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JOURNAL

OF

The New York Botanical Garden

EDITOR

H. A. GLEASON

Assistant Director

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River-cypress strand on the eastern shore of Lake Okeechobee, comprises one of the most impressive sights in the State. Large portions, however, have been destroyed by fire. The humus in some places has been burning for several consecutive years. After a fire the giant trees fall down and are either sawed into lumber or left to decay. The trees often harbor great quantities of Florida moss (*Dendropogon*), but few other air-plants.

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CYPRESS AND POPULATION IN FLORIDA

THE RELATION OF PHYTOGEOGRAPHY TO THE DRIFT OF POPULATION AS SHOWN IN THE CASE OF TAXODIUM

WITH PLATES 245–247

Some botanical genius with a taste for research will come along some day and show how closely related, at least according to our text-books, has ever been plant geography and political geography. This is not in reference to the redistribution or readjustment of floras which usually follow man's advent in new fields. It is in reference to what existed there before man's advent, or before the botanist's advent, at any rate.

Consider the case of our valuable cypress forests, for example—of *Taxodium*, otherwise known as cypress, bald-cypress, river-cypress, pond-cypress, whence the "wood-eternal" as the lumber advertisements have it.

The geographic range of this deciduous-leaved conifer—whence one of its common names, bald-cypress—is confined almost wholly to the Atlantic and the Gulf Coastal Plains, extending from southern New Jersey to Florida, southern Indiana, southern Missouri, and Texas.

The habitats often assigned for it are "River-swamps usually submerged during several months of the year, low wet banks of streams, and the wet depressions of Pine-barrens."[1]

In passing, it may be mentioned that while the more acute taxonomists of a century ago had already discerned two kinds or species of *Taxodium*, generations of their less acute successors

[1] C. S. Sargent, Manual of Trees of North America 72. 1905.

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still recognized but one. Not until the beginning of this century were the two species again clearly segregated.[1] In this connection consider also the above quoted statement of habitats. It is in the river-swamps and along the stream-banks that we find the *Taxodium distichum*—river-cypress, that which was described in 1753, while that of the pine barrens is *Taxodium ascendens*—pond-cypress, which was confused with the former cited species up to 1818, when it was separated under varietal rank, but was not recognized as a distinct species until 1833.

But the point is this: that less than a score of years ago the recorded southern limit for the geographic distribution of either cypress *still coincided almost exactly with the geographic limit of Florida's modern development.*

In leading works on trees[2] about the beginning of this present century under the paragraphs devoted to the geographic distribution of this conifer we may read ". . . southward near the coast *to the shores of Mosquito Inlet and Cape Romano. . . .*" The italics are ours. These two localities represented, as a matter of fact, not the southern limit of *Taxodium*, but of modern civilization, on the east and the west coast respectively down almost or quite to the present generation. A straight line connecting these regions of settlement diagonally divides peninsular Florida in two almost equal parts,—that lying to the northwest of the line, long ago pretty well settled, that lying to the southeast, until recently practically unsettled, or relatively speaking, the former a *terra cognita*, the latter a *terra incognita*. In this instance, at least, botany had waited on the railroads. The comparatively recent extension of the railway along the eastern coast of Florida from New Smyrna to Miami, and later to Key West, made possible—even easy—access to a storehouse of botanical lore hitherto closed.

Curiously enough, the arbitrary line of division above referred to also divides, in a general way, the higher portion of the state from the lower portion.

[1] R. M. Harper, Bulletin of the Torrey Botanical Club **29**: 383–399. 1902; **32**: 105–115. 1905.

[2] C. S. Sargent, Silva **10**: 153. 1896; Manual of the Trees of North America 72. 1905.

Pond-cypress head in the Big Cypress Swamp. This species grows more in heads than in strands. Heads may comprise a few trees or may extend over many acres of area. The growth of cypress in the southern part of the peninsula, particularly the pond-cypress, has not yet been greatly devastated, but proposed highways into the frontier parts of that region will invite large lumbering operations. The trees of the pond-cypress are the favorite harbors for several species of air-plants (*Tillandsia*).

Strange that the Big Cypress Swamp—which has been so designated on maps of Florida, at least since 1849—should have been excluded from this recorded geographic range of the cypress! Whence the name, if cypress did not grow there? Likewise, on the lower eastern coast the cypress was not hidden from view, in fact it is so prominent a feature on the old trail and main highway that it seems hardly possible that it could have been kept out of the records of distribution.

There are several ways to account for this rather striking political development of Florida—however much we lack the phytogeographic explanation; but none is wholly satisfactory. Perhaps the most logical theory is that as the Seminoles migrated southward, they followed the line of least resistance, which, in this case, was the higher part of the peninsula. As they proceeded southward they probably exterminated or absorbed the remnants of the aborigines that had escaped the Spanish. Then about the beginning of the last century, when the white man from the United States got glimpses of Florida beyond the frontier borderlands, he set out in turn to exterminate the Seminole along these Seminole trails, and this process continued for nearly half a century. During this period, Florida meanwhile becoming part of the United States, the territory from which the red man was driven became dotted with forts, many of which became permanent settlements and soon developed into towns.

The business of Indian hunting was not confined to the northwestern division of the peninsula, of course. Many forts were located far down in the southeast and southwest. But here the lines of communication were so tenuous, and the swamps and marshes so vast, and the Indians so able to hold their own, that civilization faltered, and failed to take hold. It is a melancholy but noteworthy fact that although our government spent treasure and blood prodigally in this land of botanical luxuriance, our botanical knowledge of it remained virtually at a standstill. For much of Florida, so it has remained ever since. In the lower part of the peninsula—in the Everglades, in the Big Cypress, among the Ten Thousand Islands, and even north of Okeechobee —there are still miles of lonely wilderness.

But it was these observations on the cypress along the frontier settlements in the last century that probably crystalized the recorded southern limit of the distribution of this remarkably important forest and timber tree. Thus, I suppose we must account for the coincidence of the southern cypress-limit and the limit of political distribution.

Now, notwithstanding this definite statement which stood so long regarding the geographic distribution of the cypress in the state, there is, perhaps, more cypress in Florida outside of the recorded area than within it. As a matter of fact, its range extends southward almost or quite to the Cape Sable region, that is to say, the extreme southern tip of the peninsula. It is the abundance that renders the former detailed records of distribution at once so absurd and so difficult to interpret.

We can understand to some extent, at least, the oversight or ignoring of its occurrence in the interior, even if the Big Cypress Swamp did appear on early maps. But botanists and dendrologists were not ignorant of the vegetation of the eastern coast of Florida, In fact, the main features had been quite well known for the past several generations.

There, particularly on the lower eastern coast, both species of the cypress approach nearly or quite to the sea, at least—and at many points—to the coastal lagoons. The river-cypress follows nearly all the streams flowing from the Everglades to the Atlantic Ocean almost as far south as Cutler, the southernmost settlement on the eastern coast. It is common in the Snapper Creek hammocks a few miles north of Cutler and was always a conspicuous element in the arboreous vegetation along the west and south branches of the Miami River, a stream quite well known to botanists for over half a century.

The pond-cypress does not extend as far south on the eastern coast as its larger relative, but it is often conspicuous in the landscape.

Thus the stereotyped record of distribution of *Taxodium* in Florida neglects at least four great regions. They are, the Lake Okeechobee basin, the Big Cypress Swamp, the lower eastern coastal district, and the southern end of the Everglades.

Two kinds of cypress, river-cypress (*Taxodium distichum*) on left, pond-cypress (*T. ascendens*) on right. Besides the differences in habit as shown in the two preceding plates, the trees differ in the leaves, not alone in the position, but in the shape. The fruits of the two species have not yet been carefully compared.

In all these regions occur both kinds of cypress—*Taxodium distichum* and *Taxodium ascendens*. The river-bottoms, the lake shores, and the "sloughs" support the first-named species, which is known as river-cypress. The other species, known as pond-cypress, is usually confined to the prairies and low pinelands, although it does occur rarely on sand-dunes—for example, on those near Juno on the Atlantic coast. The greatest development of the pond-cypress is doubtless in the Big Cypress Swamp, while the common cypress is apparently most copiously developed in the Lake Okeechobee region and upper Saint John's basin.

The vastness of growth of the large cypress in the Okeechobee basin can be appreciated only by seeing it. The shores of the lake, particularly the eastern and northern shore, the tributary streams, notably the Kissimmee River, the Onothohatchee, Cypress Creek, Mosquito Creek, and Fisheating Creek, and outlying sloughs often support almost impenetrable stands of beautiful trees. The trunks, tall and clear of branches, furnish the favorite material for the dug-out canoes of the Cow Creek Seminoles. The cypress forest on the eastern shore of Lake Okeechobee is one of the most impressive sights in all Florida.

The prairies that surround the fringe of the Everglades, which in turn encompass Okeechobee, are also high, but occasional lower areas support considerable pond-cypress.

The region of the Big Cypress Swamp is typically low prairie, hence a vast development of the pond-cypress. In other words, much of the cypress of the Big Cypress is not big. However, the large cypress is not wanting. In the Okaloacoochee Slough, smaller sloughs, and on lake shores we find beautiful forests of large trees. The Okaloacoochee Slough is the favorite locality for the Big Cypress Seminoles to obtain canoe material.

The eastern coastal region is well supplied with cypress. It occurs along nearly all the creeks and rivers, in the intersecting prairies of the Everglade Keys, and on the edges of the Everglades—there principally as isolated cypress heads. These clumps of cypress trees, both large and small, are much affected as temporary camping places by Seminoles as they travel to and from their permanent camps. The trees in the river bottoms are also large enough to furnish the materials for their canoes.

In several ways the southern end of the Everglades or the prairie between the Everglade Keys and the Bay of Florida is particularly interesting. There we find the most stunted growth of the pond-cypress and the most massive growth of the other species. On the one hand, we find vast areas with a growth of small pond-cypress trees about as high as one's head or twice as high, but with all the appearances of great age. On the other hand, there we find the most massive development of the river-cypress.

South of the latitude of Royal Palm Hammock one may see large dome-like masses of vegetation which, from the distance of a mile or two, he would consider to be good-sized Everglade hammocks. Imagine the surprise of the writer when he investigated one of these seeming hammocks several years ago, and found it to be a single cypress tree!

These large cypress trees are not, however, like those further north—so stately and straight, branching often only at the top. The trunks are usually short, as well as stout. In the case of the individual just referred to above, the trunk—about twelve feet in diameter—was branched ten feet from the ground. The branches grew nearly at right angles to the main stem, and were in themselves as large as good-sized trees.

Another very interesting feature of this region of the little cypress trees and the big cypress trees is the association of this typically fresh-water plant with the mangrove, a typically salt-water plant.

The cypress extends well down towards the influence of salt water, if not actually to it, while the mangrove extends up into the prairies far beyond any apparent saline influence. When we penetrate further south it will be interesting to learn if the cypress actually reaches the influence of the tide of the Bay of Florida. This, however, is apt to remain a mystery for many years. Florida is a land of underground rivers, and perhaps of underground tidal currents as well.

JOHN K. SMALL

VOCATIONAL EDUCATION IN GARDENING FOR DISABLED AND CONVALESCENT SOLDIERS AND SAILORS

The vocational training of gardeners in the New York Botanical Garden actually began on January 16, 1919, one disabled soldier beginning training at that time under an agreement between the Garden and the Federal Board for Vocational Education. Until March 3, 1919, strictly practical training was given under our gardeners. On that date the number of men in training had reached seven and they were formed into the first class of instruction. Since that time the number of students sent by the Federal Board has increased to fifty during January, and five civilians have been in the classes at one time or another.

The training of young gardeners is an important problem before the horticultural world today. The National Association of Gardeners is considering it at present, studying ways and means of interesting young men in gardening as a profession. Undoubtedly the Old World method of apprenticeship has trained the best gardeners. The present day problem is to get into our training as much of this method as possible, as well as a certain amount of scientific study and horticultural interest. Garden labor is scarce at the present time, and in competition with other industries is losing ground, owing to the extreme wages paid by other lines. Then, too, as recently pointed out by one of the experts of the profession, the beginner in gardening, the garden laborer or apprentice, does not show the interest, does not care to study, is not inspired to broaden out in the science of gardening as it is talked, written, and lectured about today. Most of the gardening education of today tends toward these latter points and the training here has covered these and in some measure the need also for practical apprentice-training. Starting with younger students, who are in good health, with a system of strictly practical training, under competent gardeners, together with the study of soils, botany, plant materials, pathology, entomology, and other related subjects and the broadening influences of horticultural literature, flower exhibitions, etc., the

ideal training would result. The percentage of persons naturally adapted to gardening is not large. We have found young men whose fathers before them were successful gardeners and florists, and though they themselves were strictly at home with plants, still they did not care to continue in the profession. However, it is probable that a sufficient number of young men can be found who will take to the work and become successes in it. For the disabled veteran of the war, gardening or one of its branches should give an interesting, healthful occupation, and the same percentage of his class would qualify as of any other at the present day. It is a matter of selection and individual preference.

Our practical training has been carried on in accordance with the seasonal work around the Garden and conservatories. Practice in care of houses and the plants in them has been accomplished both by individual work of students with our gardeners and in small classes. This work has included potting and tubbing of large conservatory plants, such as would be encountered in the conservatories of large country estates, the washing of plants for scale insects, care and potting of orchids and ferns, pruning and arrangement of plants in houses, the spraying of these plants with hand sprays, and general practice in watering, ventilation, and the maintenance of conditions in greenhouses for the growth of different types of plants.

The propagation of many of the commoner greenhouse plants, such as *Acalypha*, *Aucuba*, *Begonia*, *Bougainvillea*, *Cestrum*, *Clivia*, crotons, *Dracaena*, *Fittonia*, *Eranthemum*, *Ficus*, *Lantana*, bay trees, *Aralia*, and *Sansevieria* has been attempted on a small scale. The propagation of the common bedding plants and geraniums has been carried on during the winter. Varieties of *Coleus*, *Alternanthera*, *Iresine*, *Ageratum*, *Echeveria*, *Vinca*, *Cuphea*, and *Santolina* have been propagated by cuttings on a large scale. This practice has been done in the propagating houses, with comparatively large classes, and with almost uniform success. The constant practice of making and rooting cuttings, potting up when rooted and shifting when necessary, together with the general care of the small houses, has been of very practical value. Seeds have been sown of the more common greenhouse flowering

plants, such as *Cyclamen*, primrose, and *Gloxinia*, for flowering next summer, fall and winter; seeds of the early vegetables and of our annual garden flowers have also been sown. The sowing of vegetable and annual seeds is especially in point for the students who worked among them last year. Practice in forcing some of the bulbous plants, such as *Narcissus*, miniature hyacinths, and tulips, was also carried on, some of these flowers being placed on exhibition at Range No. 2.

The outdoor gardening practice has been varied. The first of this attempted by the school was spraying for scale insects during March, 1919. Hugh O'Neill, a student who had previously worked for the Newark, N. J., Shade Tree Commission, handled the extension apparatus as easily with the right hand and crook of the left elbow, as he had before he lost his hand in France. Beginning April 14, a course in vegetable gardening was given. The smaller crops were grown in small gardens on the site of the School Garden plots east of the Lorillard Mansion. Radishes, onions, beets, chard, parsley, carrots, salsify, lettuce, and spinach were grown here. Each student had a plot to himself, and harvested many messes of fresh picked vegetables. An area south of the Nursery was devoted to the larger crops, such as beans, potatoes, corn, cabbage, celery, kale, egg-plant and tomatoes. One disabled student, with an artificial leg, could do the work encountered in the care of such gardens, but he was not able to walk great distances for the other work.

Flower gardening commenced in the spring of 1919 with the spading of the flower beds. Annual flowering plants were planted out in the spaces left by the bulbs, peonies were disbudded and made an unusually fine display, many spaces devoted to perennials were renovated, general care was given to the collections, and chrysanthemums were planted for fall blooming.

The growing of the prominent outdoor flowering plants proved more interesting to most of the students than many other phases of gardening work. The large collection of *Gladiolus* in the Horticultural Collections was planted by the class, cared for, and dug in the fall. Variety studies were made, and lists prepared by the more advanced students for use in their own gardens

STUDENTS

Name	Entered	Duration	Left	Disability
Abbott, Thomas T., Paterson, N. J.	September 8, 1919	1 yr.		Valvular heart disease
Baiano, Carmelo, Dobbs Ferry, N. Y.	April 4, 1919	1 yr.		Gun shot wound, foot
Bland, Frank A., New York	April 5, 1920	1 yr.		Shell shock
Bernstein, William, New York	February 9, 1920	1 yr.	April 1, 1920	Tuberculosis arrested
Blumborg, Isidor, New York	February 17, 1919	1 yr.	September 15, 1919	Neurasthenia
Boyd, George S., Peekskill, N. Y.	February 24, 1919	1 yr.	October 1, 1919	Tuberculosis arrested. Heart and stomach
Brunt, Warren J., Philadelphia, Pa.	December 9, 1919	1 yr.	April 1, 1920	Gunshot wound. Tuberculosis arrested
Caples, Jeremiah, Wellingford, Conn.	July 7, 1919	1 yr.		Loss one thumb joint. Ankylosis
Cerrone, jr., Anthony, Mount Vernon, N. Y.	July 7, 1919	1 yr.		Chronic otitis media
Christof, George J., New York	January 5, 1920	3 mo.		Tuberculosis arrested
Colburn, Miss Daisy, New York	March 15, 1920	1 yr.		
Curatol, Lawrence, Tuckahoe, N. Y.	August 16, 1919	2 mo.	March 8, 1920	Tuberculosis. Gassed
Devaney, Patrick J., Dayton, Ohio	January 5, 1920	1 yr.	March 15, 1920	Tuberculosis arrested
Downing, Edward, New York	May 1, 1919	1 yr.		Tuberculosis arrested
Edmonds, Lloyd G., Front Royal, Va.	February 13, 1920	1 yr.		Shell shock
Ewing, Henry O., New York	April 29, 1919	1 yr.		Stomach trouble
Fabrizio, Michael, New York	May 12, 1919		May 20, 1919	Eye trouble
Fagan, Hugh, New York	January 19, 1920	1 yr.		Gunshot wound. Partial paralysis
Feltham, Thomas, Newport, R. I.	February 17, 1919	6 mo.	October 1, 1919	Injured knee
Flanagan, Peter, New York	November 21, 1919	1 yr.	January 16, 1920	Tuberculosis
Galino, Felix, New York	November 10, 1919	1 yr.	April 1, 1920	Gunshot wound. Loss right eye
Ganyard, Raymond A., Cleveland, Ohio	April 17, 1919	1 yr.	June 18, 1919	Amputated left leg
Graham, Charles, Yonkers, N. Y.	March 3, 1920	3 mo.	April 1, 1920	Gassed
Hamm, Howard H., New York	December 9, 1919	1 yr.		Psychoneurosis. Gunshot wound leg and finger
Healy, Raymond C., New York	October 28, 1919	1 yr.	February 15, 1920	Gassed
Hohmann, Edward, Brooklyn, N. Y.	November 2, 1920	1 yr.		Gunshot wound mouth. Gassed. Dyspnoea
Holt, Platt E., New York	March 1, 1920		March 15, 1920	Tuberculosis arrested
Greebler, Benny, New York	October 23, 1919	1 yr.	April 10, 1920	Tuberculosis arrested

STUDENTS—*Continued*

Name	Entered	Duration	Left	Disability
Jacobs, Louis N., Petersburg, Fla.	October 21, 1919	1 yr.	April 1, 1920	Tuberculosis arrested
Jones, Joseph B., New York	November 17, 1919	6 mo.	April 1, 1920	Mastoiditis. Otitis media
Killeen, John J., New York	January 19, 1920		April 1, 1920	Diabetes
Koch, Emil, New York	December 1, 1919	1 yr.	March 15, 1920	Gunshot wound leg
Lair, Henry T., Lawrenceville, N. J.	June 24, 1919		June 24, 1919	Tuberculosis arrested
Landrum, Warren R., Hattisburg, Miss.	March 3, 1919	1 yr.	October 10, 1919	Tuberculosis arrested
Lane, John, New York	February 10, 1920		March 1, 1920	Tuberculosis arrested
Laterwech, Stephen, Ansonia, Conn.	May 21, 1919	1 yr.		Tuberculosis arrested
Laura, Joseph B., New York	October 21, 1919	1 yr.		Eye and ear troubles
Loftus, Thomas, Norwich, N. Y.	April 17, 1919	1 yr.	June 6, 1919	Tuberculosis arrested
Marcus, Nathan, New York	January 26, 1920	1 yr.		Shrapnel wound. Gassed
McAllister, Henry, New York	February 9, 1920	1 yr.	April 1, 1920	Heart trouble
Meyerowitz, Nathan, New York	June 9, 1919	1 yr.		Acute rheumatism
Murray, Walter J., New York	June 24, 1919	1 yr.	January 15, 1920	Tuberculosis
Nappi, Louis, New York	March 3, 1919	1 yr.		Nervous trouble
Nembach, Albert B., Port Washington, N. Y.	February 18, 1920		April 1, 1920	Tuberculosis arrested
Newman, Egnatius, New York	January 5, 1920	1 yr.		Tuberculosis arrested
O'Brien, William J., Brooklyn, N. Y.	January 5, 1920	6 mo.	March 1, 1920	Tuberculossis arrested
O'Neill, Hugh F., New Haven, Conn.	March 11, 1919	1 yr.		Amputated left hand
Palmeri, Umberto, New York	November 10 1919,	6 mo.		Tuberculosis arrested
Paris, Frank, Yonkers, N. Y.	October 28, 1919	1 yr.	January 5, 1920	Gunshot wound
Pauline, Laurence, Port Chester, N. Y.	October 20, 1919	1 yr.		Chronic bronchitis. Tachycardiad. Myocarditis
Poupard, Percy H., New York	January 12, 1920	1 yr.		Valvular heart trouble
Reilly, James B., New York	December 1, 1919	1 yr.		Loss of hearing. Ruptured ear drums
Rollins, Pinckney C., Washington, D. C.	January 20, 1920	1 yr.		Gunshot wound. Gassed. Chronic nephritis
Sacchetti, Antonio, Yonkers, N. Y.	August 1, 1919	1 yr.		Gunshot wound left arm and side
Schultz, John V., New York	January 29, 1920	1 yr.		Gunshot wound. Shrapnel wound

STUDENTS—*Continued*

Name	Entered	Duration	Left	Disability
Sheehan, Thomas, Brooklyn, N. Y.	November 21, 1919	1 yr.		Partial paralysis of external and internal nerve of leg
Sindler, Thomas E., Islip, N. Y.	February 3, 1919	1 yr.	May 16, 1919	Loss of hearing
Snyder, Walter F., Wurtsboro, N. Y.	October 20, 1919	1 yr.	March 1, 1920	Tuberculosis
Sobol, Philip, New York	June 11, 1919	1 yr.		Tuberculosis arrested
Steele, William M., Yonkers, N. Y.	July 22, 1919	3 mo.	March 1, 1920	Stiff finger. Mental deficiency
Swentzel, Henry C., New York	June 19, 1919	1 yr.	July 7, 1919	Compound fracture hip
Tanikawa, John M., Hilo, Hawaii	October 30, 1919	1 yr.		Gassed
Tare, Nathaniel, New York	March 15, 1920			Gunshot and shrapnel wounds. Gassed
Toole, John F., Clinton, Mass.	June 2, 1919	1 yr.		Conjunctivitis. Gunshot wound ear
Ulrich, Max, New York	December 1, 1919	1 yr.		Tuberculosis arrested
Vacchio, Sebastiano, New York	June 2, 1919	1 yr.	March 15, 1920	Shrapnel wound left knee, limited flexion
Wager, William, New York	December 1, 1919	6 mo.	March 1, 1920	Wound in head. Fractured skull
Wagner, Arthur, New York	October 6, 1919	1 yr.		Operation for sinusitis and ethmoiditis
Weisinger, William, New York	November 21, 1919	1 yr.		Gassed
Willis, James M., New York	February 4, 1920	1 yr.		Gunshot wound chest and shoulder
Woerter, Charles, New York	January 13, 1920	1 yr.		
Wozniak, Michael, Detroit, Mich.	January 16, 1919	1 yr.	Died June 3, 1919	Tuberculosis. Shell shock

later on. Some practice in planting the large collection of dahlias was given, and the types and varieties, which were so well arranged and bloomed so magnificently as to form an exceptional opportunity for study, were watched throughout the entire season. Cannas were included in the summer work with flowers. This spring some students have potted the large collection at Range No. 2, and it is to be hoped that the collection will make such a showing as it did in 1919. During the past winter the class has tried the propagation of the smaller evergreens, such as retinosporas, yews, junipers, etc., by cuttings placed in sand, and the propagation of many of our flowering shrubs by long cuttings, such as are used in propagating privet, willow and other shrubs. These cuttings are being stored until late spring, when they will be rooted in the open ground. Among the shrubs treated in this manner were *Forsythia*, *Corylus*, *Tamarix*, *Ribes*, *Viburnum*, *Sambucus*, weigela, *Benzoin*, *Kerria*, *Staphylea*, *Dirca*, and *Exochorda*.

During 1919, the students attended many practical demonstrations of path-building, grading, tree-moving and other branches of the park work.

The elementary study of plants and plant functions has been a continuous feature of the gardening course. Elementary botany, including a study of seeds, seedlings, buds, stems, leaves, flowers, and fruits, was given in the spring quarter of 1919, followed in the summer quarter by a course in elementary plant physiology. Botany was taken up again during the winter, and will be followed by more plant physiology for the new students. Garden zoology, a course devoted to the study of insects and animals encountered in horticultural work, was taken up during the spring and summer of 1919.

One afternoon a week throughout the year is devoted to garden botany, a study of the plant materials used in gardening and its branches, their identification, habit of growth, uses, and interesting features. During the winter months greenhouse plants, conifers, and broad-leaved evergreens are studied. In summer the flowering shrubs, trees, annual flowering plants, perennial border plants, bulbs, and bedding plants are considered at all stages of

their growth. Although a real knowledge of such a diversity of plant materials can only be gained through constant association with the plants, a general knowledge of relationships and conditions is acquired, sufficient to give ideas for location, planting, and care during growth, protection in buying, and interest to go beyond the rather limited scope covered in most gardening work. Broad-leaved and other evergreens for winter color and attractiveness; berry-bearing shrubs for winter color and food for our friends, the birds; plants, especially many natives, which are so well adapted to wild swampy spots and the banks of streams, are all considered. Although the old garden plants such as geraniums, salvias, petunias, and *Coleus* are the most easily learned, some of the more beautiful and more valuable kinds make the most lasting impression on the student. The Chinese *Abelia* will be remembered and planted when *Hydrangea paniculata grandiflora* is forgotten.

The Cyclopaedia of American Horticulture and the Illustrated Flora of the Northeastern States have been used for reference in this study of plants. These works are accessible to the students in their reading room at the Mansion. Text books on gardening and floriculture are furnished, through the Garden, by the Federal Board for Vocational Education.

KENNETH R. BOYNTON.

TREES GIRDLED BY MEADOW MICE

One day early in March, I saw about noon at the Elevated Approach a brown rat, a gray squirrel, and a cottontail rabbit. The first two were actively hunting for something to eat, while the rabbit sat on the snow with its eyes to the sun fast asleep.

The brown rat is always with us, and is not only very destructive but helps to spread many diseases. The gray squirrel continues to be the delight of park visitors in spite of its shiftless habits, its fondness for buds and maple sap, and the fact that it destroys birds' eggs and young birds before they are able to fly. Two specimens of the black variety are frequently seen in the

hemlock grove. The cottontail rabbit is fairly abundant in our grounds, making its nests near the buildings and being quite socially inclined. Although destructive in many sections, the injury done by them here is so slight as to be negligible. They seem to stand on top of the snow and reach for the young twigs, which they nip off with a clean cut. I do not know of a single case of girdling which can be attributed to them.

But the common meadow mouse is very destructive every winter, and has been unusually so during the one just past, doubtless owing to the abundance of snow and ice.

Walk through any grassy meadow and you will notice little runways forming a network over the surface of the soil and winding in and out among the vegetation. These are made by mice about as long as the common house mouse but with thicker body and shorter legs and tail. They keep the runways very smooth and free from straws so as to reach their burrows quickly in case of alarm.

In their comfortable nests of dry grass, several litters of from four to eleven young are reared each year. Hawks, owls, crows, foxes, weasels, cats, and other natural enemies prey upon them continually—and still they increase. They consume large quantities of growing and matured crops and often destroy entire orchards by gnawing the bark from the base of the trunks and roots of trees. In winter, they tunnel under the snow from one tree or shrub to another.

No store of food is laid up for cold weather by the southern species, but there is one in Alaska that gathers and hides in its nests a quart or more of little bulbous grass roots, which the Eskimo women search for eagerly and boil to serve to their guests during winter festivals.

To recount all the damage done by meadow mice in their search for food on our grounds during the past winter would make quite a story. A great many different kinds of trees and shrubs were attacked; and the attack was made in different ways according to the quality of the bark, the depth of the snow, the amount of dry grass present, etc.

The object of the mice being to get at the food stored in the

inner bark, it was necessary for them first to gnaw away the outer corky layers, after which the tender inner layers were consumed down to the wood. On account of this complete girdling no food can pass to the roots, which will be speedily starved out and the trees will die. In the case of shrubs, new shoots will spring up, but this will take some time.

Several of the splendid Japanese flowering cherries were completely girdled for a distance of six inches or a foot near the base. Four of these are young trees, six inches in diameter, and good bloomers; while one belongs to the first lot set out many years ago. Two other fine trees in the cherry orchard are nearly girdled and will either die or become practically worthless.

In the maple collection nearby, at least two trees have been destroyed; and four Japanese maples in the Fruticetum have been girdled. In the case of one of the latter, many of the lower limbs were covered with snow and these were entirely stripped of their bark. In the hawthorn collection, also, several trees have suffered in this way, but none appear to have been girdled.

Two lindens, one poplar, several wild cherries, and other trees scattered about the grounds have likewise suffered; but not to the same extent as the shrubs.

In the lilac collection recently installed on Pelham Parkway, containing many fine French varieties, between thirty and forty plants have been destroyed. In the weigela group north of the lake near the museum building, twelve of the large clusters have been completely girdled; while at the Mosholu Approach and elsewhere, the weigelas have suffered severely.

The Georgia syringa collection is planted in a low spot in the Fruticetum, where there is much grass and the snow lingered long. Here the mice camped among the stems a foot or more above the ground and played havoc with nearly every one of them, eight large clumps being destroyed. The oriental sweet shrub on the bank above seemed to be especially attractive to the mice, eight of these clusters having been destroyed.

A group of deciduous holly was wiped out; shrubs of the pea family; privets; willows; almost anything within reach seemed acceptable to this small, lurking enemy, which is so difficult to

combat. We shall have to accept our losses with equanimity; keep the grass down as much as possible; and hope for less snow another winter.

Bridge grafting is often recommended to save trees that have been partially girdled by mice. It is done in April, when active growth is beginning aad before the wounds have dried out. My own feeling, however, is that the base of a tree is such a vulnerable point that it would probably be wiser to remove most trees thus injured and put in new ones.

W. A. MURRILL

CONFERENCE NOTES FOR APRIL

The April conference of the Scientific Staff and Registered Students of the Garden was held in the laboratory of the Museum Building, Wednesday, April 7, 1920, at 3:30 P.M. Dr. Marshall A. Howe spoke on "The Marine Algae of the Bahamas," illustrating the talk by numerous specimens, dried and in fluid.

The talk was chiefly a résumé and analysis of the speaker's account of the Bahamian algae contributed to the Britton and Millspaugh "Bahama Flora," then in press. This account was based mainly upon specimens collected by the speaker during three visits to the Bahamian archipelago made in 1904, 1905, and 1907, supplemented by earlier and smaller collections made by Dr. E. Palmer, Mr. and Mrs. John I. Northrup, Mrs. G. A. Hall, and Prof. W. C. Coker, and later ones made by Mr. Percy Wilson and Mr. L. J. K. Brace.

The Bahamian archipelago, according to the report of a former governor of the colony, consists of "29 islands, 661 cays, and 2,387 rocks," and, in addition to the coast lines offered by these islands, cays, and rocks, there are extensive areas of shallow water known as the Bahama Banks, areas of hundreds of square miles where the water is commonly from one foot to twenty feet deep. Most of the islands have shores that are in large part rocky, the rock being of oolitic or aeolian limestone and offering a good foothold for marine algae. The oolitic sand resulting from the decomposition of this rock is in some places too shifting

and unstable to allow any great development of algae, but it is usually rather compact and offers anchorage for many kinds of marine plants. Some of the Siphonaceous green algae, especially the Codiaceous genera *Penicillus*, *Rhipocephalus*, *Udotea*, *Halimeda*, and *Avrainvillea*, and certain species of *Caulerpa*, have a highly developed system of deeply penetrating rhizoids, which form compacted subterranean anchors, sometimes roughly suggesting the roots of carrots or parsnips, and by the aid of these they are able to maintain themselves on a sort of bottom that in more northern climes would be wholly destitute of the more conspicuous algae. Comparisons with the marine floras of Cuba, Jamaica, and Porto Rico and other parts of the West Indian region visited by the speaker, indicate that the Siphonales have their greatest development, both as to number of species and abundance of individuals, in the Bahama Islands and the adjacent Florida Keys.

If the diatoms are included, the list of known Bahamian algae now embraces 525 species, 6 species having been recognized since the Bahama Flora went to press. The known species are distributed in the principal groups as follows:

Rhodophyceae	157	species,	representing	68	genera
Phaeophyceae	34	"	"	16	"
Chlorophyceae	96	"	"	40	"
Myxophyceae	62	"	"	27	"
Diatomaceae	176	"	"	39	"
Total	525	"	"	190	"

One difficult group of red algae, the Squamariaceae, of which much material is available, has not yet been critically studied, and several additions to the list may be expected from this family. There are also various minute epiphytes and endophytes that need more attention. And most of the collecting in the Bahamas has been done in the winter and spring months, when conditions as to temperature and mosquitoes are the most agreeable. Some of the marine algae have a narrowly seasonal appearance and a curiously local distribution. With more extensive and intensive collecting, covering all of the months of the year, it is certain that the above list will be materially enlarged.

A. B. Stout,
Secretary of the Conference.

NOTES, NEWS AND COMMENT

Dr. and Mrs. N. L. Britton, Dr. Walter Mendelson, and Miss Dorothy Coker returned from Trinidad, May 2, bringing with them a large collection of specimens.

Professor Guy West Wilson, formerly employed at the Garden, has returned to the department of biology in Upper Iowa University, Fayette, Iowa. While at Clemson College in South Carolina, he collected a number of interesting fungi, an account of which will soon appear in *Mycologia*.

A widespread leaf-spot disease of the broad-leaved species of *Iris* has been reported from Wisconsin, California, New York, England, and elsewhere. The fungus passes the winter in the dead leaves, producing spores in the spring, which are distributed to new Iris leaves as they develop. Entrance into the leaf is through the breathing pores, the spores germinating on the surface and sending out mycelial threads which elongate until they reach the pores. The removal of dead infected leaves before the young leaves appear promises to be a successful means of control.

Mr. H. W. Becker, in charge of the Garden greenhouses, has had especial success in the control of ants. His method is by the use of nicotine, applied near their runways, on stems of plants, etc. He is sending a discussion of this to the *Gardeners' Chronicle*.

ACCESSIONS

PLANTS AND SEEDS

7 plants for conservatories. (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)

2 plants of *Coryphantha nivosa*. (By exchange with Mr. W. C. Fishlock.)

1 plant for conservatories. (By exchange with Dr. J. W. Harshberger.)

249 plants derived from seed.

7 bulbs of *Scilla maritima*. (Given by Dr. H. H. Rusby.)

5 bulbs of *Lilium superbum*. (Given by Mr. W. F. Marsh.)

2 bulbs of *Allium*. (Given by Mr. R. E. Dale.)

3 bulbs for conservatories. (Given by Mr. W. C. Fishlock.)

26 clumps of *Dahlia* roots. (By exchange with Mr. F. P. Quinby).

8 orchids for the conservatories. (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)

2 plants of *Echeveria.* (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)

45 cactus plants for the conservatories. (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)

4 plants of *Opuntia.* (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)

5 plants of *Mamillaria.* (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)

1 plant of *Opuntia Lindheimeri.* (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)

5 plants of *Pelecyphora pectinata.* (By exchange with U. S. Nat. Mus., through Dr. J. N. Rose.)

1 packet seed. (Given by Dr. H. H. Rusby.)

1 packet seed of *Magnolia acuminata.* (Given by Mr. Inglis Stuart.)

37 packets of seed. (Given by Mr. F. W. Lonegren.)

1 packet of seed. (Given by Mr. McDougal Hawks.)

14 packets of Colombia seed. (Given by Dr. Alexander Andrade.)

11 packets of seed from Ecuador. (Collected by Dr. J. N. Rose.)

2 packets of Florida seed. (Collected by Dr. J. K. Small.)

63 packets of seed. (Purchased.)

3 packets of seed. (By exchange with Director of Hort. Section, Giza Mouderish, Egypt.)

6 packets seed. (By exchange with the U. S. Nat. Mus., through Dr. J. N. Rose.)

169 packets of seed. (By exchange with Botanic Garden, Ottawa, Canada.)

3 packets of seed. (By exchange with Bureau of Plant Industry.)

1 packet seed. (By exchange with Royal Botanic Garden, Kew.)

1 plant of *Ardisia crenulata.* (Given by Mr. George Friedhof.)

8 plants from Florida. (Collected by Dr. J. K. Small.)

1 plant of *Guzmania.* (Given by Mr. Toussaint through Dr. J. K. Small.)

2 plants of *Psychotria bacteriophila.* (By exchange with U. S. Dept. of Agric.)

10 bulbs from Florida. (Collected by Dr. N. L. Britton.)

5 ferns from Florida. (Collected by Dr. N. L. Britton.)

1 pkt. of seed of *Oenothera canescens.* (Given by Miss E. M. Kittredge.)

1 pkt. of seed of *Potentilla sulphurea.* (Given by Bro. J. Peter.)

1 pkt. of seed of *Agave cupreata.* (By exchange with Dr. Wm. Trelease.)

1 pkt. of seed of *Crambe maritima.* (By exchange with Mr. Wm. Auld through Dr. J. K. Small.)

1 pkt. of seed of *Warea Carteri.* (Collected by Dr. N. L. Britton.)

1 pkt. of seed of *Zamia floridana.* (Collected by Mrs. N. L. Britton.)

MUSEUMS AND HERBARIUM

12 specimens of orchids for the local herbarium. (Given by the Rev. H. M. Denslow.)

1 specimen of *Clastobryum americanum* from Jamaica. (By exchange with Mr. L. J. Pessin.)

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