought into the area.

It is our wish that neither living nor killed elm on your property be disturbed in any manner during this experiment. Exception to this is made, of course, in the event that a high value elm becomes diseased or beetle infested and you wish to remove or prune it for protection of that tree or surrounding trees.

In the event any such control work is performed, we would appreciate being advised prior to the beginning of the work.

The experiment planned is to be conducted in cooperation with property owners and with the approval of State authorities and this request is not intended to contradict the general advice and practices regarding disposal of diseased or bark beetle infested material, we and State offices have advocated for the control of the Dutch elm disease. It merely states that for the purpose of this experiment we would prefer not to see control work done in this limited area as has been advised.

UNITED STATES DEPARTMENT OF AGRICULTURE  
Bureau of Entomology and Plant Quarantine  
503 Main Street, East Orange, N. J.

*Beds + Beds  
Landscaping*

22 December 1943

Dear Robert:

Many thanks for your letter. What you say about expense emboldens me to take the whole question of landscaping up with the appropriate committee of our Trustees in the hope that next year we may begin to make some progress, however modest.

With kindest regards, and renewed thanks, I am

Yours sincerely,

Robert Pyle  
West Grove  
Pennsylvania

ORGANIZED 1875

# AMERICAN ASSOCIATION OF NURSERYMEN

BOTANICAL GARDENS AND ARBORETUMS COMMITTEE

ROBERT PYLE, CHAIRMAN  
WEST GROVE, PENNSYLVANIA

December 9, 1943

Dear Dr. Aydelotte:

Since yesterday, my mind has reverted frequently to thy task of pioneering on the periphery of the old established Princeton campus, as well as on the frontier of education in America.

When you finished building Fuld Hall, you were able to finish the interior; both thy office and other important rooms just about as you would like to have them; that is, as nearly perfect and finished as such things can ever be that do not have the redolence of age and tradition.

But when you attempt to finish the outdoor surroundings, the possibilities call for a very different program.

My forty-five years experience in "horticulture" persuade me that it does not hold the place among the intellectuals of our country that it deserves, not for the sake of horticulture as much as for the sake of the intellectuals. I consider thee quite the exception in this respect. Thy appreciation of these things has been proved beyond question.

I have been troubled by two proposals thee made to me yesterday for the development on your campus. First, the idea that it would be fine to have \$1,000,000, the income of which could be used in the way that is proposed. And the second, that the committee of the faculty might handle the problem. Certainly, the former is not necessary and with regard to the latter, I have already written suggesting a modification.

Does thee remember the occasion at Swarthmore when we were authorized to purchase and did obtain 1,000 little hemlock trees? I think they cost the college between \$.50 and \$1.00 apiece. Has thee ever followed the history of those trees over the past, I think, not more than ten years? They have developed, certainly to five times their original size of beauty and effectiveness and have been replanted on all parts of the campus and are now worth \$10,000, if they could be properly rated. That is an example of how rapidly some

H. P. KELSEY, East Boxford, Mass.  
GEORGE C. ROEDING, JR., Niles, Calif.

HENRY HICKS, Westbury, L. I., N. Y.  
A. E. WILLIS, Ottawa, Kans.

L. M. RIGGS, Longview, Tex.  
GEORGE VERHALEN, Scottsville, Tex.

HON. GIFFORD PINCHOT, Milford, Pa.  
G. D. COOPER, L. A., Cleveland, Ohio

HONORARY MEMBERS  
CHAS. L. BAUM, Knoxville, Tenn.

ERNEST F. COE, Miami, Fla.  
E. Y. TEAS, Houston, Tex.





Dr. Aydelotte

-2-

December 9, 1943

kinds of tree plantings will develop. It would be a pity and a shame if thee, thyself, could not, within thy own life time, see the realization of thy dream in beauty on the campus as well as in the development of the intellectual program and to my mind, it is entirely possible.

Within three or four miles is one of the best tree nurseries in the United States; the Princeton Nursery in charge of my long time, excellent friend, William Flemer who used to visit our nursery at West Grove when he was a boy, along with his father. His collection of trees is one of the more complete. I will send thee a catalog of his brother's which I think could be duplicated at the Princeton Nursery though it is wholesale and does not publish a catalog like this; nevertheless, I think, has the trees and would supply you.

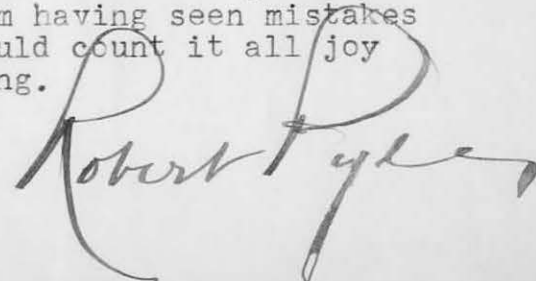
Also, I am sending to thee a copy of the Directory I showed thee yesterday in which is reflected how rare is the presence of anything of this character; I mean, a beauty spot in the way of a somewhat complete collection of important trees, anywhere in the state of New Jersey.

The real point that I am approaching and wish to make is the fact that the complete cost of doing what I would like to see thee do within the next five years say, would be an extremely modest price to pay for the result of that investment in the next ten, fifteen and twenty years, viewed from whatever standpoint you may look at it. The increase in the size, development and beauty of what may be planted would just be the difference between continuing inadequacy as regards outdoor surroundings and a gorgeously appropriate growth that would be symbolic of what doubtless will take place internally.

For an institution of your importance and with your endowment, it is possibly short sighted and bad judgment (if I may express my opinion bluntly), to be the least bit parsimonious with respect to a quality that is calculated to pay such great dividends with a very low risk indeed. What I have in mind would call for the retention of the best Landscape Architects that could be found and second, for a program that could be cared for over the years by a relatively small staff. I am not sure that Mr. Flemer might not make it possible to provide for having the planting done so that that part of it could be cared for and then maintenance would be a much smaller item for either staff or expense.

I trust my enthusiasm in this matter is no greater than my good judgment. I am speaking from having seen mistakes made in a good many directions and I should count it all joy if I could help thee to do the right thing.

Sincerely,



RP:mv

*Blago + Dao*

December 10, 1943

Dear Robert:

Many thanks for your letter of December 9th and your very useful suggestion, which I think we might carry out.

It was a great pleasure to see you on Wednesday and I send you my warmest good wishes for the success of the great plans which you have in mind.

Yours sincerely,

Robert Pyle, Esq.  
West Grove  
Pennsylvania

FA/MCE



ORGANIZED 1875

# AMERICAN ASSOCIATION OF NURSERYMEN

UNITED HORTICULTURE AND PLANT NOMENCLATURE COMMITTEE

ROBERT PYLE, CHAIRMAN  
WEST GROVE, PENNSYLVANIA

December 9, 1943

Dear Dr. Aydelotte:

In thinking more about your question regarding a committee of the faculty to develop the planting over your acreage, I have had this further thought which may be worth passing on; that even though I would not turn such a group loose in the matter of tree planting or even of large size shrub planting by reason of expense likely to be incurred in making changes later because trees are expensive to move and grow to a considerable size in a remarkably short time, as is the case with the one that sometime you wish to remove. They are very apt to be in the wrong place unless carefully planned with a view to future use.

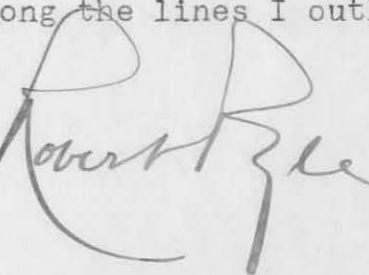
But such a committee might be liberated to develop their ideas in practice if their activities were limited to the smaller shrubs, lower growing plants and perennials.

Within precincts that obviously would be available, if this latitude were given and this liberty exercised, considerable might be done to add ornaments during the growing years, to say nothing of the lift to the spirit of man by reason of living more closely with the more humble but no less more beautiful patterns of beauty that might thus be revealed. I commend this to your consideration.

I am very grateful for your having made it possible for me to have our talk yesterday. I am afraid I invaded the time of a very busy and a very tired man.

I had a long interview with Dean Martin at Essex House, who was encouraging. I am sure that when we find the right road, that progress can be made along the lines I outlined.

Sincerely,



RP:mv

Dr. Frank Aydelotte  
Institute for Advanced Learning  
Princeton, N.J.

H. P. KELSEY, East Boxford, Mass.  
ADOLPH MULLER, Norristown, Penna.

J. FRANK STYER, Concordville, Penna.  
DON HASTINGS, Atlanta, Georgia

E. C. HILBORN, Valley City, N. D.  
MILDRED JONES, Lancaster, Penna.



# Circular No. 677

July 1943 • Washington, D. C.



UNITED STATES DEPARTMENT OF AGRICULTURE

## Dutch Elm Disease and Its Control

By JAMES M. WALTER, *pathologist*, CURTIS MAX, *senior pathologist*, *Division of Forest Pathology, Bureau of Plant Industry, Soils, and Agricultural Engineering*, and C. W. COLLINS, *senior entomologist*, *Division of Forest Insect Investigations, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration*

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### INTRODUCTION

In the northeastern part of the United States and other localities a large proportion of the trees that are important in camouflaging cities, factories, military structures, and highways are elms. All feasible steps should be taken to protect and maintain these trees in health. In the Northeast, Dutch elm disease, which was evidently brought to this country from Europe between 1920 and 1930, is at present the principal threat to the well-being of the elms.

Because of the war the Federal control program is being directed toward preventing the expansion of the infected areas and destroying the Dutch elm disease in isolated areas. More and more, private owners of elms must protect their own trees and carry out the sanitation measures necessary to restrict the disease. To furnish owners and managers of elm-concealed factories, estates, and valuable installations with the necessary information concerning the disease and its insect carrier is the object of this circular.

### SYMPTOMS

Dutch elm disease is a wilt (fig. 1), which in its mildest form reduces the protective value of the foliage and also the rate of growth of the tree. The effects of the disease range from very slight dwarf-

ing of leaves, through yellowing and various degrees of defoliation (fig. 2), to death of the entire tree or parts of the tree (fig. 3). The disease is usually more acute on succulent, rapidly growing trees than on either slowly growing or senile trees. The water-conducting tubes of diseased trees are discolored and obstructed by brown gummy substances (fig. 4). In Europe diagnosis from symptoms is practicable. But in the United States neither the internal symptoms nor the foliage effects are sufficiently distinct from those of two native diseases of lesser importance to allow field diagnosis of the Dutch elm disease. For accurate diagnosis a laboratory test must be made by competent authority. During the present emergency owners should remove all beetle-infested wood. This will reduce the beetle population and the spread of the Dutch elm disease.

### CAUSE

The disease is caused by a fungus known as *Ceratostomella ulmi* Buisman. Studies by mycologists in the Netherlands, Germany, and the United States have provided detailed information concerning its life history. Within the water tubes of the infected but living elm the fungus is almost entirely in a yeastlike stage. Its spores increase by budding and are known to be distributed rapidly within the individual water tube by the movements of the sap.

Soon after the host tissues die, the fungus grows through the wood as a saprophyte and produces spores abundantly on the inner surface of the bark and outer surface of the wood. Only the asexual fruiting stages have been found in the United States. In England and western Europe both asexual and sexual (perithecial) fruiting stages are common. All stages of the fungus are infectious, and all are too small, except in mass, to be recognized by the unaided eye.

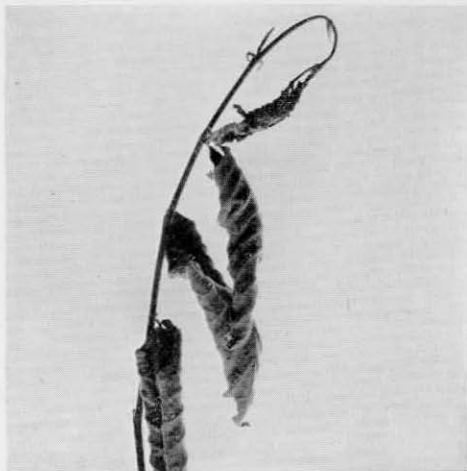


FIGURE 1.—Wilted leaves and tender twig tip of American elm. The dry, brown tuft of leaves on the end of the "shepherd's crook" frequently persists through the winter long after the large wilted leaves, which finally turn brown, have fallen. Natural size.



FIGURE 2.—A 50-foot English elm with symptoms of wilt and defoliation limited to a few branches. In cases where localized symptoms develop in late summer, pruning the diseased branches is sometimes an effective control measure.

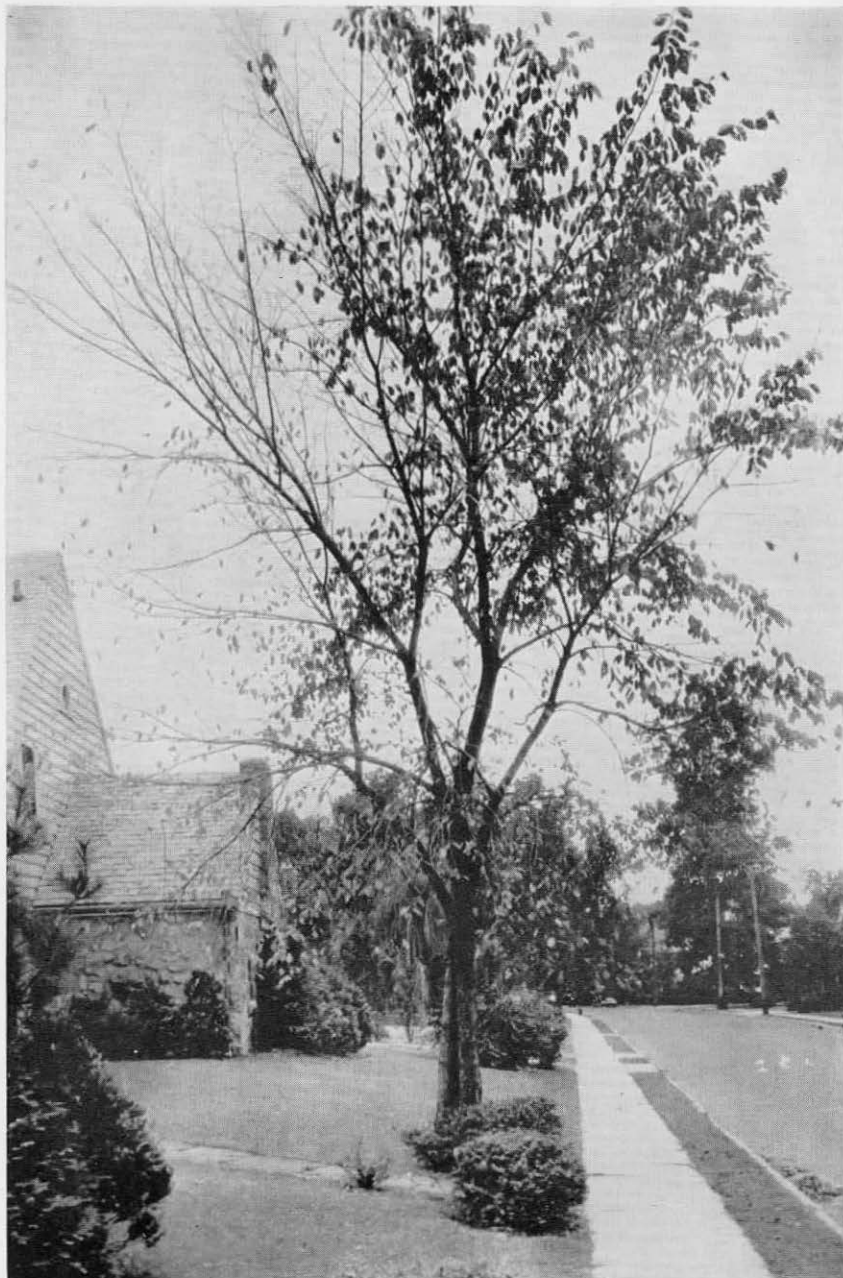


FIGURE 3.—A wilting and partly defoliated 30-foot American elm severely affected with Dutch elm disease. An elm in this condition is likely to be attacked by bark beetles. Pruning such a severely affected tree is not advised.



FIGURE 4.—Cross section of a young branch of American elm showing typical discoloration due to the disease in the most recently formed ring of large, spring water-conducting vessels.

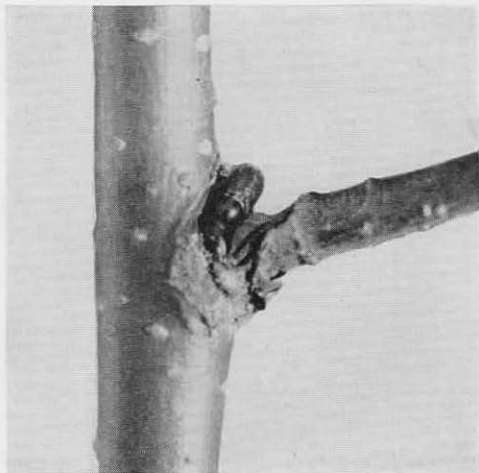
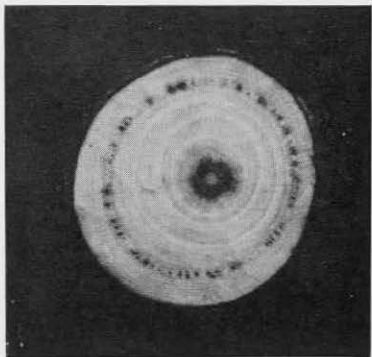
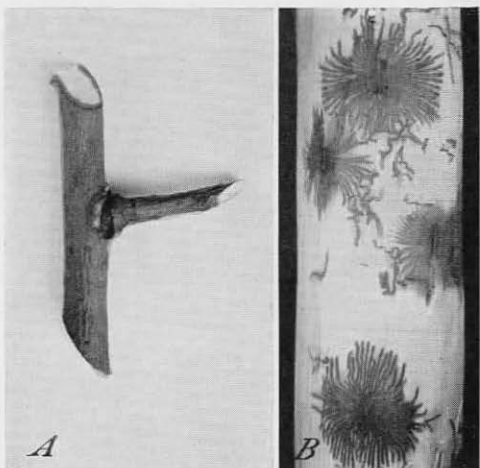


FIGURE 5.—An adult beetle of *Scolytus multistriatus* feeding in an elm twig crotch. During feeding it may deposit spores in the feeding injury; these spores can invade the tree and cause disease. Four times natural size.

FIGURE 6.—*A*, Injury in the crotch of an elm twig made by the feeding of *Scolytus multistriatus*. One and one-third times natural size. *B*, Brood galleries made by female beetles and larvae. One-fifth natural size.



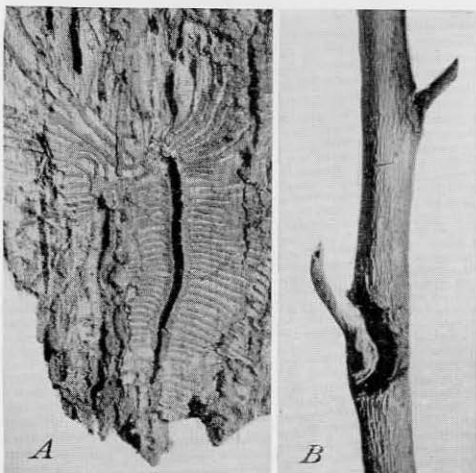


FIGURE 7.—A, Inner bark showing galleries made by female beetles and larvae of *Scolytus scolytus*. B, Feeding injuries in crotches of twigs. Two-thirds natural size.

### TRANSMISSION

The fungus causing the disease is transmitted from elm to elm by the feeding and reproductive activities of bark beetles belonging to the family Scolytidae; their habits admirably adapt them for contacting the spores of the fungus and then placing them in position to start new infections. The fungus and insect are each favored by the action of the other. In the United States the important carriers are the introduced smaller European elm bark beetle (*Scolytus multistriatus* (Marsh.)) and the native elm bark beetle (*Hylurgopinus rufipes* (Eichh.)). In Europe the former is an important carrier, but its work is overshadowed by that of the larger and more voracious *Scolytus scolytus* Fab. The adults of the two species of *Scolytus* chew into small branches or twigs, commonly at crotches (fig. 5). When the feeding injuries are made to the depth of the current season's water tubes (figs. 6 and 7) they are fairly effective places for the fungus to get into the tree.

*Scolytus* beetles develop from egg to adult in the same portions of the dying and dead elm in which the fungus produces its spores. In fact, the channels and chambers (figs. 6 and 7) cut by the beetles are frequently the best places to find the fruiting structures of the fungus. The beetles carry the fungus to broken limbs still hanging in the tree, and also to much fallen and cut elm, suitable for their breeding, that may never have had the Dutch elm disease. In such wood the fungus proceeds to develop as a saprophyte, commonly producing its spores in time to contaminate the beetles (fig. 8) of the new generation before they emerge and feed on growing elms.

Elms that have wilted or suffered severe water shortage because of the disease are attractive to the beetles when they are ready to con-



struct their brood galleries. Many trees, especially of moderately resistant varieties, would no doubt survive severe attacks of the disease if these were not followed shortly by the complications of drilling by bark beetles constructing their brood galleries and of channeling by young larvae in the cambium region.

The large majority of the beetles developing at a given point will fly no farther than necessary to reach elms suitable for their feeding and construction of brood galleries. In localities where elms are numerous and nothing has been done to disturb natural activities of the fungus and the insect, a sharp zonation of diseased trees around bark-beetle sources commonly is found. In other words, the diseased trees occur in groups or centers (fig. 9). How far the bark beetles may fly when aided by winds is not known, but in many cases they have certainly carried the fungus more than 2 miles into new territory and accounted for the establishment of new centers of the disease. Such dispersion results from the habit of the beetles of traversing longer distances for the purpose of breeding than for crotch feeding. Feeding usually takes place relatively near or within a few hundred feet of the points of emergence.

The native elm bark beetle overwinters to some extent in the larval stage, like the members of the genus *Scolytus*; but, in significant contrast, most of the adults of this native beetle construct overwintering cells in the bark of healthy elms. Before the adults emerge in the spring they frequently chew inward from their hibernation cells in the bark until they have contacted the wood. Some trees are infected through this activity of the beetles, which provides a means for survival of the fungus for many years, perhaps indefinitely. However, the native elm bark beetle is a less effective carrier of the Dutch elm disease fungus than *Scolytus multistriatus*. In localities such as

FIGURE 8.—Pupa of *Scolytus multistriatus*.

17 times natural size. Note the small structures (coremia, bearing spores of the Dutch elm disease fungus) growing from the sides of the pupal chamber and touching the pupa. Before it emerges from the pupal chamber the beetle moves its legs and other appendages and thus picks up spores, which it may carry to healthy elms on which it feeds.



Indianapolis, Ind., where the smaller European elm bark beetle formerly was not present, the disease did not intensify so rapidly as in areas in which both species are present.

Although bark beetles are the more important means of transmission, the disease can spread through underground connections between trees. The infection can pass readily from one tree to another by way of both root grafts (fig. 10) and the direct connections of trees that have originated as root sprouts, which are common in dense stands of elms.

After 20 years of experimentation no important method of spread of the disease other than by bark beetles and root connections is yet known.

### REACTIONS OF IMPORTANT ELM SPECIES AND VARIETIES

All species and varieties of elm native to North America have proved susceptible to the disease in comparison with some types native to Europe (fig. 11) and Asia. However, by inoculating thousands of American elm seedlings during the last few years, it has been found that an occasional tree within this most susceptible and valuable species possesses some degree of resistance, and efforts are being made to select superior types for hybridization with highly resistant stock of the Siberian elm (*Ulmus pumila* L.). Similar tests on seedling populations of the Siberian elm have demonstrated seedling variation in reaction to the disease, but the results clearly mean that the Siberian

FIGURE 9.—Group of trees affected by the Dutch elm disease. Elm bark beetles that had emerged earlier from the log in the foreground may have been instrumental in carrying the disease to the now defoliated trees. Later in the season the elm on the left developed symptoms. The ash in the center is not susceptible to the disease.





FIGURE 10.—Elm tree root-grafted to the stump of a formerly diseased tree. The disease spreads from tree to tree by such root grafts, which are common in elm woods.

elm is to be classed as resistant. The variety *U. pumila* var. *arborea* Litv. and the Chinese elm (*U. parvifolia* Jacq.) are very resistant, but their usefulness is limited by other important considerations.

*Ulmus hollandica* var. *belgica* (Burgsd.) Rehd., the important dike-holding and general-purpose elm of the Netherlands, is very susceptible. Before 1930 the Dutch started a search for a resistant variety. The Christine Buisman, a seedling selection from *U. carpiniifolia* Gleditsch, is the most highly resistant elm type that the Dutch have found thus far. This elm has been under propagation in Europe for only 10 years, and it is not yet possible to estimate its value with respect to characteristics other than resistance to Dutch elm disease as a substitute for the susceptible elms of Europe or the United States. Small numbers of this elm are now under observation in experimental plantings in the United States.

The small-leaved elm of Europe (*Ulmus carpiniifolia*) is a highly variable species, and, though it comprises seedlings and clones of all degrees of reaction to the disease, it must be classed as susceptible. The English elm (*U. procera* Salisb.) and the field elm of Europe (*U. laevis* Pall.) are perhaps best classed as moderately susceptible.

The mountain or Wych elm (*Ulmus glabra* Huds.) is susceptible, but it is still used as a stock for many of the highly prized clones planted in Europe. Some of the latter, such as the Wheatley elm (*U. carpiniifolia* forma *sarniensis* (Loud.) Rehd.) and the Huntingdon elm (*U. hollandica* var. *vegeta* (Loud.) Rehd.), are very likely deserving of classification as moderately resistant, especially when grown on their own roots.



FIGURE 11.—A group of diseased elms in England. The trees on the left are a type of small-leaved European elm having considerable resistance to the disease. In this area nearly all other elms have been severely affected. Standing trees recently killed by the disease are commonly a source of disease-carrying beetles.

### RECOVERY OF DISEASED TREES

Under ordinary circumstances a considerable percentage of the affected trees, even of susceptible species, may be expected to live and outgrow the effects of the disease within a few years if not re-inoculated. In order to have an opportunity to recover they must, of course, escape the attack of bark beetles during the season in which the fungus has caused the reduction in vitality. The smaller the tree, or the more localized the infection, the more likely a tree is to go through a year following the attack without recurrence of symptoms, other factors remaining the same. The fungus usually survives for several years in the infected but overgrown annual ring, and there is evidence that opportunity for the host to recover comes about only because the fungus does not readily grow through dense layers of living wood. In England some severely affected trees have been known to recover following local sanitation against the bark beetles.

### CONTROL MEASURES

Sanitation against the bark beetles that spread the fungus is the most effective means of preserving elms from Dutch elm disease. The emergence of broods of bark beetles from all fallen, storm-damaged, cut, or diseased elms should be prevented. Beetles of the overwintering brood emerging during May and June account for the most damaging inoculations. It is essential, therefore, that all infested wood in which beetles have overwintered be burned or de-

barked before May, or be treated by spraying as described in the following paragraph. If the bark is removed, it should be destroyed, because some of the beetles may complete their development in such material.

In some situations, especially where it is desired to save the wood for fuel, infested and noninfested wood may be rendered harmless by spraying. The use of sprays is restricted by low temperatures, the chemicals not being effective at air temperatures below 50° F. The insects must be actively developing for the spray to be effective, and the season for effective application to infested wood in the spring sanitation program coincides with the flowering period of standard varieties of apple (pink to petal fall) or the interval between the breaking of leaf buds and the formation of shoots 3 inches long on American elms of good vigor. Recommended spray formulas follow:

Materials:	<i>Parts by volume</i>
1. Fuel oil (26° to 28° Baumé).....	12
Monochloronaphthalene.....	1
or	
2. Fuel oil (26° to 28° Baumé).....	4
Orthodichlorobenzene.....	1

FIGURE 12.—Elm wood in wood piles, fallen trees, or broken limbs still hanging in trees commonly are breeding places for the bark beetles that spread the disease. All beetle-infested wood should be treated as advised on pages 10 and 11.





The same sprays may be used on freshly felled noninfested wood as repellents at any time from May to September. The sprays must be applied in sufficient quantity to cause the bark to glisten, for they must enter the bark through the small holes made by the parent beetles. From 2½ to 3 gallons of spray is required to treat 1 stacked cord of wood effectively.

Some trees that have only one or two branches infected may be freed of infection by pruning, if the symptoms develop quickly and are recognized at once after inoculation. However, chances for removal of the entire infected part without spoiling the appearance of the tree diminish with each day of delay if the infection advances normally through the vascular system.

Pruning for the purpose of eliminating or suppressing the bark beetles will be of more general application. This may be done at any time of the year, but, as stated, it is a good policy to make certain that all branches becoming infested in one season are removed and rendered harmless by burning, spraying, or debarking before May of the next year. Such pruning may be an important feature of a well-conducted sanitation program and appears especially advisable on large, old trees of high value. Pruning only the parts infested by bark beetles will not, for the ordinary case of Dutch elm disease, mean removal of all the wood invaded by the fungus causing the disease. However, after being pruned, such trees should have approximately the same chances of recovery as described for infected trees not attacked by the beetles.

It is sound policy to suspect all elms within 25 feet of a diseased tree and to watch them carefully for several years after the removal of the known case. The reason is the common occurrence of root connections between elms within 25 feet of each other (fig. 10).

Above all, in sanitation against Dutch elm disease it is essential to avoid piling elm wood in the open (fig. 12) unless it is peeled or sprayed with a bark beetle repellent. Time after time it has been noted that local outbreaks of the disease have as their central points small piles of wood that could not have been worth one ten-thousandth of the damage resulting from the fungus and bark beetle carriers incubated by them. It seems clear that piled wood is a more effective source of inoculum than standing dead trees, because the piled wood, especially if some of it is in contact with the soil, maintains a moisture content more favorable for the lush sporulation of the fungus. Any cut elm that is to be used for construction should be sprayed, peeled, or stored under water so that the bark beetles can not reproduce in it.

It is urged that everyone interested in the protection of elms from Dutch elm disease spread this gospel of sanitation. The best level of efficiency in controlling this disease can be attained only if a high standard of sanitation is maintained throughout a community.

Date 6/9/44 County MERCER Township PRINCETON N.

Permission is hereby granted the U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, to treat 2% of my non-ornamental elms during the summer of 1944 and 4% annually for the next four years, in accordance with the type of work specified below.

Type of Work: Kill non-ornamental elms with  
chemicals. Leave trees standing. Injected  
trap logs to be brought into areas where  
necessary.

Signature of owner or agent \_\_\_\_\_

Bureau Representative Shelby White

Mail Address \_\_\_\_\_

Remarks: \_\_\_\_\_

Approximately 300 acres of property



## DUTCH ELM DISEASE CONTROL - EXPERIMENTAL PLOT

During the past several years, the Federal Government has conducted a large scale program throughout this area to keep the Dutch elm disease under control. This work now has been discontinued. A program, essentially experimental, is being launched in an effort to determine methods of controlling the disease within local areas and thus prevent the loss of high value ornamental elms. In order to carry on such a study, it is important that we have the cooperation of all property owners within these local areas. This vicinity has been chosen for one of our study areas and we find that your property falls within it. We would appreciate your permission to allow us to conduct our studies on your land.

The experiment, in so far as your property is concerned, will involve the killing of 2 percent of your non-ornamental elm trees this summer, and 4 percent annually for the next four years. These elms are intended as breeding material for the elm bark beetles which are present in, or which may come into this area; the elm bark beetle is the agent mainly responsible for the spread of the Dutch elm disease. The beetles which infest these elms and their offspring will be destroyed by one of two methods. The tree may be killed by means of small doses of poisonous chemicals, sufficient to kill the beetles and their offspring. This is the method we prefer to use. The tree may be killed by simply cutting and it will be removed and destroyed following the period of infestation and before the offspring can emerge. This method is less desirable to us because it will entail removing and destroying all such material within a short limited period. In addition, where an elm stand does not lend itself to the killing of trees, chemically treated or untreated elm material will be brought into the area.

It is our wish that neither living nor killed elm on your property be disturbed in any manner during this experiment. Exception to this is made, of course, in the event that a high value elm becomes diseased or beetle infested and you wish to remove or prune it for protection of that tree or surrounding trees.

In the event any such control work is performed, we would appreciate being advised prior to the beginning of the work.

The experiment planned is to be conducted in cooperation with property owners and with the approval of State authorities and this request is not intended to contradict the general advice and practices regarding disposal of diseased or bark beetle infested material, we and State offices have advocated for the control of the Dutch elm disease. It merely states that for the purpose of this experiment we would prefer not to see control work done in this limited area as has been advised.

UNITED STATES DEPARTMENT OF AGRICULTURE  
Bureau of Entomology and Plant Quarantine  
503 Main Street, East Orange, N. J.

*Bldgs + Pds*  
*Landscaping*

OLMSTED BROTHERS  
LANDSCAPE ARCHITECTS  
BROOKLINE·MASSACHUSETTS

FREDERICK LAW OLMSTED  
JAMES FREDERICK DAWSON  
EDWARD CLARK WHITING  
HENRY VINCENT HUBBARD  
WILLIAM BELL MARQUIS  
LEON HENRY ZACH

27th September, 1940.

Dr. Frank Aydelotte, Director,  
Institute for Advanced Study,  
Princeton, New Jersey.

Dear Sir:

Thank you for your letter of  
September 25th and for your friendly ex-  
pressions.

The photographs will be avail-  
able for you in the spring or earlier if  
you want them, if you will let us know  
the date. Just now they are enjoying a  
second trip around the country and, al-  
though they have been on exhibition in  
both Seattle and Spokane, we have received  
requests for second showings, the one in  
Spokane being in connection with some meet-  
ings they are having to arouse enthusias-  
m for an arboretum in Washington. At present  
the pictures are in Cleveland and we have  
had a request from Atlanta, Georgia from  
someone who saw them in New York. However,  
you are welcome to have them at your con-  
venience.

Yours very truly,

*Olmsted Brothers*

September 25, 1940

Olmsted Brothers  
Brookline, Massachusetts

Dear Sirs:

I have your letter of September 23 and know very well from my experience with your firm during my early years at Swarthmore the high quality of your work and your wide experience. I should like to see the photographs which you mention, but I have so many other problems in which I am engaged this Fall that I suggest that you allow me to ask for them when the time comes that I can give the whole subject definite consideration. It may easily be that I could stop and see them at your office in Boston.

Yours sincerely,

FA/MCE

FRANK AYDELOTTE, Director

# OLMSTED BROTHERS

LANDSCAPE ARCHITECTS

BROOKLINE·MASSACHUSETTS

FREDERICK LAW OLMSTED  
JAMES FREDERICK DAWSON  
EDWARD CLARK WHITING  
HENRY VINCENT HUBBARD  
WILLIAM BELL MARQUIS  
LEON HENRY ZACH

23rd September, 1940.

Dr. Frank Aydelotte, Director,  
The Institute for Advanced Study,  
Princeton, New Jersey.

Dear Sir:

We have your letter of September 20th and note that you have already discussed the project you have in mind with another landscape architect. We believe, however, that we have a clearer idea of such matters than almost anybody in the country.

We have been sending a collection of arboretum photographs to different parts of the country at the requests of some of our friends who have been trying to promote an arboretum atmosphere. There are 55 photographs 14 by 17 inches in size and they take up a space of about 200 square feet. At the request of Mr. Franklin Delano of the National Arboretum in Washington, D. C., they have recently been exhibited there and they are now in Cleveland. If you thought they would be of any benefit to you in promoting your arboretum, we would be glad to send them to you a little later on, the only cost being the expense of sending and returning the photographs. If you would like to have them please let us know and we will be glad to arrange a definite date to send them.

Yours very truly,

*Olmsted Brothers*

September 20, 1940

Olmsted Brothers  
Brookline, Massachusetts

Dear Sirs:

The plans which Mr. Pyle discussed with you for the Institute for Advanced Study are as yet purely tentative. I have talked them over with another landscape architect and if we went forward it seems to me extremely likely that we should ask him to do the work. However, nothing has been authorized by the Trustees as yet. If there should be any chance of our being able to make use of your services I shall not fail to let you know.

With many thanks for your letter, I am

Yours sincerely,

FA/MCE

FRANK AYDELOTTE, Director



# OLMSTED BROTHERS

LANDSCAPE ARCHITECTS

BROOKLINE·MASSACHUSETTS

FREDERICK LAW OLMSTED  
JAMES FREDERICK DAWSON  
EDWARD CLARK WHITING  
HENRY VINCENT HUBBARD  
WILLIAM BELL MARQUIS  
LEON HENRY ZACH

17th September, 1940.

Dr. Frank Aydelotte, President,  
Institute for Advanced Learning,  
Princeton University,  
Princeton, New Jersey.

Dear Sir:

A short time ago Mr. Robert Pyle, Chairman,  
American Association of Nurserymen, spoke to us  
about the possible cost of making plans, etc., for  
an arboretum of about 300 acres which, we under-  
stand, you expect to develop in connection with  
Princeton University.

We gave some data to Mr. Pyle and we are  
now writing to ask you if we could be of any pro-  
fessional assistance to you in your work of forming  
an arboretum or a collection of trees, etc.

We are quite familiar with the scientific  
and horticultural requirements of an arboretum and  
should be most happy and honored to be of assistance  
to you in the development of any plans that you may  
have in mind.

We should be very glad to hear from you at  
your convenience on this subject.

Yours very truly,

*Olmsted Brothers*



*Bldg. & Gds  
Planting*

July 12, 1940

F. & F. Nurseries

Springfield, New Jersey

Dear Sirs:

Dr. Aydelotte has asked me to thank you for your letter of July 9 and to say that our planting is now in charge of Mr. Morrell. If an opportunity appears for making use of your facilities, Dr. Aydelotte will be happy to communicate with you.

Very truly yours,

ESB

Secretary

# F. & F. Nurseries

SPRINGFIELD · NEW JERSEY



TRIAL GARDENS ALWAYS OPEN

THREE HUNDRED ACRES  
TELEPHONE MILLBURN 6-0152

July 9th  
in our 58th year  
1940

Institute for Advanced Study  
Dr. Frank Aydolotte, Director  
20 Nassau St.  
Princeton, N. J.

Don't like to appear too persistent, Dr. Aydolotte, but "the world is so full of a number of things" that some are apt to be overlooked.

Almost every new building presupposes the inclusion of planting--and naturally we are interested. Interested not only in selling plant material, but in offering a service based on over fifty years' experience, plus a well-stocked three hundred acre nursery.

Some good people have complimented us upon capturing the "spirit of the place" in our plantings--believe we can do this in your garden.

You may have arranged for this work, or perhaps are not ready to consider it. In any event, your reply would be most helpful to us. Won't you just check and return this sheet to guide our action? Thank you.

Yours truly,

F. & F. NURSERIES

JJ:ET

- ( ) Planting is in charge of Architect.
- ( ) Not interested.
- ( ) Will discuss this with you.

file

# F. & F. Nurseries

SPRINGFIELD · NEW JERSEY

TRIAL GARDENS ALWAYS OPEN



THREE HUNDRED ACRES  
TELEPHONE MILLBURN 6-0152

June 25th  
in our 58th year  
1940

Institute for Advanced Study  
Dr. Frank Aydolotte, Director  
20 Nassau St.  
Princeton, N. J.

## "Landscape"

You may recall our mail conversation, Dr. Aydolotte, about planting on your grounds. Do you mind if we pass along another thought?

Over fifty years' experience has taught us that the size of the job has little to do with its importance. In fact, the art of planting is to create the desired effect with a minimum quantity of material.

That's why so many places are over-planted.

Of course, we want to sell our products, but never at the expense of good taste, and in our Nursery of three hundred acres, it is an easy matter to select the correct specimens.

We will gladly go over your plans at your convenience. Won't you tell us when we may do this?

Yours truly,

F. & F. NURSERIES

JJ:ET

*Receipts & Debits  
Planting*

COPY

Walter B. Howe, Inc.  
94 Nassau Street, Princeton, N. J.

June 23, 1939

The Institute for Advanced Study  
20 Nassau Street  
Princeton, New Jersey

Gentlemen:

Enclosed is a bill in the amount of \$490.00 received yesterday afternoon from Mr. Austin Morrell. This bill seems to be an accumulation of charges since last fall.

We suppose Mr. Morrell's bill is in order and none of these items have been paid, but as we do not keep any record in this office about Institute bills - just O.K. and send them to you - we haveno way of checking whether they have been paid or not.

As a suggestion it might be well to have Mr. Leidesdorf's office go over the bill before sending the check. However, we are quite sure it is in proper order

Yours very truly,  
Walter B. Howe, Inc.  
(signed) STANLEY S. BERGEN

ENCLOSURE

STONEACRES  
Princeton, New Jersey P.O. Box 29

June 22nd, 1939

The Institute for Advanced Study  
Princeton, N. J.

Ploughing, harrowing firebreak around pine seedling plantation - Olden property.	
Fall of 1938 . . . . .	\$170.00
Ploughing, harrowing firebreak around old pine plantation - Hale property.	
Fall 1938 . . . . .	70.00
Two acre nursery field preparation - Olden property. Fall 1938, and Spring 1939. . . . .	50.00
Transplant 40 Red Cedars from Olden property to nursery field. Spring 1939 . . . . .	40.00
Transplant 2 - 12" caliper Maples to Dr. Panofsky residence @ \$80.00	160.00

Pruning large cherry tree - Olden property.  
This tree is in such a condition that any expenditure of money on it would not be warranted.

\$ 490.00

June 9, 1938

My dear Mr. Leidesdorf:

On January 25, 1937, it was

RESOLVED, That a sum not exceeding \$1,000.00 be and hereby is appropriated to be used for the reforestation, transplantation of trees and other work on the land owned by the Institute, said sum to be expended under the direction of Professor Oswald Veblen and Professor Winfield W. Riefler.

The attached bill for \$90.00 on account of work authorized by Professor Veblen and Professor Riefler should be charged to this appropriation.

Sincerely yours,

WALTER S. GALENT

Mr. Samuel D. Leidesdorf  
125 Park Avenue  
New York City

ESB

TELEPHONE 95

WALTER B. HOWE, INC.  
REAL ESTATE AND INSURANCE  
94 NASSAU STREET, PRINCETON, N.J.

*Bedys + Grounds*  
NEW YORK OFFICE  
CLARKE & HOWE  
84 WILLIAM STREET  
TELEPHONE 3-6534 BEEKMAN

*Planting*

April 12, 1938

The Institute for Advanced Study  
20 Nassau Street  
Princeton, New Jersey

Gentlemen:

*sent to Mr. Seidendorff*  
Enclosed please find bill from Austin D. Morrell in the amount of \$500. for planting 40,000 seedlings on the southern end of Olden Manor as per his contract \$490. and trucking the seedlings from Washington Crossing \$10.

The contract was authorized by your office and the \$10. item was authorized by Prof. Veblen so that Mr. Morrell could have the seedlings as he needed them and they would be in good condition.

Yours very truly  
Walter B. Howe, Inc.

*Stanley J. Bergen*  
Secretary

B:W  
ENC.



Bldg.

*Maass & Davidson*  
*Attorneys*

*Cable Address "Maasherb"*

*Herbert H. Maass*  
*Wilbur C. Davidson*  
*Monroe L. Friedman*

*20 Exchange Place*  
*New York*

, January 31, 1938.

Dr. Abraham Flexner,  
The Institute for Advanced Study,  
20 Nassau Street,  
Princeton, New Jersey.

Dear Dr. Flexner:-

Yours of the 26th, enclosing a letter from Michael  
M. Burris, is at hand.

I do not think that this is the time when we desire  
to undertake any landscaping problems and think we will first  
have to determine the location of our new building and what is  
proposed to be done by the architects before we call in land-  
scape engineers. I am writing Mr. Burris accordingly.

With kind personal regards, I am,

Sincerely yours,



HHM:JR