# TORREYA

A Bi-Monthly Journal of Botanical Notes and News

John Torrey, 1796–1873

EDITED FOR
THE TORREY BOTANICAL CLUB
BY
GEORGE T. HASTINGS

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# TORREYA

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## "Frost-flower" plants in Alabama

Roland M. Harper

In a brief symposium on "frost-flowers," by the writer and two others, in Torreya for August, 1931, it was pointed out that comparatively few species of plants are known to have the property of producing wings or ribbons of ice on the lower parts of their stems during cold nights. The three papers published at that time, and others there referred to, cited only four genera, *Helianthemum*, *Cunila*, *Pluchea* and *Verbesina*, in three families. Another genus and family can now be added to the list.

Late in November, 1936, I was spending a week-end at a country home in the eastern part of Dallas County, in the black belt of Alabama. About sunrise on the 22nd, a cold frosty morning, my host went out to the lot to attend to his animals, and when he came back to the house he reported that some of the weeds in the garden had ice on them; something he had never noticed before, though he had lived there since 1920.

As soon as possible I went out to investigate, and found the ice formation to be confined to a single species, *Richardia scabra* St.Hil., a member of the Rubiaceae, said to be a native of tropical America, and known in this country as "Florida pusley" or "Mexican clover." It is rather common in sandy cultivated fields in the southern parts of Georgia and Alabama and the northern part of Florida, and less so in neighboring states.

Ice formations of this sort previously reported have usually been wavy ribbons about as long as wide, within a few inches of the ground. But those on the *Richardia* were wings, opposite or approximately so, about half an inch wide but extending several inches along the stem and branches. However, if nearness to the ground is essential, the *Richardia* has the advantage of being a depressed or decumbent plant, and the ice wings extended practically the whole length of the stems, while the species previously reported are erect or nearly so, and seem to exude ice only near the ground. When I arrived on the scene the sun was nearly an hour high, and the ice had already begun to melt, which made a more detailed study out of the question. The wings may have been a little larger before sunrise than they were when I saw them.

The previously recorded frost plants are supposed to be natives where they were found, at various places from New York to Minnesota and Florida (and perhaps the European cases too, though I have not had access to the European literature on the subject). But the *Richardia* is supposed to have come from the tropics, where one would suppose that it would never have learned to make ice, so to speak; though details of its native haunts are lacking, and it may have come from some comparatively cool and elevated portions of the tropics.

More information about the geographical distribution of this phenomenon, and the weather conditions that produce it, would be interesting, though the matter perhaps has no great physiological or ecological significance. The fact that it is rather rare in the experience of any one person would seem to indicate that it occurs only with some exceptional combination of weather conditions. The case I noticed in Florida a few years ago occurred on a freezing night after a long rainy spell, and that suggested that the dead or dying plant stems were pretty well saturated with water just before the freeze. But in this latest Alabama case there had been no rain for a week or more, as far as I know.

In the fall of 1934 a citizen of Albertville, Alabama, wrote to the professor of chemistry at the University of Alabama about having observed the phenomenon near there, and he seemed to have visions of a new process for making ice. Evidently it was something new to him; but if he identified the plant or discussed the weather conditions I do not now remember the details.

It seems that most of the recorded observations of this phenomenon have been made in late fall, by persons who had encountered it but once in their lives; and that would seem to suggest that an individual plant can produce ice crystals only once. However, in TORREYA (35:57–59) for June, 1935, Dr. L. M. Dickerson reports a group of plants (tentatively identified as *Pluchea*) at Lebanon, Tennessee, that exuded ice three or four times in one winter, but the crystals were successively smaller and closer to the ground each time.

At the time my last paper on this subject was written I was sojourning temporarily in Florida, and did not have access to the literature of the subject, but Dr. A. H. Graves, who was then editing TORREYA temporarily, kindly supplied some references that I remembered only vaguely, and a few others. Three more papers can be cited now, two by Dr. K. M. Wiegand, in the *Plant World*, Vol. 9, 1906. The first is "The occurrence of ice in plant tissues," on pages 25–39 of the February number, and the second "The passage of water from the plant cell in freezing," on pages 107–118 of the May number. (The last, it happens, immediately follows the paper in which I reported "frost flowers" on *Verbesina occidentalis* in Tuscaloosa County, Alabama.) Another is by W. W. Coblentz, "The exudation of ice from stems of plants," in the Scientific Monthly **2**: 334–349, *figs. 1–14*. "April" (March), 1916. This deals mostly with *Cunila*, and refers to some previous literature on the subject.

SUPPLEMENTARY NOTE. While the foregoing was awaiting publication I learned of two additional cases of "frost-flowers" in Alabama, through Mr. R. L. James, a farmer of near Russellville, Franklin County, who has been sending me plants for identification for about three years past.

On Sept. 14, 1937, he sent me a specimen of *Verbesina virginica*, with the remark that "large crusts of ice form about the base of the stalk when the first freezes come in the fall." On looking up the plant in Small's Manual of the Southeastern Flora (1933), to make sure of the identification, I noticed that one of the common names given there is "frost-weed." (But no such name for it appears in his Flora of the Southeastern United States, 1903.) So evidently the same phenomenon in that species had been noticed by others, though I am not at present acquainted with any specific mention of the fact in botanical literature.

Later in the fall Mr. James sent me a specimen of *Lespedeza hirta*, with the observation that it too sometimes produced ice crystals. When I expressed some surprise he assured me on Dec. 14 that he had seen the ice on a great many plants of that species on Nov. 20, 21 and 22, and had subsequently seen many other specimens with the bark split at the base, evidently by ice. He also stated that he had not seen much ice on it since the dates mentioned, though the phenomenon continued to be manifested by the *Verbesina*, but with diminishing intensity (as observed by Dr. Dickerson in the case of *Pluchea* in Tennessee).

The interesting thing about the *Lespedeza* record is that this is the first report of this phenomenon from the large and widely distributed family of Leguminosae (using the name in the old sense) that has come to my notice. That particular species is common and widely distributed, in dry woods, nearly throughout the eastern United States, and it is strange that no one had noticed ice crystals on it before. But probably most botanists do not get out in the country early enough on frosty mornings to keep up with what is going on in nature.

UNIVERSITY, ALA.

## A representative of the Olacaceae in the Eocene of Southeastern North America

EDWARD W. BERRY

In 1930 I described[1] under the name of *Calycites milanensis* certain unidentified concrescent calices from the upper part of the Holly Springs sand, which is the middle formation of the Wilcox Eocene group along the eastern shore of the lower Eocene Mississippi Gulf embayment, from a locality 1 mile west of Milan in Gibson County, Tennessee. The associated fossils at this outcrop were seeds of *Anona robertsi;* pods described as *Leguminosites astragaliformis;* leaflets of *Mimosites variabilis*, *Canavalia eocenica* and *Sophora wilcoxiana;* and leaves of *Apocynophyllum sapindifolium* and *A. wilcoxense.*

Some months ago Dr. Roland W. Brown sent me specimens of calices of the existing *Heisteria acuminata* and a leaf of *Heisteria concinna* and called my attention to the similarity of the former to *Calycites milanensis.* I have recently canvassed all of the existing material of Heisteria in the National Herbarium and the conclusion is irresistable that *Calycites milanense* represents a lower Eocene representative of the genus Heisteria.

The plants associated with these calices are listed above and it is obvious that the two species ascribed to the genus Apocynophyllum are the only ones worth any consideration in the present connection.

The leaves of the modern species are somewhat variable even within the limits of a single species such, for example, as *Heisteria costaricensis* Donnell Smith from Costa Rica, but there are quite a number of species: *concinna*, *costaricensis*, *flexuosa*, etc. with leaves almost identical with those fossil ones named *Apocynophyllum sapindifolium.* This species was described from the Wilcox of Louisiana by Hollick in 1899 and in my subsequent work on the Wilcox was discovered at 28 different localities along both the eastern and western shores of the Eocene embayment.

There can be slight doubt but that these leaves are the leaves of the same botanical species as that which furnished the calices and I feel so sure of this that I propose that both leaves

[1] Berry, E. W. U. S. Geological Survey Prof. Paper 156, p. 142, pl. 49, figs. 6–8, 1930.

and calices shall now be referred to Heisteria under the oldest name—that proposed for the leaves, as follows:

*Heisteria sapindifolia* (Hollick) Berry

*Apocynophyllum sapindifolium* Hollick in Harris and Veatch. A preliminary report on the geology of Louisiana, p. 288, pl. 46, fig. 3, 1899.

Berry, U. S. Geol. Survey Prof. Paper 91, p. 344, pl. 102, fig. 1; pl. 108, fig. 5, 1916; Idem., 156, p. 129, pl. 19, figs. 13, 14; pl. 44, fig. 19, 1930.

*Calycites milanensis* Berry, Idem., p. 142, pl. 49, figs. 6-8, 1930.

The figures of Calycites cited show the size of the concrescent calyx with parts of the characteristically shaped margin and the central scar where the fruit was attached. In size, shape, scar, texture and character of the calyx there is exact agreement with the calices of existing species, such as *Heisteria acuminata, costaricensis* and a number of other Central American forms.

The genus Heisteria, or Hysteria as it is sometimes spelled, contains over a score of existing species of trees almost wholly confined to tropical Central and South America, but sparingly represented in tropical west Africa. The leaves vary from linear-lanceolate to ovate-lanceolate, with regularly spaced camptodrome secondaries, in some species, e. g. *Heisteria flexuosa* Engler from Brazil, these are comparatively straight, abruptly camptodrome with flat arches subparallel with the margins, and inosculating intermediate veins subparallel with the secondaries, and constitute a type which might easily be confused with the leaves of the Apocynaceae. Others less abruptly camptodrome leaves are exactly like *Apocynophyllum sapindifolium* in size, outline, and venation, both secondary and tertiary.

The existing Heisterias with wider and larger leaves and those seen from West Africa have much more emphasized secondaries which give them a wholly different aspect. As currently treated Heisteria constitutes the tribe Heisterieae, of that interesting and rather imperfectly understood family the Olacaceae, which has scarcely been known to be represented in the geological record. So far as I know no fossils had ever been referred to the family until 1933 when Reid and Chandler described[1] the endocarps of a species of *Olax* Linné—an old world

[1] Reid, E. M. & M. E. J. Chandler, The London Clay Flora British Museum (Natural History), 1933.

genus, and 2 species of *Erythropalum* Blume—an Indo Malayan genus. All three are from the London clay of Ypresian age which is, as nearly as intercontinental correlations can be made, the same age as the Wilcox Eocene of southeastern North America.

In Engler's scheme the Olacaceae were placed along with the Loranthaceae, Santalaceae, Myxodendraceae, Grubbiaceae and Balanophoraceae in the order Santalales, between the Proteales and Aristolochiales. In Hutchinson's more recent treatment (1926) the order Olacales is proposed for the two families Olacaceae and Opiliaceae and placed between the Celastrales and Santalales and the phylogenetic relationships are, I believe, accurately expressed as follows:

$$\begin{tikzcd} & & \text{Santalales} \\ \text{Rhamnales} & & \text{Olacales} \arrow[u] \\ & \text{Celastrales} \arrow[ul] \arrow[ur] & \end{tikzcd}$$

This corresponds much more closely with morphology and the known as well as surmised geological history than Engler's ideas do. The family Olacaceae, as now understood, contains between 20 and 25 genera and less than 150 species of shrubs and trees divided into 3 subfamilies all of which are represented in the tropics of both the old and the new worlds. There are 6 monotypic genera—one each in Borneo, Mauritius and the Amazon basin and 3 in Africa. There are 5 genera with about 23 species confined to America, 6 genera with about 16 species confined to Asia and 4 genera with less than 10 species confined to Africa. The genera Aptandra, Heisteria and Ptychopetalium with about 30 species are confined to America and Africa. Schoepfia with about a score of species is confined to America and Asia, Ximenia occurs in South America, Africa and Asia, Strombosia ranges from Africa to Malaya, and Olax with about 30 species extends from Africa to northern Australia. So far as I know this is the only genus that reaches Australia, and if true would seem to indicate that the Olacaceae did not take part in the Upper Cretaceous radiation of dicotyledonous floras. At the same time the existing distribution of the family is as good proof of its having had an extensive geological history as if the actual records had been uncovered in the rocks.

Johns Hopkins University
Baltimore, Md.

## Lilaea subulata in Washington

W. C. Muenscher

The monotypic genus Lilaea of the Najadaceae is represented by the west American species, *L. subulata* Humb. and Bonpl., commonly called flowering quillwort. It is said to occur in fresh or brackish water of lakes or slow streams from British Columbia to South America. It has been reported from Somas River, Vancouver Island, B. C., and Oregon[1,2] but none of the floras covering the region[2,3,4] credit this species to Washington State.

*Lilaea subulata* was found, in association with *Lilaeopsis occidentalis* C. and R., between *Scripus americanus* Pers., on tidal mud flats near the mouth of the Nooksack River at Marietta Whatcom County, Washington. Growing in streams, left in the intertidal area which is subject to periodic inundation by brackish water, were *Ruppia maritima* L. and *Zannichellia palustris* L.

The Marietta station appears to be the first recorded from Washington and closes a wide gap in the known range of this species. Flowering and fruiting specimens collected by the writer at Marietta, No. 7680, June 28, 1937 and No. 7681, July 28, 1937, have been deposited in the herbarium of Cornell University.

1. Henry, J. K., Flora of Southern British Columbia and Vancouver Island. Toronto, 1915.
2. Piper, C. V. and R. Kent Beattie. Flora of the Northwest Coast. 1915.
3. Piper, C. V. Flora of the State of Washington. Contr. U. S. Nat. Herb. 11. Washington, D. C., 1906.
4. Jones, G. N. A Botanical Survey of the Olympic Peninsula, Washington. University of Washington Publ. in Biology, 5: 1936.

## FIELD TRIPS OF THE CLUB

### Trip of August 6–8 to Mount Marcy

Dr. Alfred Gundersen of the Brooklyn Botanic Garden gives the following report on the week end trip in the northern Adirondacks, including a climb of Mount Marcy with the joint leadership of himself and Dr. Lloyd Rider:

"I have been above timber line many times in Norway, in Switzerland and in the Rockies, but in the eastern states only on Mount Moosilauke, in the White Mountains. The thrill of Mount Marcy to the members of our party was very great, though near or beyond the limit of endurance to the older members.

"On the summit of Slide Mountain, in the Catskills, is a quotation from Burroughs, 'Here the words of man dwindle,' which would apply even more strongly to Marcy. Recommended as an antidote to race and war ideas."

"Remarkable resemblance between Norwegian and Mount Marcy alpines. Particularly interested to see the yellow lichen *Rhizocarpon geographicum*, which presumably covers all summits between New York, Alaska and Norway. The Norwegian *Lycopodium Selago*, larger and less green. *Empetrum nigrum*, *Diapensia lapponica*, *Rhododendron lapponicum*, and *Vaccinium uliginosum*, very similar in the two regions. The sudden change of vegetation on coming on the Summit of Marcy contrasts strongly with Norway conditions."

The party numbered ten, including Dr. Gundersen, Dr. Rider, Dr. George Wood and members of their families.

### Trip of Sunday, August 29, to the Ellenville Ice Caves

Mr. Fred R. Lewis, leader of the trip to the Ice Caves on the Shawangunk Mountain, near Ellenville, N.Y., reports on it as follows:

"One of the objectives of this trip was fossil footprints (which Mr. Lewis had reported finding many years ago). We failed to locate them, but found fossil sea worms in North Gully. (Perhaps graptolites, which are recorded in the geological literature, as in the shales included in the Shawangunk Grit.) The Ice Caves are very interesting; there are five or six fissures, one or two to ten feet wide and one 200 feet across. They are from 30 to 150 feet deep, with smaller fissures going to unknown depths. They are on the westerly slope of the mountain between Ellenville and Pine Bush, the same mountain that Sam's Point is on.

"We found a rare species of the *Hydnum* fungus, new to me, and so far unidentified. The mountain flora included as a prominent element *Solidago graminifolia*, 'Mountain Tea' the natives call it. There were two species of holly, *Ilex opaca* and *Ilex vomitoria*. Among the many lichens noted at the Ice Caves was an abundance of *Evernia furfuracea*, not a common species, and a few specimens of *Mycoblastus sanguinarius*, also rather infrequent.

### Trip of August 29 to Washington Valley and Watchung, N. J.

Thirteen members and 10 guests were present on this all-day excursion. Trips to this same locality under the same leadership in previous years had been in spring; this year's trip was the first one to this marvellously rich locality to study the summer aspect of the vegetation. Portions of the First Watchung (alt. 515 feet at this point) and of the second Watchung Mountain (alt. 552 feet at this point) were climbed, sometimes along old wood roads and at other times through the overgrown fields and tangled woods themselves. Among the interesting phanerograms observed were *Hypopitys lanuginosa*, *Corallorhiza maculata*, *C. odontorhiza*, *Ilex verticillata* var. *padifolia*, *Chimaphila maculata*, *Vitis aestivalis*, *V. cordifolia*, *Gerardia purpurea*, *G. paupercula*, *Helianthus strumosus*, *Lappula virginiana*, *Lycopus americanus*, *Menispermum canadense*, *Aster schreberi*, *Monotropa uniflora*, *Mitchella repens*, and *Liatris spicata*. In the shale and sandstone valley between these two Triassic basaltic ridges (alt. of valley about 304 ft.) were collected *Cathartolinum medium*, *Polygala verticillata*, *Paspalum laeve*, *Sarothra gentianoides*, *Cynthia virginica*, *Veronicastrum virginicum*, *Doellingeria umbellata*, and *Helenium latifolium* in great abundance, as well as the interesting naturalized exotics *Salix purpurea*, *Elaeagnus umbellata*, *Berberis thunbergii*, *Pinus sylvestris*, *Hemerocallis fulva* var. *kwanso*, *Perilla frutescens* var. *crispa*, and *Coreopsis grandiflora* var. *pilosa*. Indian-grass (*Sorghastrum nutans*) was at its prime, and rendered the fields a spectacular sight. Seven species of tick-trefoil were identified, *Desmodium paniculatum*, *D. rotundifolium*, *D. marylandicum*, *D. canescens*, *D. ciliare*, *D. nudiflorum*, and *D. grandiflorum*. The differences in growth and structure between *Cuscuta gronovii* and *C. coryli* were pointed out. Among the interesting cryptograms identified were *Osmunda spectabilis*, *Botrychium obliquum*, *B. virginianum*, *Selaginella apus*, *Diphyscium sessile*, *Fissidens taxifolius*, *Trichoglossum hirsutum*, *Clavaria pistillaris*, *Hypomyces hyalinus*, *Fistulina hepatica*, *Boletus felleus*, *Lycoperdon pyriforme*, and *Geaster hygrometricus*. Interesting ecological lessons were observed in areas which were formerly fenced-off pastures and orchards—the fences and fruit trees long since gone, but their sites now accurately marked by dense growths of certain berry-producing species of wild plants, the seeds of which had unquestionably been dropped there by perching birds when the fences and fruit trees were still extant. The kindness and courtesy of Mrs. Richard Moldenke in allowing members of the party to visit "Castle Elsinore," one of the very few Old World style castles to be found in America, was deeply appreciated.

H. N. Moldenke

## Trip to the Green Mountains
## September 4, 5, and 6

Three members and 5 guests were present on some or all of the excursions which comprised this Labor Day week-end trip. Headquarters were established at Jamaica, Vt., and from here excursions were made by car and by foot to various portions of Windham, Bennington, and Windsor Counties, Vt., and Cheshire Co., N. H. Bromley Mountain was climbed to an altitude of about 3200 feet and a breath-taking view of Stratton and other majestic peaks obtained. On another day the old Coolidge homestead at Plymouth was visited and the lovely chain of lakes about Tyson. The intriguing mysteries of a northern sphagnum bog were explored. Among the interesting plants collected were *Elymus canadensis*, *Andropogon provincialis*, *Asplenium viride*, *Camptosorus rhizophyllus*, *Circaea alpina*, *C. canadensis*, *Lobelia cardinalis*, *Spiranthes cernua*, *Rhus typhina* f. *laciniata*, *Sicyos angulata*, *Mnium punctatum* var. *elatum*, *Fontinalis antipyretica* var. *gigantea*, *Solidago rugosa* var. *villosa*, *Rubus canadensis*, *R. pubescens*, *Viburnum cassinoides*, *Eupatorium purpureum* var. *maculatum*, *Coeloglossum bracteatum*, *Allium tricoccum*, *Scutellaria epilobifolia*, *Matteuccia struthiopteris*, *Bidens cernua*, *Sanguisorba canadensis*, *Scirpus cyperinus* var. *pelius*, *Peramium pubescens*, *Corydalis sempervirens*, *Coptis groenlandica*, *Dasystephana andrewsii*, *D. linearis*, *Equisetum palustre*, *Chrysosplenium americanum*, *Taxus canadensis*, *Aralia hispida*, *A. racemosa*, *Bilderdykia cilinodis*, *Dulichium arundinaceum*, *Mentha arvensis* var. *canadensis*, *Sorbus americana*, *Muhlenbergia sobolifera*, *Cicuta bulbifera*, and, of course, the very abundant *Lysimachia terrestris*, *Viburnum lantanoides*, *Lonicera canadensis*, *Aster acuminatus*, *Clintonia borealis*, *Cornus canadensis*, and *Streptopus roseus*. In the larch-sphagnum bog *Sarracenia purpurea* and var. *heterophylla*, *Kalmia polifolia*, *Chamaedaphne calyculata*, *Chiogenes hispidula*, *Andromeda polifolia*, *Blephariglottis psycodes*, *Eriophorum virginicum*, and *Nemopanthus mucronata* were found in great abundance. Among the clubmosses identified were *Lycopodium flabelliforme*, *L. lucidulum*, *L. clavatum* and var. *monostachyon*, *L. annotinum*, and *L. obscurum* and var. *dendroideum*. The kindness of Miss E. M. Kittredge and Mrs. F. F. Doubleday, of the Vermont Botanical Club, in guiding the party to some of the prize spots for rare species was deeply appreciated.

H. N. Moldenke

## Labor Day Week-end Trip to the Pine Barrens of New Jersey

The objective of this trip was to visit some of the so-called "ghost towns," as well as some of the outstanding botanical localities of the Pine Barrens. The ghost towns were formerly actively engaged in the manufacture of bog iron, or associated industries. Some, like Lakehurst, survived by one means or another; others, like Atsion, are reported to be actually haunted by one or more ghosts, while still others, such as Calico, are now only place names on the map. We visited Mt. Misery, Hampton Furnace, Pleasant Mills (Sweetwater), West Mills, Batsto, "Washington," Jenkins Neck, Harrisville, and Martha in addition to those mentioned above. Besides these places, Bispham's Mill Creek, Skits Branch, Nancy Geiffert's one time farm, and a large savanna along Mechescatauxin Branch were found to be profitable collecting places.

Any visit to the pine barrens finds it characterized by some botanical aspect such as the conspicuous flowering of some species. We noticed the frequency of Gerardia (purple and yellow), Polygala, Polygonella, Sabatia, Lobelia, Bidens, Liatris, Utricularia, Aster, Chrysopsis, Solidago, Lycopus, and Eupatorium. Species less frequent and perhaps more noteworthy were *Decodon verticellaris*, *Bartonia penniculata*, *B. virginica*, *Breweria pickeringii*, and *Eupatorium resinosum*. Two striking grasses of the wet places were *Calamagrostis cinnoides*, and *Erianthus saccharoides*. Such familiar favorites of the region as *Lygodium palmatum*, *Schizaea pusilla*, and *Gentiana porphyrio*, and *Narthecium americana* (Abama) were seen.

One of the pleasantest parts of the trip was a visit to the stockrooms of James Bassett and William Bassett who market certain pine barren plants through the florist trade. On Sunday night we saw some Kodachrome pictures of the pine barrens as they appear at other seasons.

John A. Small

## Trip of September 11 to Belmont Lake State Park

The field trip to Belmont Lake State Park, north of Babylon, L. I., led by Miss Farida A. Wiley of the Department of Education, American Museum of Natural History, proved to be very interesting. The trip followed around the lake in the Park and along Carlls River, the stream which enters it from the north and flows south into Great South Bay, for the study of wet forest and aquatic plants.

A notable feature of the fern flora is the presence of frequent stands of both species of the Chain Fern, *Woodwardia* (*Anchistea*) *virginica*, and *Woodwardia* (*Lorinseria*) *areolata*, along the well designed and well maintained Nature Trail, on the east side of the lake; and along the stream above and below it. The Massachusetts Fern, *Aspidium simulatum*, is also more abundant than at any other station I recall in our range. The New York Fern, *Aspidium noveboracense*, and the Cinnamon and Royal Ferns are also abundant.

An interesting inhabitant of the shores of the lake was *Lythrum salicaria*, the Purple Loosestrife, common along the Hudson but not hitherto recorded, as far as I know, from Long Island. It is said to have been transplanted by the Long Island State Park Commission's landscape gardeners, from the Hudson. It is doing very well, and already spreading naturally downstream, and will probably establish itself in fresh and brackish marshes around Great South and Moriches Bays in the course of time, which will add to summer floral associations.

In the brook, at the bridge west of the Nature Trail was found *Callitriche palustris*, and around the shores of the pond, where the water had fallen a little, stranded plants of *Ludvigia palustris*. Another interesting aquatic, which Miss Wiley found in the pond on Park Avenue, Babylon, at the south end of the Park, and which some of us found on the way home, in a partly dried pond on Grand Avenue, Wyandanch, north of the Park, was *Heteranthera reniformis*, the Mud Plantain, with small, kidney-shaped leaves, and pretty little bluish-white flowers, an attractive little plant. This pond at Wyandanch looks as if it would merit attention on another field trip next year, for a variety of aquatics. The region along this stream, rising north of the railroad at Wyandanch, following it south, through the dry pine and oak woods, reaching the brook wherever possible through a tangle of catbriar, to the lake, and south to the salt marshes on Great South Bay would give an interesting cross section of Long Island vegetation.

A stately adventive herbaceous plant, at the dam of the lake in the Park, was *Artemisia absinthium*, the Wormwood. The Nature Trail is worthy of close study, with many shrubs labelled. The inkberry, *Ilex glabra* is plentiful and well fruited. Around the north end of the lake are typical Leatherleaf bogs, with *Drosera rotundifolia* and *Sarracenia purpurea*. A well made path, the Belmont Trail, follows the stream south from the lake to another pond on Park Avenue, Babylon. It would make an easy and rewarding botanical ramble at any season of the year.

RAYMOND H. TORREY

## TRIP OF SEPTEMBER 12 TO BEAR MOUNTAIN

Seventeen persons attended the field trip of Sunday, September 13. The morning was spent on the Nature Trail and at the Trailside Museum at Bear Mountain. In the afternoon the party botanized along the foot of the slope leading to the summit of Anthony's Nose. A fairly large colony of *Xanthoxylum americanum*, the Toothache Tree, was found on the slope between the highway and the Hudson, and a little north of the Bear Mountain Bridge, under conditions which indicated that it had been originally introduced. Large bunches of *Vitis vulpina*, the River-bank or Frost Grape, with their blue acid berries, festooned the banks, and in the woods and along the main highway several interesting plants were found, such as *Bidens bipinnata*, *Chenopodium hybridum*, *Trichostema dichotomum*, *Acalypha virginica*, *Hedeoma pulegioides*, *Pilea pumila*.

Arthur H. Graves

## Trip of September 26 to Owen, New Jersey

Some 25 members of the Torrey Club and the American Fern Society parked their cars along a road near the tiny hamlet of Owen, Northern Sussex County. After passing several barbed-wire fences we proceeded to a fern survey at the large wooded swamp. The particular locality was not remarkable for its fern hybrids, probably because it is too densely wooded, and because of the extensive cattle grazing. However, two distinct *Dryopteris* hybrids of the *Boottii* type were found.

The most abundant fern was probably the "*fructuosa*" variety, usually described as *Dryopteris spinulosa*, and possibly a cross between *D. intermedia* and *D. spinulosa*. Also of interest was the presence of *Dryopteris simulata*, this being a new station for this species, although Mr. Edwards has found it several times in the country.

In the afternoon, under the leadership of Mr. Edwards, the party traveled across country to the region of Andover. There in a very restricted swamp several interesting fern species were found—*Pellaea glabella* together with *P. atropurpurea; Athyrium pycnocarpon*, the narrow-leaved spleenwort, which is decidedly rare in this state; *Dryopteris goldiana*, with a single plant of the *goldiana* x *marginalis* hybrid.

## Trip of October 22–24 to Mohonk Lake, N. Y.

The fall outing of the Torrey Club to this beautiful Shawangunk Mountain resort was enjoyed by 33 members and guests.

In spite of unfavorable weather there was much of interest to be seen and done.

On both Friday and Saturday evenings there were three blossoms of the tropical night blooming cereus to be seen in the large Mohonk Greenhouse. This was a new sight to many of the group and was thoroughly enjoyed. There are three large plants, one of which is over sixty years old. Each summer they are kept outdoors from May until October where they bloom regularly, sometimes having as many as 29 blossoms in one night. The blossoms remain open only a few hours before wilting. They give off a rich heavy scent. The broadly flattened stem and absence of true leaves makes this cactus particularly noteworthy.

On the way to the greenhouse on Friday a noise was heard in a hemlock tree. A flashlight revealed an oppossum hanging on the under side of a low branch. In the corner of his mouth were the tail feathers of a junco, just disappearing from sight. Evidently he had caught the bird from its roosting place at the end of the branch.

Saturday morning was rainy. Seven completed a 4 mile hike along the northwest side of the mountain, passing through the deer paddock where about twelve deer and fawns were seen. A stop was made at the old log cabin which was built about 1770. In the afternoon some visited Sky Top Tower where the forest fire observer is stationed, while others enjoyed the extensive natural history library of the Smiley family.

On Saturday evening the leader projected a number of his Kodachrome lantern slides showing scenery around Lake Mohonk. Some of the scenes in the Mohonk garden and shots in the "sugar bush" were of particular interest.

On Sunday morning 3½ miles were covered, including a visit to Rhododendron Swamp. On the way home there was a brief snow squall.

The following botanical notes seem worth recording. Various mosses were collected including some good specimens of *Fontinalis gigantea*, *Polytrichum piliferum*, *Georgia pellucida* and *Thelia asprella* (sp?). Liverworts were in fine condition; only the following genera were identified, *Pallavicinia* and *Scapania*. *Cetraria fahlunensis* var. *frostii* was especially beautiful in color because of its wet condition. *Asplenium platyneuron* and

*Asplenium montanum* were noted. *Nyssa sylvaticum* was found in fruit. The alleged date-like taste of the drupes was not detected. The only plant of *Rhus vernix* which is known on the estate was seen. *Ilex verticillata* and *Ilex montana* were observed in fruit. *Adlumia fungosa* seemed to be a new plant to some. The fruit of *Gaultheria procumbens* were especially large, and tasty! The following asters were noted, *Aster acuminatus, lowrieanus, divaricatus, novae-angliae, vimineus* and *tradescanti*. *Solidago caesia* was the only goldenrod found in bloom. The following species had gone to seed: *Solidago graminifolia, latifolia, arguta, erecta,* and *nemoralis*.

DANIEL SMILEY, JR.

## TRIP OF DECEMBER 5 TO LAKEHURST, IN THE PINE BARRENS

The brooks in the Pine Barren area of Southern New Jersey, around Lakehurst, Ocean County, were seen by the members of the club to be running full of cranberries. Continued rains had flooded the cranberry bogs and floated the spoiled and many good berries missed by the pickers some weeks before, over the dams, and the dark, tea-colored streams, running over their banks, bore millions of the scarlet fruit.

Lichens, at this season, were of interest, and in good condition after wet weather. Some color was given, among flowering plants, by the slender, dark red, racemed fascicles, of the flower buds of the Stagger-bush, *Lyonia mariana*, and buds of the same color, in umbels, of the Sand Myrtle, *Leiophyllum buxifolium*.

Cladoniae were the chief object of study among the lichens, including tall, robust *C. sylvatica*, along edges of woods in swamps; *C. caroliniana*, ff. *dilatata* and *dimorphoclada*, *C. uncialis* and the common Pine Barren *cladina*, *C. tenuis*, always identifiable by its frequent fertile condition, with numerous tiny brown apothecia, whereas all the other larger, densely branching species of this genus in the Barrens are sterile. *C. squamosa*, f. *levicorticata*, m. *rigida*, was, as usual in the Barrens, frequent, and it seems to flourish there, although it is very widely spread in eastern North America, occurring on the high summits of the Adirondacks, New England, Maine and Gaspe, and ranging in altitude from a few feet above tide to over 5,000 feet.

One of the best finds among the Cladoniae was another station for *C. floridana*, in the smooth f. *esquamosa*. The extension of the known range of this species in the past ten years has been interesting, and suggestive that many reported plant ranges may be incorrect, owing to lack of extensive search by botanists acquainted with them. Plants from North Carolina and Alabama, under the name of *C. santensis*, b. *beaumontii*, described by Tuckerman, in his Synopsis of North American lichens, 1882, probably included what is now defined as *C. floridana*, according to C. A. Robbins, in Rhodora, July, 1927, in a paper resolving confusion among *C. floridana*, *santensis* and *beaumontii*. Plants from South Carolina, collected by S. C. Ravenel, sent to Tuckerman, and named *C. santensis* by him, also were C. floridana.

*C. beaumontii* is not reported north of North Carolina. I found it in a cypress swamp at Manteo, N. C., in 1936. *c. Santensis*, long unknown north of South Carolina, has lately been found in many places in Ocean, Atlantic, and Burlington Counties, N. J. *C. floridana*, named for its originally known stations in Florida, was known only along the coastal plain north to Maryland and Massachusetts up to 1927, when Robbins wrote his paper in Rhodora. I have found it since in half a dozen places in southern New Jersey, and in two places on Long Island. But the most surprising new location, 70 miles from the coastal plain to which Robbins and others regarded it as limited, was on Shawangunk Mountain, near High Point, Sullivan County, N. Y. It was found, by the writer, September, 1937 in ff. *esquamosa* and *typica*, along blueberry pickers' paths for half a mile on the way from the end of the fire truck road, below the fire tower, toward the Ice Caves, at an altitude of about 2,100 feet.

The occurrence of what had been supposed to be a coastal plain Cladonia, so far from and above the sea, suggests speculation as possible reasons. One might suppose analogies in the presence on the Shawangunks, on Gertrude's Nose, near Lake Minnewaska, at 1500 feet, of *Corema Conradii*, also generally a coastal plain plant; and of *Chamaecyparis thyoides* in high swamps on Kittatinny Mountain, N. J., at 1600 feet, although it is generally limited to the swamps and stream courses of the coastal plain from New Hampshire to Delaware. To invoke extension of the sea coast in recent geological times to explain these curious stations, would do violence to the geological record but the occurrence of three plants, a gymnosperm, an angiosperm and a lichen, in such stations, far from normal ranges, is intriguing.

## Easter Field Trip to Wilmington, North Carolina
## April 16–18, 1938

The Southern Appalachian Botanical Club, and the Torrey Botanical Club, will join in an Easter field trip in the vicinity of Wilmington, N.C., April 16–18. It will be under the leadership of Dr. B. W. Wells, of Raleigh, N.C., who offers the following itinerary:

Saturday, April 16, meet at 9 A.M., in the lobby of the Cape Fear Hotel, Wilmington, N.C. Trip to Southport with stops en route to study wire grass savannahs, pocosins (shrub bogs), station for *Dendrium buxifolium*. Lunch at Southport. Afternoon, excursion to Fort Caswell, salt marshes, low dunes on south facing beach;—weather and tide permitting, trip to Smith Island.

Sunday, April 17, leave Cape Fear Hotel, at 9 A.M., for Burgaw, N.C., 25 miles north of Wilmington; visit the great Angola Bay, a peat bog 15 miles wide, and the Big Savannah, perhaps the finest example of the savannah type of community in the South. Visit White Lake, of supposed meteoric origin, near Elizabethtown.

Monday, April 18, leave hotel at 9 A.M. for Carolina Beach, stopping at Greenfield Park, with cypress-filled lake, and studying the xeric vegetation (*Selaginella acanthonota* and other peculiar species) of old bars on the way. Spend afternoon in survey of vegetation of lower Cape Fear Peninsula, which will include the recent evidence of Wells and Shunk showing the major role of sea spray in determining the nature and form of dune plants, rather than the wind per se. A transect of the peninsula will be studied, to note recent physiographical studies recorded by the vegetation. *Dionaea* may be seen at many places.

It would require leaving New York early Friday, April 15, or Thursday evening, April 14, to reach Wilmington for the start Saturday morning; and those wishing to reach home on Tuesday, April 19, could leave the party Monday afternoon or stay over another day as desired. The shortest automobile route is via Route 25 to Camden, N.J. then to Pennsville Ferry, Route 13 through Delaware, Maryland and Virginia to Prince Charles, ferry to Norfolk, and Route 17 via Windsor and Washington, N.C., to Wilmington.

## NEWS NOTES

John Kunkel Small, chief research assistant and curator of the New York Botanical Garden, died of heart disease on January 19 in his sixty eighth year. Dr. Small was the author of the Manual of the Southeastern Flora, the standard work for the region. He published fully illustrated volumes on the ferns of Florida and of the vicinity of New York and had in preparation fern books to cover every section of the United States. In his collecting in the southern states, especially along the Gulf Coast, he discovered many new species of iris, some of which are now being cultivated. His published papers amount to more than 400. He graduated from Franklin and Marshall College in 1892 and received his doctor's degree from Columbia University in 1895. From 1895 till 1899 he was curator of the herbarium at Columbia, then joined the staff of the recently formed Botanical Garden and was prominently connected with the Garden from that time till his death.

At the meeting of the Botanical Society of America held during Christmas week in Indianapolis the following officers were elected for the coming year: President, A. J. Eames, Cornell University; Vice-president, W. J. Robbins, New York Botanical Garden; Secretary, G. S. Avery, Duke University; Treasurer, F. E. Denny, Boyce Thompson Institute; Editor of the Bulletin, J. R. Schramm, University of Pennsylvania; Representative on the National Research Council, E. W. Sinnott, Barnard College, Columbia University; Alternate Representative N. E. Stevens, Bureau of Plant Industries, Washington.

The American Institute has awarded its gold medal to Dr. William Crocker, of the Boyce Thompson Institute for "his contribution to knowledge of life processes in plants and for his unique leadership in the organization of diverse sciences and techniques in plant research." Dr. Crocker is responsible for the organization of the Boyce Thompson Institute and has been director since its organization in 1921.

Huntington College, Indiana, has issued a report of the botanical garden and arboretum established in 1935. The report lists 456 species of plants now growing in the garden. There is also given a series of notes on the growth of a number of plants which have been planted in entirely different habitats from those in which they originally grew. Some of these plants, such as *Acorus calamus*, were taken from swamps to dry upland and have grown normally for two years.

In order to make more permanent the research in the relation of the growth of tree rings to climate, which Dr. A. E. Douglass has carried on for years, the University of Arizona plans to establish a permanent laboratory with Dr. Emil Haury, professor of anthropology and Dr. Edwin F. Carpenter, professor of astronomy, collaborating with Dr. Douglass.

The Cornell Alumni News has the following note: "Dr. Liberty Hyde Bailey, Agriculture, Emeritus, seventy-nine years young, has returned to his Hortorium in Ithaca from exciting adventures in the West Indies. During a trip to collect palms in some of the uncharted islands of the Bahamas, he and a companion were caught in a tropical storm at sea in an eighteen-foot open skiff, without food or water for five days and four nights, and were raked with gunfire in a native brawl. 'But I got what I went after,' Dr. Bailey says."

Dr. Eugene C. Auchter has been appointed Chief of the Bureau of Plant Industry of the U.S. Department of Agriculture, succeeding Frederick D. Richey, who resigned to engage in professional corn breeding. Dr. Auchter graduated from Cornell University in 1912 and received his doctorate there in 1923. From 1912 to 1917 he was a member of the West Virginia Experiment Station. From 1918 to 1928 he was head of the Department of Horticulture at the University of Maryland, since and has been head of the Division of Fruit and Vegetable Crops and Diseases of the Bureau of Plant Industry.

Dr. Roland Harper has sent us a note from a Sacramento paper, stating that 45 tons of granulated borax had been received by the County Agricultural Commissioner on Sonoma County to be used in the control of Klamath Weed. This weed is our familiar St. John's Wort, *Hypericum perforatum*. In Jepson's Manual of California Plants the statement regarding this plant is "European weed, becoming a pest in abandoned or poorly tilled fields in the hill country of northern California."

Dr. Harper also asks if any of our readers have seen this plant in the southern states.

In our last issue we asked if any of our members knew of a plant called Wild Isaac. Dr. E. B. Harger, President of the Connecticut Botanical Society writes as follows: "When I was a boy about 1880 this name was commonly applied in this region to the species of *Pycnanthemum*, but I do not remember that they were distinguished as broad or narrow leaved. I remember a discussion as to whether the name was "Wild Isaac" or "Wild (H)yssop" and that my grandfather cited the case of Isaac Chatfield, who was noisy and demonstrative and his demure wife Sarah, and were known as Wild Isaac and Tame Sary."

The 1937 prize of the American Association for the Advancement of Science was awarded at the December meeting in Indianapolis to Dr. Philip R. White of the Rockefeller Institute for Medical Research, Princeton, N. J., for his paper "Root Pressure—an Unappreciated Force in Sap Movement," presented before the Physiological Section of the Botanical Society of America on December 28. It is interesting to recall that the prizes for 1935 and 1936 were also awarded for work on plants,—that of 1935 to Drs. Zimmerman and Hitchcock for their paper on Plant Hormones and that of 1936 to Dr. Stanley for his paper on the crystallin protein possessing the properties of tobacco mosaic.

On the 25th of January the Japanese Shinto Shrine in the Japanese Garden of the Brooklyn Botanic Garden was destroyed by fire. Some months before a fire had been started in the shrine, but was discovered and extinguished before it had done much damage. The Fire Department considered the fire accidental; Dr. Gager, director of the garden said, "There is no room for doubt that this was an anti-Japanese demonstration, and the only result of it is to put the museum to considerable expense and to deprive .the city of a unique work." The shrine was built in 1914 by Japanese workmen using Japanese tools, and was of California redwood, held together with wooden pegs.

The annual report of the New York Botanical Garden states that 31 botanists from other cities and countries have engaged in research in the herbarium during the year and more than 16,000 specimens have been loaned to workers in other places. More than 30,000 annual plants were grown in the bed and borders, 1500 new hybrid tea roses were planted in the rose garden, 800 plants of heather added to the Thompson Memorial Rock Garden, over 100 mountain laurels planted in the woodland background of the rock garden, 1,125 rhododendrons and laurels planted in the new rhododendron glade, and about 1,000 trees and shrubs set out in the permanent collections.

Dr. F. E. Gardner of the U. S. Horticultural field station at Beltsville, Md. and Dr. Ezra J. Kraus of the department of botany of the University of Chicago report success in developing holly berries and good quality strawberries by spraying the flowers with a dilute solution of indoleactic acid, one of the hormone-like substances. The method is said to be cheap enough to be commercially practical.

# THE TORREY BOTANICAL CLUB

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# THE TORREY BOTANICAL CLUB



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## Common species of the Mycetozoa

Robert Hagelstein

The fruiting bodies of the Mycetozoa, Myxomycetes, or slime molds appear abundantly about the middle of June, and continue throughout the summer and autumn until cold weather sets in. They are spore carriers, and develop from a creeping, feeding, growing slime called the plasmodium, which is generally regarded as an animal. The plasmodium is formed from small animal-like bodies germinated from the spores under favorable conditions of warmth and moisture. Plasmodia that have not gone into fruit with the approach of freezing temperature will change themselves into a hardened substance called sclerotium, in which inactive condition they will survive the winter, reviving in the early spring and, after a certain period, forming the first fruiting bodies. Often, during the winter in mild weather, these revivals will come and fruitings develop. After the first revival in the spring, the complete cycle will be repeated during the warmer months, and, in many species, several times.

The plasmodia feed mainly upon bacteria of decaying vegetable matter. The fruiting bodies may therefore be sought on old logs, leaves, ground debris, rubbish piles, and similar habitats that are in a moist condition giving rise to sufficient bacterial food. They are fragile, and when collected should be pinned into old cigar boxes into which a layer of corrugated cardboard has been pressed. On arrival home the specimens should be thoroughly dried with the addition of a small amount of ordinary napthaline flakes to avoid the ravages of insects. After that they may be trimmed and glued into small boxes, and will keep indefinitely.

The fruiting bodies exhibit great diversity in shape and color among the different species, and are very beautiful under the microscope. There are three general forms of fructification. The ordinary one is in numerous, small sporangia, either sessile or with stalks, quite uniform in shape and size, and averaging a millimeter or so, although in some species they are larger and may reach a height of 20 mm. Another form is in plasmodiocarps. These are sessile sporangia of irregular shape, sometimes thinly and rather widely effused, or stouter and much elongated, curved, sinuose or in rings. Again they may be branched or netted, the last sometimes covering 20 sq. cm. or more. The third form is in aethalia, which are compound bodies formed by the union of many sporangia and with the walls of the component sporangia more or less imperfectly developed. Aethalia are usually sessile, and of large size, from about 1 cm. to 30 cm.

The Mycetozoa are classified on the characters of the fruiting bodies. More than 50 genera with about 400 species are generally recognized. Obviously, all of them cannot be mentioned in the limited space of this paper—nor can they be fully described—so that only a certain number of the common forms have been selected. The student is likely to find others that cannot be reconciled with the meagre descriptions, and if a small portion, properly boxed and with data, is sent to me, I will be glad to determine it and give any advice desired. The specimen will not be returned.

The higher classification into families, orders, and so on is based on broad, general characters which are herein applied to the genera described, and are present in all species of the genera, whether mentioned or not, unless otherwise stated.

Form of fructification. Fuligo, Tubifera, Enteridium, and Lycogala form rather large aethalia with one or two exceptions not mentioned. In all other genera described, except Ceratiomyxa, the fructification is always sporangiate or plasmodiocarpous.

Spore color. In all genera Nos. 1–12, Badhamia to Lamproderma inclusive, the spores have some shade of violet-brown or purplish-gray when observed through the microscope by transmitted light with a magnification of about 600 diam. In all other genera described, the spores have no purple tints, but are yellow, reddish, olivaceous, or colorless. There are some exceptions in each group which are mentioned when the species are covered in this paper. Spore color, size and markings are important specific distinctions between many species.

Lime (calcium carbonate). This is present in all genera Nos. 1–8, Badhamia to Didymium inclusive. It may be in the stalk, columella, peridium or capillitium; and in all but Didymium it is in the form of minute, rounded granules. In Didymium it is in crystals, usually in or on the sporangium-wall, and rarely elsewhere. The lime may be recognized by crushing a sporangium in water under a cover glass and observing it with the microscope, when the countless hyaline or colored granules or crystals will be seen among other parts of the sporangium. In lime-less forms they are absent. Also, in some species not mentioned, the lime may be in crystalline plates, rhombs, or irregular masses. There is no lime in the remaining genera except occasionally in certain species of Trichia and Perichaena, but there it may be ignored as it is usually regarded as anomalous. With a little experience the student will be able to recognize the calcareous genera—in fact any genus—as generic differences, together with general appearance, are prominent enough to be noticed with a hand lens.

Capillitium. This is the system of threads within the sporangium among which the spores are distributed. It is entirely absent in Cribraria, Dictydium, and Ceratiomyxa. In Tubifera, Enteridium and Lycogala, there is no true capillitium but the imperfect walls of the confluent sporangia are regarded as a pseudo-capillitium. In all other genera mentioned there is a true capillitium, the characters of which often make the generic distinctions.

Peridium. This is the wall of the sporangium enclosing the spores and rupturing at maturity. It may consist of several layers, firm or frail; and persistent for some time, or vanishing rapidly after maturity. In aethalioid forms it is usually called the cortex.

Columella. That part of the stalk or an elongation thereof extending into the sporangium; or, in sessile forms, a supporting structure for the capillitium arising within and from the floor of the sporangium.

## Genus 1. BADHAMIA

The genus is marked by the character of the capillitium which is calcareous throughout. There is also lime in the peridium. Stalks when present are rarely calcareous, and columellae are not common among the 17 or 18 known species. Several species are fairly common but require microscopical study to separate them. *B. rubiginosa* is abundant and easily recognized. It has obovoid sporangia on stalks about half the total height, and of a uniform reddish-brown or purple-brown color for sporangia and stalks, the latter continuing as columellae. The top of the sporangium breaks away leaving a persistent lower part, or there may be a distinct lid, which brings the species close to the genus Craterium from which it is distinguished by the uniformly calcareous capillitium. It is true, however, that short, hyaline threads are sometimes present in this and other species of Badhamia. *B. rubiginosa* is different in superficial appearance from all species of Craterium.

### Genus 2. PHYSARUM

This is the largest genus of the Mycetozoa, containing perhaps 70 or more species. The capillitium is the important character and consists of a network of hyaline or pale colored threads with expansions filled with lime granules which are called lime-knots. It differs in that respect from Badhamia where the threads are entirely calcareous, although there are intermediate forms which, sometimes, are difficult to place. The peridium in Physarum has lime granules, and they are frequently present in the stalk and columella. The lime is often colored, and specific distinctions are based on that as well as on sporangial shape, stalk, spores, and other characters, In occasional abnormal instances the lime may be scanty or entirely absent. There are many fairly common species among the more abundant of which may be mentioned *P. globuliferum* which is white throughout in stalk, sporangium and lime-knots. The stalk is calcareous and there is a small, conical columella. The capillitium is persistent, which means that when blown free of spores it remains as a globose mass, and it usually has small, rounded lime-knots. *P. nucleatum* is similar with a persistent capillitium, but with a small, central ball of lime instead of a columella. The stalk is non-calcareous and yellowish in color. *P. nutans* and *P. viride* are much alike except in color of the lime in the peridium and lime-knots, which is white in the first and yellow in *P. viride*. The sporangia in both are somewhat flattened or subglobose, and on stalks that may be partly yellowish and grayish or darker otherwise. The capillitium is lax, not persistent, and there is no columella. *P. melleum* is globose and yellow, with a lax capillitium, a white or yellow stalk, and a short columella. The stalk is densely calcareous and the lime-knots are large, white or yellow. *P. cinereum* forms sessile sporangia and elongated or branching plasmodiocarps, ashen-white in color. It is distinguished from related species by the globose paler spores which are almost smooth. *P. sinuosum* forms sessile, laterally compressed sporangia and elongated, sinuose or branching plasmodiocarps, similarly compressed. The color is white to grayish or bluish, and the sporangium splits at the top or ridge to disseminate the spores.

### Genus 3. FULIGO

The fructification is always in sessile aethalia, the component confluent and interwoven sporangia being similar internally to the individual sporangia of Physarum. The common species is *F. septica* which forms large masses, sometimes a foot across, and usually of a yellow color. Occasionally the color runs to dull red or brown, and a white phase in small aethalia is fairly common. The last appears much like *F. cinerea* but may be distinguished by the spores. In *F. septica* these are globose, 6–8$\mu$ diam. In *F. cinerea* they are larger, darker, ellipsoid or subglobose, and more strongly spinulose. Lime in granules is present in Fuligo.

### Genus 4. CRATERIUM

The capillitium is like that of Physarum but the six species are separated therefrom mainly on the goblet-shaped or funnel-shaped, stalked sporangia which have more or less distinct lids. These lids open, and after the spores are dispersed, leave the empty sporangia standing. There are exceptions, of course. The common species is *C. leucocephalum* and its variety *cylindricum*, with sporangia white at the tops, ranging to reddish at the bases and stalks. The variety is more cylindrical in shape. In both the lid is white, convex, and crumbles away; the capillitial lime is usually white, but may be yellow. The next ally is *C. minutum*, which, in the common phase, is uniform in its brown color, and has a lid depressed below the edge of the rim. The lime-knots are white which distinguishes the species from *C. concinnum*, found only on chestnut burs, and brown like *C. minutum* but with yellow or brown lime-knots.

## Genus 5. LEOCARPUS

There is but one species, *L. fragilis*, which is very common and easily recognized. The sporangia are large, up to 4 mm. in total height, obovoid or somewhat lengthened, and of a yellowish to chestnut or purple-brown color. The peridium or sporangium-wall is smooth, shining, tough and brittle, often contracted or shrunken as it surrounds loosely the enclosed capillitium and spores. The lime-knots are large and brown but often faded to white; and together with the spores present a dark appearance, under a hand lens, when the wall has ruptured. The stalks are membranous, yellowish, and weak, so that the sporangia are often recumbent, and arise from a spreading base of the same color, which is called a hypothallus.

## Genus 6. DIDERMA

We now come to a genus in which granular lime will be present in the peridium, stalk, or columella, or all of them together, but not in the capillitium like in Badhamia, Physarum and allied genera. The capillitium consists of hyaline, purplish, or dark purplish threads without lime. The common species, found everywhere on leaves in damp places, is *D. effusum*. It forms white, sessile, flattened sporangia and plasmodiocarps, usually irregular in shape, and the plasmodiocarps often effused like a thin smear. The columella is depressed, in many instances hardly more than a yellowish or reddish-brown inside base. *D. testaceum*, also common on leaves, forms similar depressed sporangia, but they are more circular, and pinkish when fresh, although rapidly fading to white. The columella there is large, convex or hemispherical, and reddish-brown. *D. floriforme* is a stalked form found on very rotten wood. The yellowish stalk is rather stout and long supporting a globose, yellowish sporangium with a tough wall, which, when it opens, splits in a petal-like manner and exposes the almost black, spherical mass of capillitium and spores. Within the capillitium is a large, globose, yellowish columella coming from the stalk. The form, when open and expanded, looks like a miniature flower. The spores have large scattered warts which distinguishes it from *D. radiatum* where similar phases occur, but the spores there have small, uniformly distributed, spines.

## Genus 7. DIACHEA

In this genus of a few species the capillitium is a network of purplish threads without lime-knots. The peridium has no lime and is membranous, and hyaline or iridescent. There is granular lime, however, in the stalk and columella, both of which are usually present. The abundant species hereabouts is *D. leucopodia* having cylindrical, blue or purple, iridescent sporangia with white, brittle, calcareous stalks and columellae. It cannot be confused with any other species of Mycetozoa. There is a globose variety which is close to other globose species of the same genus, and cannot be determined so readily unless in company with the typical form.

## Genus 8. DIDYMIUM

This is one of the four genera of the Mycetozoa in which lime is present in crystalline form. In Didymium it is often in stellate clusters sprinkled on the sporangium-wall, or in a closely compacted layer forming an outer layer of the peridium. The capillitium in nearly all species consists of hyaline or purplish threads without lime in normal developments. Sometimes, when abnormal, there are traces, and in one species, *D. Sturgisii*, it is normal and prominent. Most of the species form sessile sporangia or plasmodiocarps and are seldom collected in this region. Three species having stalks and columellae are abundant and are separated mainly on the differences in those characters. Columellae otherwise are rare. *D. squamulosum* has white, subglobose, umbilicate sporangia on short, white, stalks which usually spread at the bases, and white or yellowish columellae. It also forms sessile sporangia and plasmodiocarps. *D. xanthopus* has more hemispherical, umbilicate, white sporangia on much longer stalks, which are yellow or reddish-brown, translucent, and free from lime. The columella is white. *D. melanospermum* has sporangia like *D. xanthopus* but somewhat larger, on short, dark, opaque stalks, and the columella is dark. *D. xanthopus* and *D. melanospermum* do not form sessile sporangia or plasmodiocarps; and all three species have the lime crystals sprinkled on the sporangium-walls.

## Genus 9. STEMONITIS

In this genus, and in all those that follow it, there is no lime. The fructification in Stemonitis is different from that of all other genera mentioned in this paper except Comatricha, Enerthenema and Lamproderma, which are allied. In Stemonitis there is a solid, black stalk which extends to almost the top of the sporangium as a columella, except in certain confluent forms. The brown capillitium springs from the part regarded as a columella, the outside branchlets united to form a surface net beneath a frail peridium, which latter is rapidly evanescent. The species of the genus do not form sessile sporangia or plasmodiocarps. The sporangia are narrowly cylindrical, and in some instances reach a height of 20 mm. or more. They usually form large colonies, either closely fasciculate or in smaller tufts, and the color in most of the species is some shade of purple-brown. Three species are abundant everywhere, and are distinguished on spore and surface net characters, and somewhat by the color. *S. fusca* is usually dark with a closely meshed surface net. The spores have spines arranged in more or less reticulate fashion. *S. splendens* is usually larger and not so dark, but more of a purplish-brown color. The surface net is coarse, of very large meshes, and the spores are faintly and closely warted without reticulations. *S. axifera* has a reddish, ferruginous color, and the surface net is close, like *S. fusca*, but the spores are almost colorless, nearly smooth, and very small, 4–6$\mu$ diam. The spore color of *S. axifera* is an exception to the general rule of purple tinted spores as mentioned earlier, the tint here being ferruginous. Around these three species are grouped several others having different combinations of the characters mentioned; and

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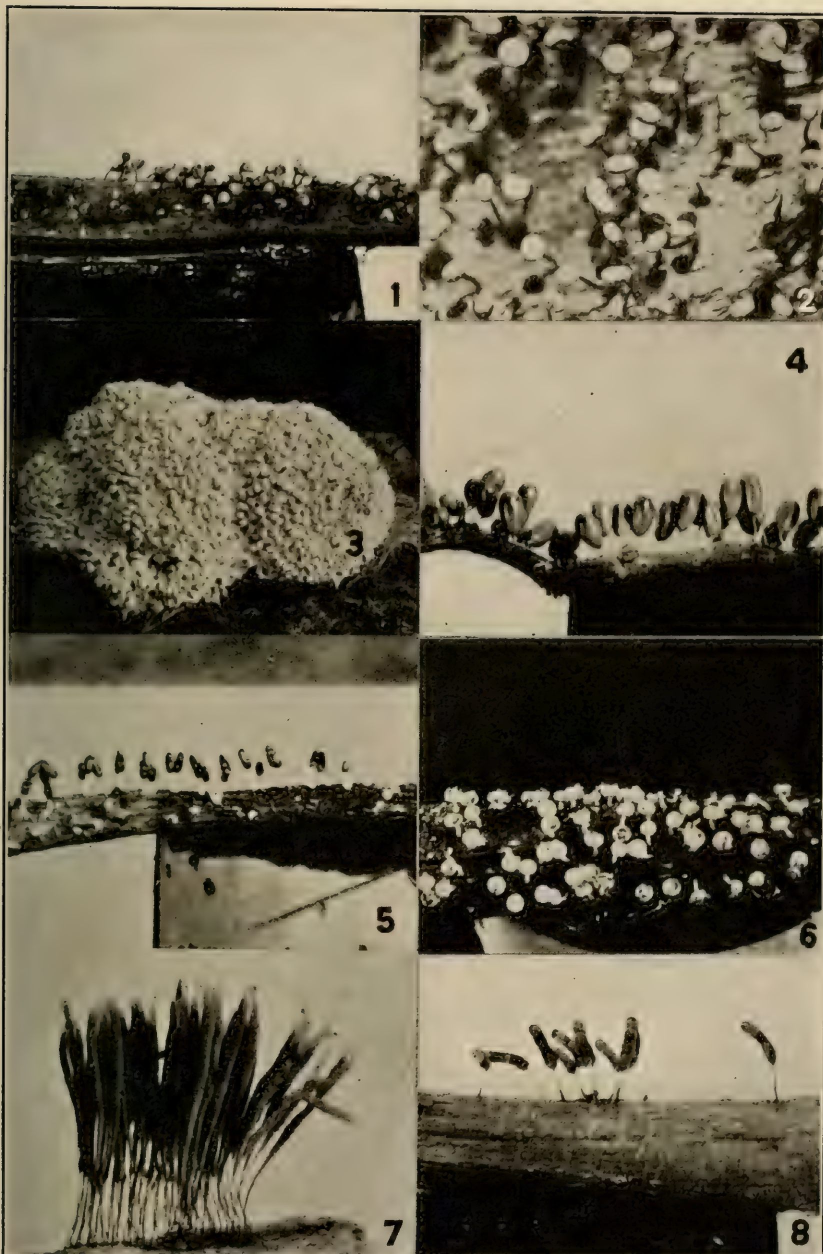
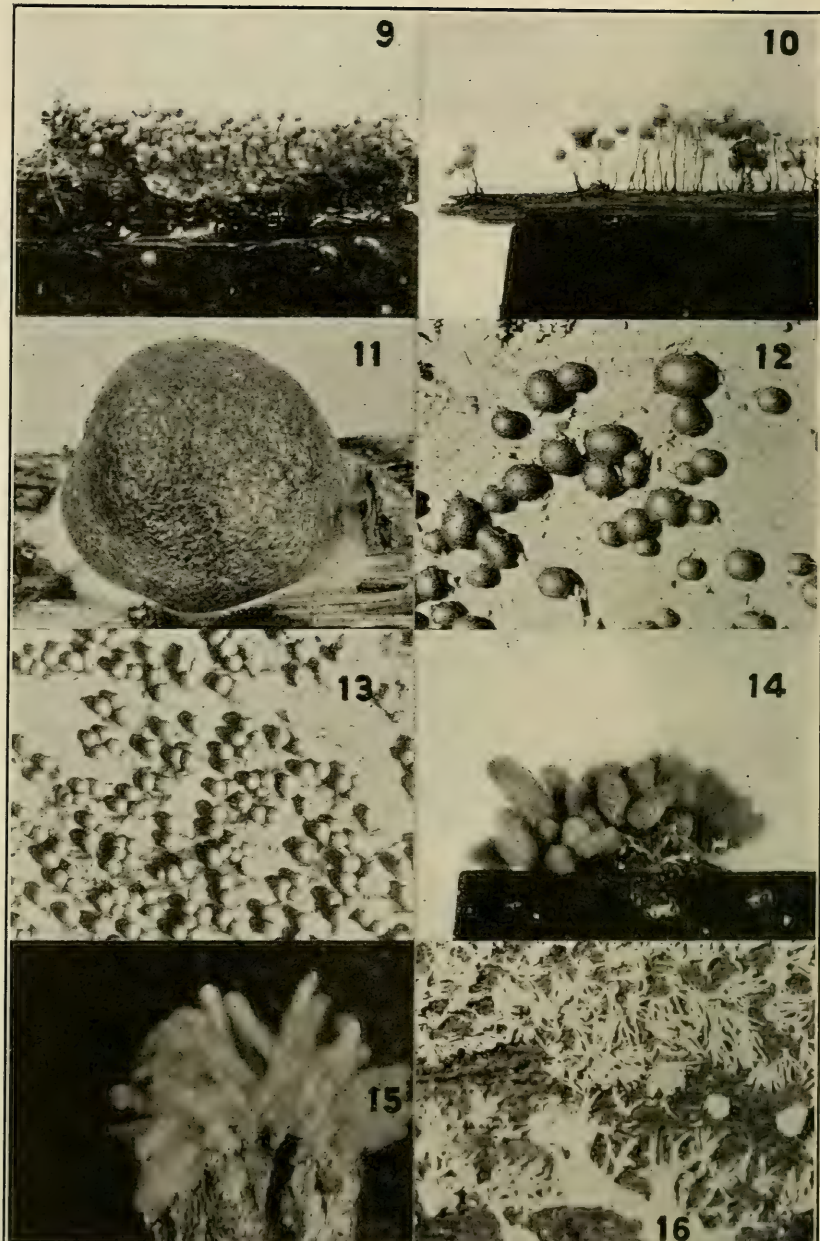
### EXPLANATION OF PLATES

PLATE I

Fig. 1. Badhamia rubiginosa, ×4
Fig. 2. Physarum viride, ×10
Fig. 3. Fuligo septica, ×1
Fig. 4. Leocarpus fragilis, ×4
Fig. 5. Diachea leucopodia, ×4
Fig. 6. Didymium squamulosum, ×4
Fig. 7. Stemonitis axifera, ×3
Fig. 8. Comatricha typhoides, ×4




MYCETOZOA Plate I




MYCETOZOA Plate II

other species of the genus have other pronounced characters. They require close microscopical study in order to make proper determinations.

### Genus 10. COMATRICHA

The genus is closely related to Stemonitis and differs materially only in the absence of the surface net to the capillitium. However, this is not a sharp line of demarcation as certain species of Comatricha have a partially developed net, and some species of Stemonitis have an imperfectly developed one. The same general conditions and brownish colors prevail, and in addition in Comatricha we have globose sporangia; a greater tendency to form a more persistent peridium and a columella that in some species divides into branches instead of continuing to the top. A number of species are quite common but it would take too much space to describe them all. *C. nigra* has globose sporangia with a dense capillitium, and a columella that extends to the top. If the columella divides into several branches it is *C. elegans*. Both species have long stalks. *C. typhoides* has cylindrical sporangia on long or short stalks, and is often 3–4 mm. in height. The stalk often has a thin, white membrane surrounding it. There is also usually a gray peridium which persists for some time before it peels off. The species can always be recognized by the spores which have a few prominent warts, not seen in any other member of the genus.

### Genus 11. ENERTHENEMA

In this genus the black stalk and columella ends in a shining, black, circular disc from which the dark capillitium hangs. The common and typical species is *E. papillatum*, and the other two, which are rare, differ little therefrom. The disc on the outside distinguishes the genus from all other species of Mycetozoa.

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PLATE II

Fig. 9. Lamproderma arcyrionema, ×4
Fig. 10. Cribraria intricata, ×6
Fig. 11. Enteridium rozeanum, ×2
Fig. 12. Lycogala epidendrum, ×1
Fig. 13. Trichia varia, ×8
Fig. 14. Arcyria denudata, ×4
Fig. 15. Arcyria nutans, ×3
Fig. 16. Ceratiomyxa fruticulosa, ×6

## Genus 12. LAMPRODERMA

The genus is recognized instantly by the shining, silvery, brassy, blue, or purple, more or less persistent peridium, which is often brilliantly iridescent. Most of the sporangia have black stalks and columellae. Several species may be found locally, but not often, except *L. arcyrionema* which is common in large developments on wood. The sporangia are globose with steel-gray peridia which break away in large patches exposing almost black, globose masses of capillitia and spores. The stalk is black, slender, two or three times the size of the sporangium and continues as a columella which divides into a much branched dark capillitium.

## Genus 13. CRIBRARIA

The genus, comprising about 20 species, is related to only two other monotypic genera, Dictydium and Lindbladia, the last not described in this paper. The developments are always in sporangia on more or less crooked, dark stalks. There is no uniformly closed peridium, except occasionally in one species; and there is no capillitium. The sporangium-wall, at the base forms a cup or calyculus, which is often only a thickened base, or may be absent entirely. Above, and merging into the cup, is a net of slender threads more or less expanded or thickened at the nodes. The spores lie within this net and are dispersed through the meshes. The colors of the various species are yellowish, brownish, purple-red or violet-blue. Species known to occur in this region are rarely collected except *C. intricata* and *C. tenella*, but these are typical of the genus and abundant. Both form globose, ochraceous sporangia on dark stalks, with cups that may reach to one-third the sporangial height, or smaller to obsolete entirely. The nodes of the net in *C. intricata* are thickened, dark, prominent, and polygonal or branching. In *C. tenella* they are also thickened and dark, but rounded or globose, and not so prominent as in *C. intricata*. There are frequent intermediates which cannot be placed definitely. Forms of *C. intricata* with obsolete cups are also known as *C. dictydioides* but such are only phases of *C. intricata*. The same phases occur in *C. tenella* and are not taken seriously there.

## Genus 14. DICTYDIUM

There is but a single species, *D. cancellatum*. It is related to Cribraria, but the wall instead of forming a net with nodes, consists of numerous, straight ribs extending from the base to the apex, and connected by transverse, slender threads. Occasionally there is an irregular net at the top, and often a more or less well defined cup at the base. The color is purple-brown or purple, and the long crooked or twisted stalks are red or purple-brown. Several varieties are based on color; the presence of a cup; or the presence of a net in the upper part. The species is an exception to the rule of spore color as in the purple phase the spores also show purple tints. The form is common and abundant.

## Genus 15. TUBIFERA

In this genus the three species form aethalia or clusters of more or less closely compacted, brown, erect, cylindrical sporangia. There is no true capillitium. The common species is *T. ferruginosa*, forming aethalia 1–8 cm. across. The sporangia are usually connected but they may be almost free at times. The aethalia show on the outside the convex or conical apices of the component sporangia. *T. stipitata* is the same as *T. ferruginosa* but has a short, stout, spongy-like stalk. *T. Casparyi* is also like *T. ferruginosa*, but not common, and has in many sporangia a long, thin, dark, columella attached by processes to the wall.

## Genus 16. ENTERIDIUM

In this genus the individual identity of the component sporangia is so far lost that only vestiges of the former peridial walls remain within the aethalium. The common species is *E. Rozeanum* which has brown, subglobose or irregular aethalia up to 4–5 cm. across. The cortex or peridium is firm, and if this is lifted partly with a needle, there will be observed attached to it many perforated, membranous bands or plates. The form resembles *Reticularia lycoperdon* in appearance, and also in the spores, but in that monotypic genus the attached plates are absent, and instead there is a bush-like mass of stranded threads at the base of the aethalium.

## Genus 17. LYCOGALA

The common species is *L. epidendrum* which is so abundant and well known that it hardly needs description. The aethalia are subglobose of a grayish to black color, but with yellowish, reddish, or brownish tints occasionally. The average size is about 10 mm. diam. with smaller and slightly larger ones in the same development. The mass of spores in fresh material is pinkish. There is no true capillitium, but short threads running in from the cortex form a sort of pseudo-capillitium. There are only two other species in the genus which are rarely collected. *L. conicum* is smaller and conical in shape. *L. flavo-fuscum* is much larger and looks like a puff ball.

## Genus 18. TRICHIA

In all preceding genera where a capillitium is present, the threads are smooth and not ornamented except in a few specific instances where small spines appear. We now come to four genera where the threads of the capillitium are ornamented in various ways. Also, curiously, a columella is lacking in all species of these genera. In Trichia the threads of the capillitium are free and not attached to any part of the sporangium—therefore doubly terminated. This feature appears in only a few species of the Mycetozoa other than in Trichia. In all others the capillitium is attached to some part of the sporangium. In Trichia the free threads, or elaters as they are called, are ornamented with from two to five spiral bands or thickenings which wind around the elaters, usually like the threads of a left-handed screw, but sometimes in the other direction. In addition, the elaters are often marked with spines of varying lengths in different species. A number of species also have beautifully reticulated spores. Specific distinctions are based on elater and spore characters; the absence or presence of a stalk; and the character and color of the sporangium-wall. Only one Trichia is red, and that is *T. floriformis*, a stalked form with reddish elaters and spores. It resembles *Hemitrichia vesparium* in appearance but has free elaters. The majority of the species are yellow in color with yellow elaters and spores. Among them is *T. varia*, a common form, producing sessile or stalked sporangia, or short plasmodiocarps, the stalks when present being short and black. *T. varia* is the only Trichia with two spirals on the elaters, all others having three or more, so that the spirals are diagnostic. *T. persimilis* is another common form and in the group with reticulated spores, but the poorest member in that respect as the reticulation is not continuous, but broken or partly replaced by warts. The species forms small groups of crowded, globose, sessile sporangia. Near to it and fairly common is *T. favoginea* which has lengthened, sessile sporangia, also densely crowded. The elaters are much broader than in *T. persimilis*, and the spores are beautifully reticulated with continuous bands showing from three to five meshes to the hemisphere. Among the brown forms, *T. contorta* is the only one that forms sessile sporangia, and it is common.

## Genus 19. HEMITRICHIA

There is only one important difference between the genus and Trichia. The capillitium consists of a more or less elastic network of branching threads, parts of which are attached to the sporangium. This has spirals like in Trichia and occasionally spines. The same yellow colors predominate. *H. vesparium* is the only red species on red stalks with red capillitium and spores. The sporangia are usually combined in clusters and have firm walls, and often distinct lids. When empty the cluster appears like a miniature wasp's nest, from which the species takes its name. *H. clavata* is a yellow form on brown stalks. The sporangia are turbinate or funnel-shaped, and the yellow capillitium protrudes therefrom in an expanding mass. *H. serpula* produces elongated, branching, and netted plasmodiocarps extending 1–8 cm., and yellow throughout. The three species can be readily recognized.

## Genus 20. ARCYRIA

The species of Arcyria form stalked sporangia, the upper part of the wall evanescent, but persisting below as a deep or shallow cup. The capillitium is attached to this cup, more or less, and arises therefrom as a tall, expanded, netted mass. The capillitium is variously ornamented with spines, warts, cogs, or half rings, but not with distinct spirals as in Trichia and Hemitrichia. The predominating colors are red, yellow, and white. Among the red forms, *A. denudata* is extremely abundant. The cup is shallow and the capillitium is firmly attached to it at many points. *A. incarnata* is similar but the capillitium expands more and is only lightly attached by a few threads to the center of the cup. There are two other red species similar to *A. incarnata* but nor common, and distinguished by spore and other characters. *A. insignis* has small pinkish or flesh-colored sporangia, arranged usually in small clusters. The common yellow form is *A. nutans* which has a long expanding capillitium so lightly attached that it is often separated when found. The white or grayish cylindrical form with capillitium firmly attached is *A. cinerea*. A variety of this called *digitata* has the sporangia clustered together with the stalks confluent or partly so. *A. pomiformis* is a small, yellowish form, globose or almost so, and scattered in small developments. *A. stipata* is copper-colored.

### Genus 21. PERICHAENA

The genus is still controversial as to the members composing it. The two common species mentioned are generally accepted. *P. corticalis* forms chestnut-brown or purple-brown, subglobose, sessile sporangia, often crowded. The dehiscence or splitting of the sporangium-wall is in an irregularly horizontal manner or by a distinct, convex lid, exposing the yellow spores and scanty yellow capillitium, which latter may be absent entirely. The capillitium may have simple or branched threads, free or attached to the wall. The threads are irregular in breadth, warted or spinose, but rarely smooth. *P. depressa* is similar but the sporangia are larger, much flattened, and usually angled by mutual pressure. The dehiscence by a lid is pronounced, and the capillitium is usually abundant. In either species lime is sometimes present in the wall or lid, or both.

### Genus 22. CERATIOMYXA

All species of the Mycetozoa, except *C. fruticulosa* the only member of this genus, have spores that are developed within a wall or peridium whether definite, indefinite, or evanescent. In the present species the spores are developed on the outside of the fruiting body. The fructification consists of numerous, small white bodies called sporophores, which branch or fork and resemble a minute bush or tree. On them are many small, slender stems, each of which carries an ellipsoid, colorless spore. The fruiting bodies may be found everywhere throughout the season on very rotten wood.

## CONCLUSION

These brief descriptions should not be accepted as definite or conclusive in all instances. They apply to perfect and typical examples, and, in the main, give the prominent, outstanding characters. There is much variation in size, color, shape, stalk, and internal characters within species of the Mycetozoa; and between species and genera there are many intermediate forms. These and the abnormal forms that often appear are interesting subjects for critical study.

The New York Botanical Garden

## BOOK REVIEWS

### A list of Missouri Fungi

The University of Missouri Studies, volume 12, number 3, is "A list of Missouri fungi," by Dr. Willis E. Maneval. Following ten pages of introduction comes a list of over 1000 species of fungi, arranged alphabetically. For each species the synonyms and hosts are listed. Then follows a complete host index, making the volume especially useful to those studying diseases of forest plants. Last is the bibliography of 526 titles. Since the fungi are more or less cosmopolitan this check list from Missouri will be found useful in most of the states of the Middle West.

FRED J. SEAVER

### Polynesian Botanical Bibliography*

This bulletin revises and brings down to date an earlier volume by Dr. Merrill published in 1924. While the original listed about 1300 titles, the present gives about twice that number. In general the region covered includes the islands of the Pacific lying between 30° North latitude and 30° South latitude. For each paper listed, unless the title is self-explanatory, there is a short abstract, sometimes a word or two, sometimes a few lines, that enables one to judge of the scope and value of the paper. The papers listed are those that deal with systematic botany, ecology, phytogeography and plant pathology; those on plant physiology, genetics and morphology have been omitted. A list of over 400 serials with the abbreviations used for them is given. Anyone working with plants from Polynesia will find this bulletin indispensable. The author states "It is believed that it will make Polynesian botanical work easier, and, it is hoped, more accurate."

G. T. HASTINGS

* Polynesian Botanical Bibliography 1775–1935. E. D. Merrill. Bernice P. Bishop Museum, Bulletin 144. 194 pages. Honolulu, Hawaii. 1937. $3.00.

## PROCEEDINGS OF THE CLUB

### Meeting of May 19, 1937

The meeting was held at the Boyce Thompson Institute for Plant Research, and called to order by President Barnhart at 3:30 P.M. There were forty persons present. The minutes of the last two meetings were read and accepted.

The meeting was given over to the scientific program which was supplied by the Institute staff. Dr. Zimmerman presented the speakers who gave short resumés of their work.

Mr. Setterstrom spoke on "The toxicity of air containing sulphur dioxide and contaminated air about industrial centers," describing a very elaborate apparatus which can detect one part of sulphur dioxide in one hundred million. Four parts per million were found to be toxic to plants.

Miss Barton mentioned "Recent trends and a survey of research on seed germination." She stated that there are two reasons why seeds do not germinate: 1) because they have hard seed coats; 2) because they have dormant embryos. Concentrated sulphuric acid can be used to break down the seed coats. A period of storage at a low temperature is usually required to break dormancy.

Dr. Flint showed there was a relationship between "Light sensitivity and seed germination." Although lettuce seed will not normally germinate until spring, Dr. Flint found that by exposing moist seed to bright light for one second he could get 100 per cent germination in twenty-four hours. Experiments were conducted with light of various wave lengths. The seeds were found to contain chlorophyl.

Dr. Youden stressed the importance of "The recognition of biological variation in designing experiments." He showed how it was possible to determine accurately the effect of five solutions on a plant by using five plants with five leaves each.

Dr. Hitchcock spoke on "Growth promoting substances up to date." He displayed tomato plants showing the systemic and local effects of various of these substances. He stated that fifty substances are now known to induce these reactions. An attempt is being made to determine accurately how much more active one substance is than another, using the degree of bending as a method of measurement.

Dr. Zimmerman showed "Responses of plants to growth promoting chemicals" with lapse time motion pictures. These demonstrated the characteristic bending and the systemic responses of the plant to ethylene gas.

The meeting adjourned at 5:15 P.M.

D. ELIZABETH MARCY
Recording Secretary

MEETING OF OCTOBER 5, 1937

The meeting, held at the American Museum of Natural History, was called to order at 8:20 P.M. by President Barnhart. Thirty persons were present.

The minutes of the May 19th meeting were read and approved.

A number of nominees for membership, having been approved by the council, were presented to the Club for election. The following were unanimously elected to annual membership: Dr. W. A. Campbell, Div. Forest Pathology, Bureau Plant Industry, Washington, D.C.; Dr. Francis Drouet, Dept. of Botany, Yale Univ., New Haven, Conn.; Dr. Edouard Jean Gilbert, 6 Rue du Laos, Paris, France; Dr. George J. Goodman, Iowa State College, Ames, Iowa; Dr. Leon Grodsinsky, Saenz Pena 141, B. 2, Buenos Aires, Argentina; Dr. H. N. Hansen, Univ. of California, Berkeley, Calif.; Dr. Howard A. Kelly, 1406 Eutaw Place, Baltimore, Md.; Mr. John Leutritz, Jr., Bell Telephone Laboratories, Summit, N.J.; Dr. W. H. Long, Albuquerque, N.H.; Mr. Eugene Steinhart, 50 East 21st St., Brooklyn, N.Y.

The following were unanimously elected as associates: Miss Mary L. Atkins, 10 Mitchell Place, N.Y. City; Mrs. Harriet Brown, 430 East 70th St., N.Y. City; Miss Keith Brown, 21 East 10th St., N.Y. City; Miss Louella B. Conkling, 126 Sterling Pl., Brooklyn, N.Y.; Mrs. Leon A. Duckworth, "Knollcrest," Finesville, N.J.; Miss Ethel Engle, 6 Doughty Avenue, Somerville, N.J.; Miss Mabel Foellner, Ferndale, Bucks Co., Pa.; Mrs. May R. Hamilton, 4003 165th Street, Flushing, L.I.; Miss Esther Holm, 3901 Shore Road, Brooklyn, N.Y.; Miss Faye C. Horton, 3416 93rd St., Jackson Heights, N.Y.; Miss T. Margaret Jamer, R.F.D. No. 2, Huntington, N.Y.; Miss Frances Johnston, 10 Mitchell Place, N.Y. City; Miss Grace

Kelly, 57 West 124th Street, N.Y. City.; Miss Eleanor King, 47 West 55th St., N.Y. City; Mr. Fred R. Lewis, 399 East 32nd Street, Paterson, N.J.; Mr. Emanuel Lopez, 217 West 138th Street, N.Y. City; Dr. Frank P. Mathews, 49 West 52nd Street, N.Y. City; Mr. Joseph Monachino, 242 East 33rd Street, N.Y. City; Miss Wellmer Pessels, 47 West 55th Street, N.Y. City; Miss Florence Plymell, 561 West 143rd Street, N.Y. City; Miss Grace Randall, 117 Lincoln Street, Passaic, N.J.; Mr. Lloyd A. Rider, 1982 Troy Avenue, Brooklyn, N.Y.; Miss H. Mabel Secor, 18 Hubert Place, New Rochelle, N.Y.; Miss Mary E. A. Smyth, 2857 Buhre Ave., N.Y. City; Miss Gretchen D. Taylor, 59 Mercer Street, Somerville, N.J.; Dr. James S. Wiant, Room 1022, 641 Washington St., N.Y. City; Miss Berthe Wittlinger, 840 Grand Concourse, N.Y. City; Miss Sarah J. Woodward, 1 Sidney Place, Brooklyn, N.Y.

The resignations of Miss Mary A. Clark, Bedford, New York; Mr. Thomas S. Constantine, 793 East 169th Street, New York City; and Miss Ruth H. Kennedy, 76 Washington Street, East Orange, New Jersey, from annual membership were accepted with regret and they were unanimously elected associates.

The resignations of Dr. Stuart M. Pady, Department of Biology, Ottawa University, Ottawa, Kansas, as an annual member, and of Miss Marion Evans, Freeport, Maine, as an associate, were accepted with regret.

There was no further business, so the rest of the meeting was devoted to reports of the members on their botanical activities during the summer.

Mr. Torrey gave an account of the Gaspé trip, conducted by him, which proved to be very interesting and successful. It included an exploration of Tabletop Plateau in the Shickshock mountains, and also a drive through the Laurentide National Forest.

Mrs. Mitchell told of a visit of Torrey Club members to her summer place near Port Jervis, N.Y., a spot rich in all sorts of botanical material.

Dr. Denny reported that one of his most interesting experiences while at the Colorado meetings was a visit to Mt. Evans, where he learned that birds as well as plants are often restricted to rather narrow zones.

Dr. Gundersen spoke of a trip up Mt. Marcy, and his surprise at finding that a number of plants above timberline were the same as those found above timberline on mountains in Norway.

Mr. Hastings called the Club's attention to the fact that Manasseh Cutler, whose picture has recently appeared on a three cent postage stamp, is the first botanist to be so honored. He also showed specimens of several interesting plants he had found in California.

Prof. Harper reported that he had been working a bit on the identification of blackberries.

Miss Nicholson told of her summer experiences in the botanically-rich state of Vermont.

Prof. Sinnott stated that he had been growing a great variety of gourds during the summer. He also gave a short account of the meeting of the Botanical Society in Nova Scotia, and of the genetics meeting at Wood's Hole.

Prof. Paul B. Sears from the University of Oklahoma remarked that timberline in the West is at a much higher altitude than in the East, but that timberline in the Rockies is continually moving downward.

Dr. Wodehouse reported on his travels in search of a hay fever resort in Michigan and its rather discouraging results as far as the hay fever victim is concerned.

Dr. Graves told something of his chestnut investigations, reporting that he had obtained seven hundred hybrid nuts. He also gave an interesting account of the origin of the bald cypresses near Bear Mountain.

Dr. Cheney told of his trip to Nova Scotia, Dr. Carey of trying to isolate nitrifying bacteria at Wood's Hole, and Dr. Mann of collecting near her summer home. Dr. Svenson reported on his trip to Europe and Ireland and said he was impressed by the paucity of species in Europe as compared to America.

The meeting adjourned at 10 P.M.

D. Elizabeth Marcy
Recording Secretary

## Meeting of October 20, 1937

The meeting was called to order at 3:30 P.M. by the President at the New York Botanical Garden with 18 members present. In the nature of old business J. S. Karling brought up the question of the appointment of a delegate to represent the Torrey Botanical Club on the Council of the International Congress of Microbiology, and was unanimously elected as representative. The President then appointed the following Committees:

Nominating Committee: H. A. Gleason, Chairman, P. W. Zimmerman, E. B. Matzke, A. H. Graves, G. T. Hastings.

Budget Committee: H. N. Moldenke, Chairman, Helen Trelease, F. E. Denny, H. K. Svenson, J. S. Karling.

The scientific part of the program consisted of an illustrated address by Prof. J. S. Karling of Columbia University on "Predacious and Carnivorous Fungi," in which he described a number of genera and species which prey on amoeba, rotifers, and nematodes and discussed the mechanisms by which they capture their prey.

The meeting adjourned at 4:20 P.M.

J. S. Karling
Acting Recording Secretary

### Meeting of November 2, 1937

The meeting was called to order at 8:25 P.M. by the Corresponding Secretary at the American Museum of Natural History with 42 members and visitors present. The reading of the minutes of the previous meeting as well as other business matters were postponed so as to allow sufficient time for the address of the evening.

Professor John M. Fogg, Jr., of the University of Pennsylvania gave an able and inspiring address on the "Floral Areas of Southern New Jersey," in which he showed by a series of excellent maps the occurrence and restriction of a large number of species to certain areas. Dr. Fogg. emphasized primarily the need for more care in recording the localities in which plants are collected. His address stimulated an unusual amount of discussion.

The meeting adjourned at 9:45 P.M.

J. S. Karling
Acting Recording Secretary

### Meeting of November 17, 1937

The meeting, held at the New York Botanical Garden, was called to order at 3:40 P.M. by President Barnhart. There were

17 persons present. The minutes of the October 5th, October 20th and November 2nd meetings were read and approved.

The deaths of Dr. J. J. Davis of the University of Wisconsin on March 5, 1937, and of Dr. George C. Osterhout, Windsor, Colorado, on April 2, 1937, were reported to the Club.

For the scientific part of the program Dr. Joseph J. Copeland of the College of the City of New York spoke on *Nitrogen Fixation by the Blue-Green Algae.* He reported that it had long been supposed that blue-green algae might fix nitrogen because of their close relationship to bacteria, but this has been hard to prove because of the difficulty in culturing the algae, free from bacteria. Dr. Copeland stated that his interest in the subject was aroused when studying the thermal types of blue-green algae found in hot springs. The water of many of these springs was found to lack nitrogen. He discovered that certain forms which he isolated from such springs had the ability to fix nitrogen, while very closely related forms isolated from water with an abundant supply of nitrogen lacked this ability. In one case the nitrogen fixing and non nitrogen fixing strains belonged to the same species, *Oscillatoria princeps.*

Eight species of blue-green algae have been found by analytical chemical analysis to fix nitrogen; fifteen to twenty species have been found not to fix it. Algae which grow in symbiotic relationship with other species of plants are among the nitrogen fixing types, as well as algae which live in nitrogen deficient habitats.

After some discussion the meeting adjourned at 4:40 P.M.

D. ELIZABETH MARCY
Recording Secretary

MEETING OF DECEMBER 7, 1937

The meeting, held at the American Museum of Natural History, was called to order at 8:30 P.M. by President Barnhart. Thirty-eight persons were present. The reading of the minutes was omitted. The following nominees for annual membership, having been approved by the Council, were unanimously elected by the Club: Mr. W. L. Dix, 801 Crown Street, Morrisville, Pa.; Mr. Edward E. Gaige, 111 Passaic Street, Hackensack, N.J.; Miss Elizabeth C. Hall, 45–20 243rd Street, Douglaston, L.I.; Mr. Noe L. Higginbotham, Botany Dept., Columbia University

N.Y. City.; Prof. Dr. A. A. Pulle, Javalaan 5, Baarn, Netherlands; Dr. Hugh M. Raup, Arnold Arboretum, Jamaica Plain, Mass.; Prof. Ferdinando Vignolo-Lutati, R. Instituto Merciologico dell Universita di Torino, Corso Vittorio Emanuele II. 103 Torino, Italy; Miss Rosalie Weikert, 3050 Perry Ave., Bronx, N.Y. City; Mr. Alain White, Litchfield, Conn.; Miss Pauline Young, 3609 Thomas Boulevard, Port Arthur, Texas.

The following were unanimously elected as associates: Miss Dorothy Barta, 208 Macon Street, Brooklyn, N.Y.; Mr. Milton Lesser, 816 Howard Avenue, Brooklyn, N.Y.; Miss May C. Smith, Canaan, Conn.; Dr. Lyman B. Smith, 228 Highland Ave., Winchester, Mass.; Mr. Charles Staloff, 75 Fort Washington Ave., N.Y. City.

Miss Amy E. Davis, 87 Hamilton Place, N.Y. City, and Mr. George M. Krall, West Trenton, New Jersey, having sent in their resignations from annual membership and their applications to be made associates were, on the recommendation of the Council, unanimously elected associates of the Club. The Council having approved the resignation of Miss Clara Raska, 21–14 149th Street, Whitestone, Long Island, as an associate and her application for annual membership, she was unanimously elected an annual member.

The resignations of Miss Marjorie R. Swabey, Los Gatos, California, and Dr. J. J. Taubenhaus, Chief of Division of Plant Pathology and Physiology, Agricultural Experiment Station, College Station, Texas, were accepted with regret.

For the scientific part of the program, D. H. K. Svenson of the Brooklyn Botanic Garden gave an account of his recent visit to *Botanical Gardens of Northern Europe*. The talk included lantern slides showing the birthplace of Linnaeus, the Linnaean garden at Uppsala and other places of interest in connection with Linnaeus. He also showed views of the botanical gardens at Gothenburg, Copenhagen and Berlin. These were followed by pictures of the coast of southwestern England, and of the flora of the china clay region of Cornwall, showing especially the growth of *Erica cinerea* and *Ulex* in the white silica. The botanic gardens at Glasnevin, Dublin, were of principal interest, the illustrations showing large specimens of *Araucaria imbricata* and *Sequoia gigantea*, and general views of the gourd and succulent collections in the green houses. Finally, there were views of the vegetation of the Wicklow Mountains on the Southeast coast of Ireland, and of peat bogs from the vicinity of Dublin.

After considerable discussion the meeting adjourned at 9:40 P.M.

D. ELIZABETH MARCY
Recording Secretary

## MEETING OF DECEMBER 15, 1937

President Barnhart called the meeting to order at 3:40 P.M. at the New York Botanical Garden. Seventeen persons were present. The minutes of the November 17th and December 7th meetings were read and approved.

The recording secretary reported the deaths of Miss Sara F. Passmore on September 19, 1937, and of Dr. J. J. Taubenhaus on December 13, 1937.

For the scientific part of the program, Dr. B. O. Dodge of the New York Botanical Garden reported on several diseases of Opuntia and showed interesting photographs and paintings of the diseased plants. The fungus which caused one of these diseases he found hard to classify, although an Ascomycete and probably one of the Perisporiales.

Prof. E. B. Matzke of Columbia University was the speaker of the afternoon. He discussed "Infloresence patterns and the effect of soil fertility on sexual expression in *Begonia semperflorens*." He stated that the factorial interpretation frequently adequately explained sex differences in the lower plants, but that in the higher plants environment had been found to play a large part in sex determination. In the angiosperms a plant is never absolutely staminate or absolutely pistillate. It has been observed that it is possible to reverse the sex of plants, in some cases a plant producing staminate flowers being induced to produce pistillate ones by more heavy feeding.

In Prof. Matzke's study of *Begonia semperflorens* he observed that the flowers which opened first in an infloresence were staminate, those opening later, pistillate. The ratio of staminate to pistillate flowers in any one infloresence varied, but any two plants which had the same ratio also had branching patterns which were either alike or the mirror image of one another. He also observed that there was a greater proportion of staminate flowers when the plants were grown under unfavorable conditions.

There was considerable discussion, after which the meeting adjourned at 4:45 P.M.

D. ELIZABETH MARCY
Recording Secretary

THE ANNUAL MEETING, JANUARY 4, 1938

The annual dinner of the Torrey Botanical Club was held at the Men's Faculty Club, Columbia University, at 6:30 P.M. There were fifty-nine persons present. At the close of the dinner the annual business meeting was called to order, President Barnhart presiding. The minutes of the preceding meeting were read and accepted.

The resignations of Prof. James P. Bennett, University of California, Dr. Wright MacMillan, Montclair, New Jersey, and Mr. George Henry Schneller, Corona, New York, were accepted with regret.

The annual reports of the corresponding secretary, recording secretary, treasurer, editor of the Bulletin, editor of Torreya, business manager and bibliographer were read. Also the chairmen of the program committee, field committee, and local flora committees gave brief resumés of the work done by these committees during the year.

Dr. B. O. Dodge, delegate to the council of the New York Academy of Sciences, and Dr. T. E. Hazen, representative on the board of managers of the New York Botanical Garden, gave short reports.

The resignation of Dr. Chrysler as editor of the Bulletin having been accepted by the council, a motion was made that the Club extend to him its sincere thanks for his services during the past five years. This was carried with a rising vote of thanks to Dr. Chrysler.

Dr. Blakeslee made the humane motion that hereafter the ballots be counted before dinner thus giving the tellers the opportunity of eating. This was carried.

The need of Biological Abstracts for the financial support of all biologists was presented to the Club, and the vote of the council "that the Club support Biological Abstracts to the full extent of its facilities" was read to the Club members. There was considerable discussion of this proposition. The possibility of making a contribution compulsory was considered. The treasurer expressed the opinion that a compulsory assessment would be very difficult to collect. A motion was finally made that the Club approve the resolution of the council and make a contribution from the treasury of $200 toward the publication of Biological Abstracts. This was carried. It was voted that a committee made up of the president, corresponding secretary and treasurer be delegated to take care of any business with Biological Abstracts and keep the Club informed.

A motion was made that in addition to the $200 contributed outright by the Club the society make a voluntary assessment of $2.00 on all regular members of the Club. After considerable debate this was carried by a vote of 18 to 16.

The ballots having been counted, Dr. Karling read the results of the election of officers for 1938. Their names are recorded on the inside of the front cover of Torreya.

The recording secretary reported that the applications of Mr. Morris Cohen, American Textile Mills, 467 Broadway, New York City, and Prof. Tr. Savulescu, Institutul de Cercetari Agronomice al Romaniei, Casuta Postala 207, Bucharest, Roumania, for membership, had been approved by the council, and they were unanimously elected members of the Club.

The meeting adjourned at 9:40 P.M.

D. Elizabeth Marcy
Recording Secretary

## FIELD TRIP TO NEWFOUNDLAND PLANNED

The field committee of the Torrey Botanical Club has made arrangements, through the Newfoundland Tourist Bureau, R. H. Tait, Director, British Empire Building, 620 Fifth Avenue, New York, for a two weeks trip to western Newfoundland, which if it can be carried out as planned, will offer an unusual excursion, the longest we have attempted, and of scenic and botanical interest comparable with our Shickshock Mountains, Gaspé, Quebec trip of 1937.

The chief objective would be the Long Range of western Newfoundland, a nunatak area, like that of the Shickshock Mountains, and containing many plants which survived from the last inter-glacial period, because they escaped the effects of the Wisconsin glacial advance. The party might leave Thursday, July 7, by train from New York, 2 P.M., to Boston, connecting at 9:30 P.M., North Station, with train via St. John, N.B., to Mulgrave, N.S., ferry to Port Hawkesbury, and train to North Sydney, Cape Breton Island, there taking steamer Caribou to Port aux Basques, Newfoundland, arriving Sunday morning, July 10, or leaving New York Sunday afternoon, 2 P.M., Boston 9:30, reaching Port aux Basques, Tuesday evening. Or members might drive, allowing three full days, or an evening start and three days, to cover the distance of about 1,000 miles by automobile, to North Sydney, where they would leave cars and take the Caribou to Port aux Basques. From Port aux Basques, the plan is to take the Newfoundland Railway, about 175 miles, to Deer Lake, and by automobile, over a new dirt road, said to have been finished last summer, to Lomond, on Bonne Bay. This would be headquarters for three or four days, during which, according to weather, we would climb Gros Morne, 2,500 feet, the highest point on the Long Range, and in Newfoundland; and possibly another mountain of about the same height. Motor boats would be used from Lomond, around the branches of Bonne Bay, to reach the nearest points for climbing summits.

The summits of these mountains have never been reached by any botanist, the only extensive studies, by Prof. M. S. Fernald, of the Gray Herbarium, Harvard University, and his parties, about 15 years ago, having covered only the slopes.

Gros Morne and similar heights would offer a region new to botanizing and undoubtedly display associations like those of northern Labrador and southern Greenland.

After covering the Bonne Bay area, the party would return to the railroad, perhaps cover some forest areas of lower elevations on the way south to Port aux Basques, cross to North Sydney, resume the automobiles and if we have a day or two to spare, drive leisurely home through northern Nova Scotia, New Brunswick, and Maine; or return by train as preferred. The cost, by rail all the way, both ways, would be about $140; including steamer, Newfoundland Railway, meals and incidentals; by automobile from New York to North Sydney, about $30 less.

Those planning to drive, are asked to notify by June 15, the leaders, Raymond H. Torrey and James Murphy, and perhaps also Prof. Joseph H. Copeland, of the College of the City of New York, who will be in Newfoundland in July. Further details will be available later. Strong clothing, adequate waterproofs and precautions against insects such as worked well in the Shickshocks, would be required, but it is not planned to camp out overnight, but to return each night for comfortable shelter. Members will be invited to collect interesting plants for the New York and Brooklyn Botanic Gardens.

## NEWS NOTES

Regulations regarding the Gaspesian National Park. Part of the region covered by last July's trip of the Torrey Botanical Club to the Gaspé region is in the new Gaspesian Park. The regulations given here apply to the park. The objects of the restrictions against gathering plants are first—to prevent collecting of plants for commerce, and—second—to prevent amateur botanists from destroying unique stations. Any serious botanist will have no difficulty in obtaining written authorization for collecting. Requests for such authorization should be addressed to the Superintendent of the Gaspesian National Park, Department of Mines and Fisheries, Quebec.

The following regulations have been adopted by Order in Council, respecting the Gaspesian National Park:

That it be prohibited:

(a) To hunt, in any manner whatsoever, the animals which are within the limits of the said park;

(b) To have in one's possession, within the limits of the park, hunting implements of any nature whatsoever;

(c) To enter the limits of the park without a special permit from the superintendent or the person named for such purposes;

(d) To gather wild plants for any purposes whatsoever, without a written authorization from the superintendent of the park.

L. A. Richard
*Deputy Minister of Mines and Fisheries*

Common names. Dr. R. A. Harper comments on the inquiry about "Wild Isaac" in our November-December issue and the reply in the January-February number. "Some years ago I was called on Mrs. Elfleda B. Taylor of Thomasville, Ga., an amateur botanist. The conversation turned to common names of plants, and she said that she had heard negro children apply to a species of Ascyrum a name that sounded like 'Izup.' She thought at first that it must be a corruption of 'Hyssop,' but on further inquiry, or reflection, decided that they were really saying 'eyes up,' as the flowers of the genus always face upward." "Another illustration of the tendency for names to get curiously garbled is found in the case of the crepe myrtle, *Lagerstroemia indica*. Some years ago my brother Francis found it growing near a house on one of the islands in Okefinokee Swamp, and the people there calling it 'Ladies streamer,' a very neat adaptation of the technical name."

GARDENS AT THE NEW YORK WORLD'S FAIR. A contract was recently signed by the president of the fair corporation, Grover A. Whalen, and Hortus, Inc., a non-profit corporation, for a horticultural exhibit to cover an area of five acres. The exhibit will be a concession, with admission charged and plants and garden equipment for sale. There will be a building where continuous flowers shows will be held. Also naturalistic, formal and informal, rock and rose gardens, lily pools and a stretch of landscaped lawn along the Flushing River. Mrs. Harold Irving Pratt, the first secretary of the Garden Clubs of America and director of the Horticultural Society of New York, is president of Hortus and Mr. A. M. Dauernheim, past president of the Society of American Florists and Ornamental Horticulturalists, is executive vice-president.

## WHAT IS THE EXPLANATION?

Our camp is situated at the foot of Mt. Tom, Conn. and is surrounded by many acid soil plants and tall trees.

In this Camp we burn only the useless gray birch (*Betula pendula*). One day a pailful of ashes was taken out, carried far back into the dense woods and scattered on about a seven foot square spot of land.

Two weeks later through and really upon the scattered ashes dozens and dozens of small plants of *Malva rotundifolia* were starting up. They continued through the season and grew very large, but produced no flowers.

The following season not a single specimen of the barnyard mallow returned or has there been a single one since that date.

The gray birch came from directly around our Camp, and no other wood was used. Also there never had been a farm on this location.

I would like to know why this species of a neutral soil and sunshine habitat should have appeared as it did.

A. E. H.

# THE TORREY BOTANICAL CLUB

Contributors of accepted articles and reviews who wish six gratuitous copies of the number of TORREYA in which their paper appears, will kindly notify the editor, when returning proof.

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# OTHER PUBLICATIONS

### OF THE

# TORREY BOTANICAL CLUB

## (1) BULLETIN

A journal devoted to general botany, established in 1870 and published monthly, except during July, August, and September. Vol. 64, published in 1937, contained 639 pages of text and 14 full page plates. Price $6.00 per annum. For Europe, $6.25.

In addition to papers giving the results of research, each issue contains the INDEX TO AMERICAN BOTANICAL LITERATURE—a very comprehensive bibliography of current publications in American botany. Many workers find this an extremely valuable feature of the BULLETIN.

Of former volumes, 24–64 can be supplied separately at $6.00 each; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Single copies (75 cents) will be furnished only when not breaking complete volumes.

## (2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–18 are now completed. Volume 17, containing Proceedings of the Semi-Centennial Anniversary of the Club, 490 pages, was issued in 1918, price $5.00.

Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

HAROLD N. MOLDENKE,
New York Botanical Garden,
Bronx Park,
New York, N.Y.

Volume 38 May-June, 1938 Number 3

# TORREYA

A Bi-Monthly Journal of Botanical Notes and News

EDITED FOR
THE TORREY BOTANICAL CLUB
BY
GEORGE T. HASTINGS

John Torrey, 1796-1873

CONTENTS



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## MEMBERSHIP

All persons interested in botany are invited to join the Club. There are three classes of membership: *Sustaining*, at $15.00 a year; *Life*, at $100; and *Annual*, at $5.00 a year. The privileges of members are: (a) To attend all meetings of the Club and to take part in its business, and (b) to receive all its publications. Associates of the Club, $2.00 a year, have the privilege of attending meetings and field trips and of receiving the Bulletin of the New York Academy of Sciences.

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Matter for publication, and books and papers for review, should be addressed to

GEORGE T. HASTINGS
2587 Sedgwick Ave.,
New York, New York

TORREYA

Vol. 38 May-June, 1938 No. 3

## A new genus and species of fossil Algae

Titus Ulke

### GLOBULINEA, n. gen. n. sp. Ulke

*Original Description.*—The generic name GLOBULINEA has been here adopted to designate members of a group of calcified fossil algae, each of which, in mature stage at least, possesses a long and usually branchless, flexible, rope-like, stem or axis, fairly uniform in diameter for any given plant, built up of, or inclosing, a series of globular or rounded cylindrical cells or joints, like a chain of close-set beads, and occasionally exhibiting a thin transverse septum between adjacent cells or joints. (See Fig. 1.) Each stem appears to have been sheathed, at least partly, by a skin or epidermis, as evidenced by a faint line or groove along its length, though apparently absent, or worn off, in parts of the stems of slenderer (as if younger) plants, which then resemble a rope of contacting beads (Fig. 2). A tiny groove may often be observed around each bead-like cell, suggesting some sort of wall around it.

The larger sized stems are almost always stout and unbranched, while smaller stems, and young plants of this genus often show a few short branches or buds, as illustrated in Figs. 2, 3 and 4. The thallus in young plants does not appear to be divided by any transverse septa (Fig. 4). Stems and branches are usually curved, looping or undulating in form and occasionally curled up at their end (Fig. 3) or bent back at an acute angle. Distinct rhizoids have not yet been observed. The calcareous epidermis or walls do not show any evident structural pores.

In a single instance (Fig. 5), what may be a fruiting organ, terminating a branch, was observed.

Small lobate markings, associated with the "rope" and "bead-like" structures, suggest algal fronds, but have not been found definitely attached. Rarely the "beads" decrease in size in one direction, as in a budding algal branch.

Where best developed, the algae lie in zones parallel with the bedding planes in the Salem limestone (Mississippian) in which they occur, and their constituent material is essentially like that of the surrounding limestone, both in composition and in structure.

*Type Locality.*—The genotype, as well as the type specimen of my new species, *Globulinea giganteus* Ulke, n. sp., can be seen exposed on the weathered top face of the 2nd lowest step, a block of Salem limestone cut about 10 feet long, 1-foot tread and 7-inch rise, in front of the 16th Street entrance of the Baptist Memorial Church at 16th Street and Columbia Road, Washington, D. C. The type specimen is the stout, reversed U-shaped alga, approximately 30 in. long and .75 in. diameter, appearing in the right half of a 3-foot section on the left hand portion of the stone block. It is illustrated in Fig. 1, as a, b, c, grouped with portions of other algae of the same species and in Fig. 6.

*Classification and Occurrence.*—These fossil algae probably belong to the class *Chlorophyceae*, order *Siphonales* and family *Siphoneae*, and represent completely calcified rope-like remains

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EXPLANATION OF PLATE

Fig. 1. Sketch of groups of fossil algae visible on the weathered, flat, top face of the next to lowest step, a block of Salem limestone, in front of the 16th Street entrance of the Baptist Memorial Church of Washington, D.C. Portion of step illustrated is a 3 ft. long section at left end. The alga a, b, c shown in Fig. 1, approximately 30 in. long and .75 in. diameter, is the genotype of GLOBULINEA n. gen. Ulke, and specific type of *G. gigantea,* Ulke, n. sp.

Fig. 2. Sketch of a long and slender "rope and bead-like" alga (a to g) of a variety which I have named *Globulinea gigantea* var. *catenaeformis,* visible on the top slab of Salem limestone of the wall on 16th street, between Allison and Buchanan, in Wash. D.C., the particular stone being the 7th, S. of the main entrance to Crandall's residence. This variety differs from the above type species in being slender (3/16 to ¼ in diam), in usually lacking a continuous stem sheath, and in its branching habit. Were it not for the occurrence of somewhat intermediate forms, this variety, catenaeformis, might well be considered a valid new species.

Fig. 3. Sketch of an alga (a, b, c) with several short branches, on 5th capstone, N. of Allison, on 16th street.

Fig. 4. Sketch of a young branching alga, lacking septa, on 7th step, 38 in. fr. left end, front Columbia St. entrance, Bapt. Mem. Ch.

Fig. 5. Algal stem, with possible fruiting body, on step shown in Fig. 1.

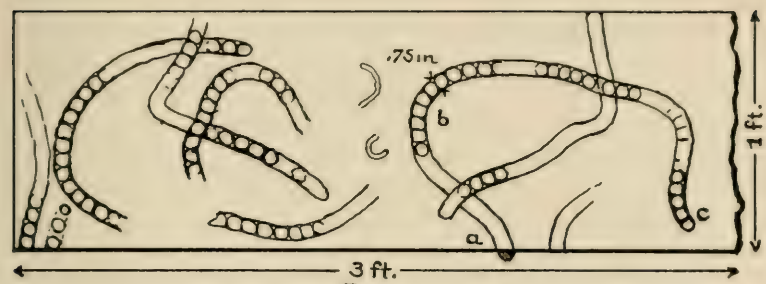


Fig. 1.

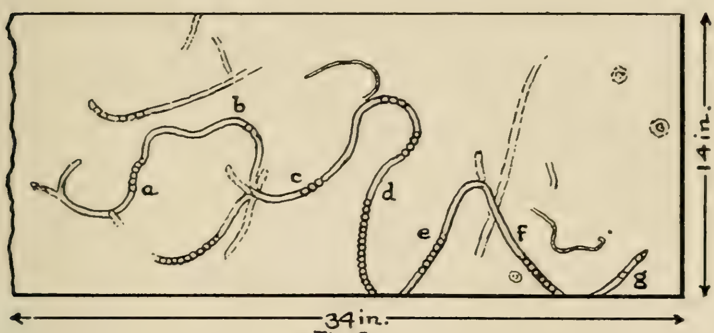


Fig. 2.

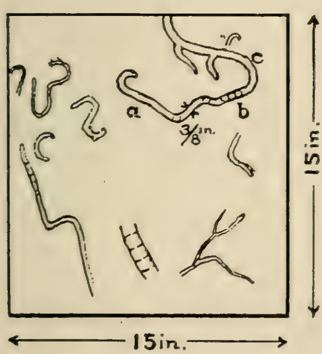


Fig. 3.

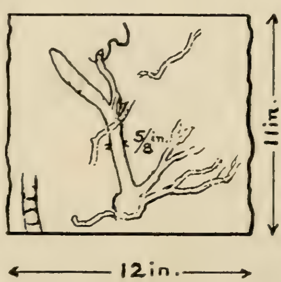


Fig. 4

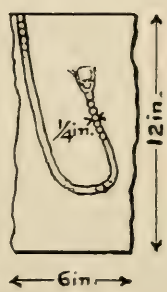


Fig. 5.

All figures are drawn to scale: 1/8 in = 1 in. U. del.

0 6 in. 12 in.

of a lime-secreting, sparsely branched marine alga in which the thallus or stem is not at first divided by transverse septa. All of the original softer parts of the alga, filaments or stems, branches and algal cells, have evidently either been replaced, or incrusted, by calcareous matter. The algae, or their fragments, together with macerated shell matter, containing crinoid stem joints and numerous bryozoan remains, now constituting Salem limestone, were apparently deposited on shallow shores. (See literature cited by Professor Robert R. Shrock (1).)

My attention was first directed in 1934 to these fossils, which were at that time locally known as "vertebral back bones," and then, late in 1935, to the article written by Professor Shrock entitled: "Probable Worm Castings ('Coprolites') in the Salem limestone of Indiana" and included in "Invertebrate Paleontology" by Twenhofel and Shrock (2).

These authors received my evidence as to the algal nature of these fossils late in 1935 and in 1937 (see literature, note 3), and my suggestion that they be referred to the lime-secreting *Polysiphonia*, which, however, are of relatively very small size, and much branched forms. I now believe that *Cymopolia* (fam. *Siphoneae*, which includes *Diplopora*, *Gyroporella* and *Dactylopora*) is the genus nearest to *Globulinea*, as illustrated in Fig. 509 of Haas: "Die Leitfossilien," but which former is distinguished from the new genus by its numerous whorled, bifurcating or compound branches, lack of a stem sheath, relatively minute size, and much more recent geological age.

My reasons for favoring algal, and not annelid origin, for these fossils in short are the following: 1. Where best developed the markings almost always lie flat and parallel to the stone bedding planes, and not transverse thereto. 2. The material inside the stalks (or rods) and beads is essentially like the surrounding granular limestone. 3. Stalks and beads alike are separated from the surrounding rock by a tiny groove, suggesting that there was once some sort of a cell wall around them. 4. In some instances the "rods" bend back at an acute angle, in a bend which a worm could hardly make. 5. Some of the stalks fork, or branch, as in the var. *catenaeformis*, such normal power of branching being unique among the worms, and as far as I know, only observed in the tiny annelid *Syllis ramosa*, found living in "glass sponges" in Eastern seas. 6. Small lobate, as well as foliate, long and wavy markings associated with the "rod and bead" structures, suggest the fronds of algae. 7. Rarely the "beads" decrease in size in one direction, as in an algal branch.

*Distribution.*—Blocks of Salem limestone, with these fossil algae plainly showing on their weathered surfaces, are com-

Photograph of type specimen in Salem limestone. The differences shown in diameter are due to the position of the camera.

monly used as side panels, steps, building stone, wall slabs and the like, on public and private edifices throughout the United States. In the city of Washington good exposures may be seen on the entrance steps of the Baptist Memorial Church, located at the N. E. corner of 16th Street and Columbia Road, on the capstones and covering slabs of the garden and lawn walls on 16th Street between Allison and Buchanan Streets, on wall panels on the 10th Street side of the Internal Revenue Building, and on the roof floor railings of the new building of the Interior Department. Other similar localities, cited by Professor Shrock (2), are in Madison, Wisconsin, Chicago, Illinois, and Bloomington and Bedford, Indiana.

*Pertinent Literature.*—(1) E. R. Cumings et al., "Fauna of the Salem limestone," 30th Ind. Rept., 1905, p. 1199.—J. W. Beede et al., "Geology of the Bloomington Quadrangle," 39th Ind. Rept., 1915, pp. 204–206, E. R. Cumings, "Nomenclature and Description of the geological formations of Indiana," Handbook of Indiana Geology, Pt. IV, 1922, p. 504.

(2) R. R. Shrock, "Probable worm castings ('coprolites') in the Salem limestone of Indiana," Proc. Ind. Acad. Sci. for 1934 (1935), Vol. 44, pp. 174–175, Figs. 1A–C, included in "Invertebrate Paleontology," which appeared in the fall of 1935, by W. H. Twenhofel and R. R. Shrock, McGraw-Hill Book Company, Inc., 1935, p. 137, Fig. 43A.

(3) R. R. Shrock, "Fossil Algae from the Salem limestone (Indiana Building Stone) of Indiana," Science **87**, 2263, pages 438–439, May 13, 1938.

(4) Hyppolyt J. Haas: "Die Leitfossilien," Veit & Comp., Leipzig, 1887, pp. 283–284, and Fig. 509. Also Strasburger et als., "A Textbook of Botany," Macmillan and Co., Ltd., London, 1912, p. 363.

(5) Report of Voyage of H. M. S. *Challenger* (during the years 1873–76), Zoology, Vol. XII. Text, pp. 198–205. Plate XXXI. Fig. 1.

Washington, D.C.

## Ferns of the New Jersey Pine Barrens

Martha H. Hollinshead

At Quaker Bridge, New Jersey, there are river banks, bogs and upland where grow a most varied pinebarren flora. Under pines are sheep laurel and clethra. There are white cedars, magnolias, and viburnums. There are rushes and cotton grass. There are cranberries and teaberries. There are orchids, lycopodiums, drosera, sphagnum, and pitcher plants. We were there in 1937 in late September; as I sat in the car looking at the tawny patches of cinnamon fern and the sienna colored cosmopolitan bracken whose stout stipes still held aloft the dried fronds, I remembered that I had often seen in books, not botanical, the expression "ferns and bracken" and the rhyme from Scott:

> "The heath this night must be my bed,
> The bracken curtain for my head."

*Pteris latiuscula* is one of the commonest of the few ferns found in the Pines for that land does not offer situations loved by ferns. Bracken adapts itself to sand and bog. Its long rootstocks may grow ten to twenty feet in a season, sending up numerous fronds. There is a variety, *P. latiuscula pseudocaudata*, that has the terminal pinnules elongated in various patterns.

With us that day in September was a young woman just beginning to study ferns. She first brought me a frond of *Woodwardia*. Both *W. virginica* (*Anchistea virginica*) and *W. areolata* (*Lorinseria areolata*) are fairly abundant. After cedar swamps have been cut or burned over *W. virginica* with its creeping rootstocks appears plentifully among the alders and magnolias that follow *Typha latifolia* and wool grass which spring up at first. Then the young cedars start up again.

The young lady next brought me a frond of Royal Fern which recalled *O. regalis* as seen growing luxuriantly at Miami, Florida. It grows in New Jersey in the shallows beside streams. When next she came to the car she was tattered and torn having crept under cedars and crossed a bog to get *Schizaea*. She is keen on conservation and only allowed herself to gather two specimens. I took mine home and planted it in a small glass globe with moss and partridge berries. After some weeks it is still alive and interesting. The sterile fronds are very curly and green and the fertile ones still wave their tiny flags.

In July 1818 Dr. John Torrey and William Cooper reached Quaker Bridge after driving through a "labyrinth" of little roads. In a letter Dr. Torrey says, "we found a considerable number of plants that were new to us, indeed, there were few plants but what we found here." Then he tells about finding *Schizaea* which pleased them more than any other plant they found. That was more than a hundred years ago and except for the proximity of deer hunters' camps, Quaker Bridge is still a happy hunting ground for those of us who love the Pines. Of course the old hostelry where they stayed is gone.

I have found Curly Grass at Warren Grove at the edge of the Plains in a hollow where rainwater collects. It was in the region where that other strange plant, *Corema Conradii*, grows. People always want to tell about finding Curly Grass. One autumn a good botanist and I took a train to Chatsworth, New Jersey. Upon arrival we back-tracked about a half mile, so eager to find *Schizaea* that we passed *Gentiana Porphyrio* without stopping! Reaching the designated place we searched on our hands and knees under cedars for an hour or so without luck; then gathered some cranberries which had escaped from a bog, ate our lunch and from a pile of railroad ties surveyed the landscape. Crossing the railroad we found a patch of the pert little fern, enough to justify taking a few specimens. The fertile frond is stiff and brown having at the end four or five pairs of pinnae folded close together over the spore cases on their inner surfaces. The locality was open and comparatively dry. On returning to the railroad station the rare lovely gentian had disappeared but we had found *Schizaea pusilla!*

Scattered through the Pines is *Thelypteris Thelypteris* but it is not plentiful. *Thelypteris simulata* is more often seen. This fern is considered to have boreal affinities. It was named in Massachusetts. Its stalk and pinnae are hairy, sori large. It grows in low woods and thickets where sphagnum is abundant. Creeping rootstocks send up fronds in early summer. The fertile fronds come in late July. Fronds are tender and hurt by early frosts. Mr. Witmer Stone lists *Asplenium felix-foemina* (*Athyrium asplenioides*) and *Phegopteris Dryopteris* as occurring at Calico in the Pine Barrens. The Christmas fern is rarely found in the Pines but has been seen at Cape May. *Asplenium platyneuron* occurs in suitable locations like Speedwell and Dover Forge.

There is no well-defined line of demarcation between the Pine Barrens and the arable land, for peninsulas of pines jut into surrounding territory and there are also islands of pine barren formation found here and there. We natives of New Jersey whose grandfathers and, yes, grandmothers, did not feel equipped for life unless they owned some woodlots in the pines or a cranberry bog do not bother to say "Pine Barrens." They are "The Pines" and we mean that area intersected by streams and lakes. To us the barren land is "The Plains," a fine view of which can be had from the fire tower at Oswego Lake.

*Lygodium palmatum* although found deep in the Pines is more often seen on the so-called peninsulas. Near New Lisbon is a lane leading to the pineland. By a stream are drainage ditches three or four feet deep on either side, on the banks of which are climbing ferns (*Lygodium palmatum*), quantities of them forming lacy mats so dense that other plants were smothered and only a few stalks of aster and goldenrod had pushed through to offer stems for the ferns to climb. Lacking support for the most part, the ferns were prostrate and tangled and twisted around each other. The very prolific fertile ends fell over and added themselves to the fern cushions on the banks of the ditches. The cord-like root stalks were matted and creeping up the sides and near the surfaces of the ditches. On the 1st day of October, in deference to the season, the fertile fronds were slightly yellow and reminded one of dodder as they twisted their threads around the stalks. The sporangia were immature. The sterile fronds are evergreen. The stalk is light brown or yellowish, two forked, each fork bearing roundish palmately lobed pinnae. The fronds do not climb until they are a foot long, the shorter ones spreading over the ground. Sometimes the fertile pinnae are in the middle of the stalk with sterile above and below. Those above are much smaller. Sometimes a sterile pinnule has one or more lobes changed to fertile and vice versa.

It is a pleasant surprise to find a great quantity of a fern heretofore seen growing scantily. The first locality I knew for *Lygodium* was Medford where each fern grew in solitary state climbing neatly and tidily its own sweet gum sapling. I thought they grew that way. One finds no more ferns at that place. The marsh was filled and drained as so many other such places have been to the destruction of the vegetation.

Such is the list of ferns for the Pine Barrens. It is not arbitrary for ferns and plants from the outside creep in and the floras mix. It would be justifiable to make it longer by adding two *Botrychiums* and four *Lycopodiums*, the latter being frequently seen.

MOORESTOWN, NEW JERSEY.

# Collecting Cladoniae on Martha's Vineyard and Nantucket Islands

Raymond H. Torrey

Much of my early collecting of lichens of the large and fascinating genus of *Cladonia* was done on Long Island, where I live. Although the western end of the Island, in Brooklyn and Queens, New York City, and Nassau County, is intensively developed, and areas where lichens survive are scarce, the eastern half, in Suffolk County, includes many areas of pine and oak barrens, abandoned fields and pastures, seashore dunes and backbeach strips, and open moorland such as on Montauk Point, which are richly rewarding to the student of Cladoniae.

A few years of collecting, principally in Suffolk County, yielded a comprehensive acquaintance with the species and forms of the genus. The associations of species on the richer soils, on the northern, or Harbor Hill Moraine, were much like those in the hardwood forests in the highlands of southeastern New York and northern New Jersey. But in sandy soils, along the beaches, on the southern, or Ronkonkoma Moraine, or ancient dune areas in the interior, the associations were dominated by the larger, densely branching members of the subgenus *Cladina*, such as *C. mitis*, *rangiferina*, *sylvatica and tenuis;* and by species in the sub-section *Unciales*, such as C. *Boryi* and *C. caroliniana. C. Boryi* was particularly interesting, for its robust character, and often large, nearly exclusive colonies, and my acquaintance with it, first made on Long Island, led to pursuit of other stations along the coast from New Jersey to Cape Cod and I hope some time to pursue it to its northernmost stations, in Newfoundland and Labrador. It seems to be a characteristically eastern North American seacoast species, most abundant close to the ocean, although it has been found in a few stations, farther from the coast in Maine. It does not occur in Europe, although species have been reported from Japan and the Himalayas in India, according to Tuckerman.

Another interesting discovery in Long Island was *Cladonia floridana*, which had been regarded as southern, until S. F. Blake found it in Maryland, several years ago, and C. A. Robbins found it in Wareham, Mass. Within the past few years I have found it in several stations in southern New Jersey and three stations on Long Island. Although Robbins regarded it as a plant of the coastal plain, I found it in great quantity, in September, 1937, on Shawangunk Mountain, Ulster County, N. Y., 75 miles from the Atlantic Ocean and at 2,000 feet elevation, which shows how much more there is to be learned about the ranges of *Cladoniae* beyond the sometimes meagre records of available references.

Increasing acquaintance with the *Cladoniae* of Long Island, with the aid, in determinations, of Dr. Alexander W. Evans, of Yale University, to whom I owe thanks for his prompt identifications of material, and his kind guidance in further pursuit of the genus, led to curiosity as to *Cladonia* associations on other unsubmerged portions of the terminal moraines of the last Glacial Period, off the southern coasts of New England, such as Block Island, No Man's Land, Martha's Vineyard, Nantucket and Cape Cod. So far, I have made collecting trips to the last three, and have yet to reach the first two. As my trips were the first any botanical student ever made, to Martha's Vineyard and Nantucket, for the study of *Cladoniae*, at least since the genus has been reorganized by Vainio, Sandstede, and Anders, in Europe, and their re-classifications have been followed in the United States, by Robbins, Blake and Evans, they will be the principal subject of this paper. Dr. Evans has made some studies of the *Cladoniae* on Cape Cod, and I have sent him material from there, and I hope he will give us a paper on that region.

I spent two days on Martha's Vineyard, in June, 1936, with James Murphy, of Brooklyn, New York, a fellow member of the Torrey Botanical Club, who has been a companion on hunts for *Cladoniae* in many remote places from North Carolina to Gaspé. We crossed the island, from Vineyard Haven, through the oak and pinewoods, to West Tisbury, examined the open, grassy moraine north of Squibnocket, and followed the beach and the shores of the numerous long narrow fresh water ponds along the south side of the Island, east to Edgartown.

The conditions are very much like those on the eastern half of Long Island, and the Cladonia associations similar, although more numerous, especially on the barren, sandy soils around the southern ponds. Large colonies of robust *Cladinae* and *Unci-*

*ales*, including *C. rangiferina*, *mitis*, *sylvatica* and *tenuis*, and a little *impexa;* and *C. Boryi*, *caroliniana* and *uncialis*, were frequent, covering many acres almost exclusively. *Cetraria islandica* occurs, mixed with the *Cladoniae*, as it does in some places on eastern Long Island. Here I found *C. Boryi* with apothecia, for the first time in my experience, a very pretty lichen, with the brown fruits. Dr. Evans, up to that time, had seen fruiting *C. Boryi* only from Wellfleet, on Cape Cod, but later I found it profusely fruiting, at Nauset, Eastham, and South Chatham, on Cape Cod, and on Nantucket. It fruits more commonly northward, and diminishes in fertility southward, most material on Long Island and New Jersey being sterile. In my observation, on Nantucket and Cape Cod, *C. Boryi*, f. *lacunosa* is usually sterile, while f. *reticulata*, with cups, is often fertile, and apothecia are also found on the old, weathered, extremely perforated f. *cribrosa*.

A novelty to Dr. Evans was a very dwarfed *C. squamosa*, growing on the upper sides of cedar fence rails on a farm near Tisbury Pond, which Dr. Heinrich Sandstede determined as f. *clavariella*. A species which I had not found on Long Island, although I find it in central and northern New York, in old fields, open woods, and around ledges, was *C. multiformis*, f. *Finkii*, south of Vineyard Haven.

The most barren soils, in several places on the island, yielded about the same Cladonia associations, as in such soils on Long Island: *C. strepsilis*, f. *coralloidea; C. papilaria*, f. *molariformis; C. pyxidata*, var. *neglecta*, f. *simplex; C. pleurota*, *C. subcariosa*, f. *evoluta; C. cristatella*, ff. *Beauvoisii*, *vestita* and *scyphulifera; C. bacillaris*, and *C. nemoxyna*, f. *fibula*. *C. squamosa*, not distinctive enough to refer to any forms, occurred in wooded areas. I looked in vain for *C. floridana*, but suspect further search might disclose it.

I had to leave the western end of Martha's Vineyard, including Gay Head, for another time, but I am sure the sandy, dune areas there would be rewarding. No Man's Land, off the west end, is a terra incognita for Cladoniae, although a few bits of *C. uncialis* collected hastily there for me by the late Allen C. Eaton, of the Audubon Society, suggest associations like those of the larger island.

A trip to Nantucket, of two days, was made in May, 1937, with Mr. Murphy and Mr. Louis W. Anderson, also of the Torrey Botanical Club, to whose helpfulness with his automobile I owe many excursions to remote places for collecting. We visited several spots, along the moraine extending east of the town toward Siasconset, on the ocean beach and about Miacomet Pond to the south, and on sandy hills to the west. *Cladoniae* colonies proved to make up a large proportion of the vegetation of the island. *C. Boryi* was common and almost everywhere fruiting. A novelty to me was *C. rangiferina*, f. *leucitica*, in which some of the podetia diverge from the normal, tall, sterile forms, to shorter, fastigiate, fruited stalks, found near Gibbs Pond. *C. impexa*, f. *laxiuscula*, and *C. mateocyatha*, were species I do not find every day. Since these are the first Cladonia records, for Nantucket, under modern classification of the genus, I give them, complete, as determined with the aid of Dr. Evans, and, in a few cases, of Dr. Sandstede.

Gibbs Pond: *C. cristatella*, f. *Beauvoisii; C. Boryi*, f. *reticulata*, fruiting; *C. uncialis*, *C. rangiferina*, normal and f. *leucitica; C. caroliniana*, f. *dilatata; C. tenuis*, *C. mitis*, *C. papillaria*, ff. *molariformis*, and *papillosa; C. clavulifera*, f. *pleurocarpa;* and *C. Grayi.*

Altar Rock Hill: *C. Grayi*, *C. verticillata*, f. *evoluta; C. caroliniana*, f. *dilatata; C. mateocyatha*, (an American species published by Robbins in 1925, from Buzzard's Bay material, and which I have run across rather rarely, on Montauk Point, at Commack, L. I., and Charlottesburg, N. J.); *C. tenuis*, *C. impexa*, ff. *laxiuscula* and *condensata; C. cristatella*, ff. *Beauvoisii* and *vestita*, and excellent specimens of the pretty, pseudocupped f. *scyphulifera*, published by Dr. Evans in 1935; *C. clavulifera*, f. *nudicaulis*, and *C. mitrula.*

On the moraine a mile and a half west of Nantucket village: *C. tenuis*, *C. rangiferina*, some fruiting; *C. Boryi*, f. *reticulata*, mostly fertile; *C. mitis*, some *fertile*, which is not often the case south of Cape Cod; *C. caroliniana*, *C. uncialis*, *C. furcata*, var. *racemosa; C. macilenta*, f. *styracella; C. papillaria*, ff. *molariformis* and *papillosa; C. piedmontensis*, f. *obconica*, a species which I do not find often, although its small size probably causes it to be overlooked; *C. verticillata*, f. *evoluta; C. cristatella*, ff. *Beauvoisii*, *vestita*, *pleurocarpa*, and *ramosa*, the last uncommon, in my experience, and very pretty, with its numerous tiny apothecia, on closely branching podetia; *C. grayi*, f. *simplex*, as now distinguished by Sandstede, from the much similar, outwardly at least, *C. chlorophaea*, by the red reaction with paraphenylenediamine; and *C. subcariosa*, f. *evoluta*.

Corner of Siasconset Road and lane to Gibbs Pond: a novelty here was *C. rangiferina*, f. *patula*, with unusually tall podetia, strikingly upright and massed together; *C. tenuis*, *C. sylvatica*, *C. Boryi*, f. *reticulata*, fertile; *C. furcata*, var. *racemosa*, growing amidst the grasses in sandy soil, browned by exposure to the sun, quite a different habitat than those in which I find it in the Hudson Highlands.

On the sandy hills three miles west of Nantucket Village, overlooking Nantucket Sound: *C. tenuis*, *C. mitis*, *C. rangiferina*, and *C. Boryi*, f. *reticulata*, much of it fruiting.

Folger Hill, on the moraine three miles east of Nantucket Village: *C. coniocraea*, f. *truncata*, an old friend of hardwood forests inland; *C. pleurota*, f. *decorata*, small and delicately pretty; *C. cristatella*, F. *Beauvoisii*, *vestita*, and well defined f. *scyphulifera*, one of the most beautiful forms of this scarlet fruited species; *C. squamosa*, f. *levicorticata*, m. *epiphylla*, this modification being new to me; also the commoner m. *rigida;* as well as m. *pseudocrispata*, and m., *pityrea*, which latter Dr. Sandstede calls the more densely fruited modifications of f. *levicorticata; C. Grayi*, f. *carpophora; C. furcata*, var. *racemosa; C. tenuis*, *C. clavulifera*, ff. *nudicaulis* and *pleurocarpa; C. caroliniana*, f. *dilatata*.

Shawkeno, a knob of the moraine east of Nantucket Village; *C. uncialis*, *C. tenuis*, *C. mitis*, *C. Boryi*, ff. *lacunosa* and *reticulata*, the latter fertile.

Miacomet Pond on the south side of the island: *C. cristatella*, f. *scyphulifera*, this colony being almost all in this form with its pretty pseudo-cups; *C. Boryi*, ff. *reticulata* and *cribrosa*, both fertile; *C. rangiferina*, *C. furcata*, var. *racemosa; C. tenuis*, *C. uncialis*, *C. Grayi* and *C. macilenta*, f. *styracella*.

Hollis, Queens, N. Y.

## Local flora notes

*Aegilops cylindrica* and *Kyllinga pumila* in the Torrey Club range.—A grass which goes by the name "Jointed Goatgrass" in Hitchcock's Manual (p. 245) has appeared for several years in succession in vacant land at Franklin Avenue and Montgomery Street, Brooklyn. This annual, described as a weed in wheat fields from Missouri to New Mexico, recently introduced from Europe, seeds itself year after year and may therefore be considered as established.

An annual sedge, *Kyllinga pumila*, reported in the manuals from Delaware southward, was sent to me in 1937 as a weed in lawns at Hollis, Long Island. It is hoped, under the circumstances, that this southern plant will not establish itself in our area.—Henry K. Svenson, Brooklyn Botanic Garden.

### *Lythrum Salicaria* L. on Long Island, N.Y.

Mr. Raymond Torrey, in TORREYA, vol. 38, no. 1., records *Lythrum Salicaria* from Belmont State Park, L.I., with the statement: "Common along the Hudson but not hitherto recorded, as far as I know, from Long Island."

I have recorded this species from three localities on Long Island prior to 1925. It was first found established in a cranberry bog at Jamesport in 1918. It was also found back of the dunes near the ocean at Southampton in 1922, and in the North Sea region in 1923. Mr. William C. Ferguson recorded it from the vicinity of Ronkonkoma in 1926, but I do not know the location of his exact station.—Roy Latham, Orient, Long Island.

## BOOK REVIEW

### A key to Florida trees*

Florida is, indeed, the Land of Flowers. The visiting botanist from the north is likely to be overwhelmed by the immense number of species new to him. There are over three thousand species of plants in the state. Of these there are more than four hundred species of trees, more than in all the remainder of the United States. One hundred and seven species and subspecies of ferns and their allies are found within the border of the state.

Fortunately in only a few sections are there great concentrations of species. The total number is spread over five hundred miles in latitude and about one hundred miles in longitude except in the extreme northern part. In great areas, such as the "Piney Woods," pure Everglades and Prairie sections, only comparatively few species are found. In the far south, however, one will be kept very busy identifying the great variety of tropical and subtropical plants concentrated in the relatively small areas of the so-called Hammocks.

Added to the great number of native plants is a wealth of exotic ones from all quarters of the tropics which have been planted in the gardens of extensive estates, public parks, along highways and about small private homes.

"The Manual of the Southeastern Flora" by Small covers all the native flowering plants for the technical botanists and Mary Francis Baker's "Florida Wild Flowers" will enable the non-technical plant lover to identify the more striking plants at the time of the blooming.

Unfortunately, until recently, there has been no way of identifying the exotic trees and shrubs or the native ones when not in bloom. Miss Barrett's book of seventy-nine pages is designed to fill this lack. On the first few pages definitions of the small numbers of technical terms used are given. Nearly a page is devoted to the naming of places where concentration of exotics may be seen. Another page gives a short bibliography. The keys are based on leaf size, shape, margin, venation, and whether simple or compound.

Sometimes twig, and other characters are mentioned.

* A Leaf Key to Florida Broad-Leaved Trees, Native & Exotic, Except Palms. By Mary Franklin Barrett. Published by the author, 57 Union Street, Montclair, N.J., pp. 79, 1937. $1.50.

Forty-seven line drawings illustrate terms. These drawings are of plants described in the key and thus serve a double purpose. There is a short "general" key which leads to many special keys. Over 600 species of trees are worked out in these keys.

In using the book it is very easy to go astray as one must be sure he understands just what each term means. The use of the sizes of leaves or leaflets is rather dangerous as these vary so greatly. Leaves from various parts of a tree or shrub are necessary in many cases.

There are some exotics omitted and the book is bound to be out of date as soon as published, since new plants are being introduced every day. However, it is a step in the right direction. Use will bring out its good and its bad points.

Julius M. Johnson

## PROCEEDINGS OF THE CLUB

### Meeting of January 19, 1938

The meeting held at The New York Botanical Garden was called to order by the President, Raymond H. Torrey at 3:30 P.M. There were 37 persons present. The minutes of the Annual Meeting on January 4 were read and after due corrections were adopted by the club.

A letter from Lord, Day, and Lord Real Estate Company concerning the sale of a portion of Dr. N. L. Britton's estate was read. Action on this was referred to the council, to be considered at its next meeting.

Dr. J. S. Karling announced that Dr. Fritz von Wettstein, Director of Kaiser Wilhelm-Institut for Biologie is to be in the city in the near future and asked to have the regular meeting of the Torrey Club adjusted so as to have him as a guest speaker of the Club. It was moved and seconded that such authorization be granted. The motion carried.

The scientific program consisted of a lecture by Dr. E. W. Sinnott, Professor of Botany, Barnard College, Columbia University on "The Cellular Basis for Shape Changes in the Development of Cucurbit Fruits."

Dr. E. B. Matzke chairman of the nominating committee reported that this committee met and unanimously nominated Dr. R. P. Wodehouse as editor of the Torrey Bulletin.

The meeting adjourned at 5:10 P.M.

Respectfully submitted,

Clyde Chandler
Recording Secretary

### Meeting of February 1, 1938

The meeting of the Torrey Botanical Club held at the American Museum of Natural History on February 1, 1938 was called to order by the Vice-President, Dr. Alfred Gunderson at 8:15 P.M. There were 54 persons present. The minutes of the meeting of January 19 were read and after due corrections, adopted by the Club.

Mrs. Marguerite B. Fulling, 12 Gifford Street, Tuckahoe, N.Y.; Dr. J. G. Hopkins, 102 East 78th Street, New York City; and Dr. Adolph Pascher of Czechoslovakia were unanimously elected Annual Members of the Club.

The resignations of Miss Honora M. Hollinghurst, 2736 Creston Ave., New York City, and Miss Myrtle H. Waterfall, 32 Pennington Ave., Passaic, New Jersey from Annual Membership were accepted, after which they were elected Associates.

The resignations of Miss Helen Holme Bancroft, 2 Wellington Square, Oxford, England, and Mrs. Ruth H. Burritt, 16 Prospect Drive, Yonkers, N.Y., were accepted with regrets.

The deaths of Dr. John K. Small, an honorary Life Member of the Club, on January 20 and of Mrs. Arthur H. Graves, an annual member since 1926, on January 29 were reported. The President was authorized to draw up suitable resolutions to be sent to their families. A rising vote of sympathy for Dr. Graves in his bereavement was taken.

Dr. R. P. Wodehouse was unanimously elected Editor of the Bulletin.

Two members were elected to the Council. Dr. J. J. Copeland of the College of the City of New York, to succeed Dr. Wodehouse and Dr. W. J. Robbins, the newly elected Director of the New York Botanical Garden, to succeed Mr. Torrey. Dr. Wodehouse and Mr. Torrey having been elected officers of the Club became automatically ex-officio members of the Council.

Dr. J. S. Karling presented the report of the committee on the revision of the Constitution, and moved that the chair appoint the council as a committee to consider the amendments.

The scientific program consisted of a lecture by Dr. W. H. Camp of the New York Botanical Garden on "Plant Collecting in Southern Mexico." The lecture was illustrated with a fine series of pictures taken by Dr. Camp on his trip.

Clyde Chandler
Recording Secretary

## Meeting of February 15, 1938

The meeting of the Torrey Botanical Club scheduled for February 16th at The New York Botanical Garden was changed to February 15th at Columbia University. The guest speaker of the evening was Dr. F. von Wettstein, Director, Kaiser Wilhelm Institute für Biologie, Berlin-Dahlem, Germany. Dr. von Wettstein reported on "Some Problems of Heredity, Especially of Polyploidy in the Mosses."

Clyde Chandler
Recording Secretary

## NEWS NOTES

Dr. Frank Lamson-Scribner, United States agrostologist and first director of the Philippine Department of Agriculture, died in Washington on February 22. Dr. Scribner was known as an authority on American grasses. His work in the Philippines in developing modern methods of agriculture has had important results. Dr. G. E. Juan, who was associated with him in his work, writes the following: "There was something in the face of this modest man that manifested the true greatness of mind, which likewise appeared in all he said, obliging us to regard him with a sort of veneration. His spirit lives on in the new depths and breadth and fullness of life that through his work and influence have brought new comforts to the rural homes, new conveniences to the work of the farmer and the young people of the farms, new ideals of success and happiness on their own lands and among their own people."

Norman McClintock, photo-naturalist of Rutgers University died at Orlando, Fla., on February 27 in his seventieth year. He was well known for his time-lapse motion pictures of plant growth and movement and pictures of animal life. He had lectured widely on animal life and the growth of plants.

Dr. Paul B. Sears, professor of botany at the University of Oklahoma, author of "Deserts on the March," has been appointed head of the department of botany at Oberlin College.

### Protection for *Typha angustifolia*

An interesting bill which was introduced into the Assembly, in Albany, in the 1938 session, by Hon. Lawrence W. Van Cleef, of Seneca Falls, Seneca County prohibits the cutting or destruction of narrow leaved Cat-tail, *Typha angustifolia*, on state-owned lands, before Sept. 15 in each year. It seemed so unusual that I asked Assemblyman Van Cleef for his reasons for the bill. He explained them as follows:

"In my section of the state there is considerable state owned land, and on this land this plant grows in abundance. The tight cooperage trade or the making of wooden barrels tight enough to hold liquid contents use the leaf of this flag as a caulking between the staves to make these containers water tight.

"There seems to be no substitute for this method. This represents an industry in my locality of perhaps $200,000 per year.

If this flag is cut before September 15, it has not reached its mature state, and when dry it shrivels and is worthless."

Presumably the narrow leaved cat-tail is more suitable for such purposes, because longer and fitting the staves better than the broad-leaved species, *Typha latifolia.* If cut before Sept. 15, the seeds are perhaps not quite ripe, although extension is largely due to rootstocks. It is probably an interesting survival of an old custom, by which botanical principles have considerable practical application. R. H. Torrey

### Bill to Remove *Trapa natans* as a Nuisance

Another botanical bill introduced in the 1938 Legislature at Albany, proposed the eradication of the Water Chestnut, *Trapa natans*, as a nuisance along the shores of the Mohawk River. This bill, by Assemblyman James J. Carroll of Albany, was an amendment to the Conservation Law, "in relation to authorizing and directing the conservation Department to abate nuisances created by the presence of water or river chestnuts along the shores of the waters of the Mohawk River between the cities of Cohoes and Little Falls and to remove the same," and making an appropriation of $25,000. The bill was not reported out from the Committee and so was not acted on.

*Trapa natans*, the water chestnut, is a very interesting plant, in that after it was eliminated in America, following the Tertiary Epoch, by disturbances affecting many species, it has now appeared in North America, as a scattering adventive, which seems to do very well where established and to spread rapidly. Gray's Manual (1908) reported it in quiet streams, in Schenectady County, N.Y., which was evidently the source of the present large Mohawk Valley infestation, and in Middlesex County, Mass., "introduced from Eurasia." Mr. Carroll tells us that the plants in the Mohawk River are from seeds imported from Germany about ten years ago by a group of local sportsmen, who planted them thinking it would be valuable food for wild ducks and so a boon to hunters. Frere Marie-Victorin, of the University of Montreal, says it exists in southern Europe as a relic. Last year, driving north from North Carolina, waiting for the ferry from Colonial Beach to Potomac Beach, across the Potomac River, Louis W. Anderson, of Newark, picked up large quantities of the curious horned seed vessel, on the beach, so it must occur somewhere along the Potomac below Washington, where the seeds had been floated.

The trouble caused by the plant is due to the long tough stems, crowded with toothed leaves above, and finely cut leaves below water, which fill canals, ponds, and other quiet waters, so as to prevent bathing and boating. The name is abridged from *calcitrapa*, a caltrop, in allusion to the spreading points of the fruit. (The Bur-grass, *Cenchrus*, has a species, *tribuloides*, named for *tribulus*, another word for the caltrop, which was a sphere of iron, with sharp points sticking in every direction, to catch the feet of cavalry horses. The extent of the plant seems hardly to justify such potentous measures on the Mohawk. If it is established there, the chances are it will appear elsewhere down the Hudson before long.

Dr. Alexander W. Evans, professor of botany at Yale University celebrated his seventieth birthday on May 17. Dr. Evans is well known for his work on the Hepaticae and lichens. A special volume of Annales Bryologici is being prepared—with a biographical note and a portrait of Dr. Evans, together with some twenty five contributions from leading American and European bryologists and hepaticologists. (Science)

The New York Botanical Garden has recently acquired two large and important collections of Myxomycetes. Mr. Robert Hagelstein, Honorary Curator of Myxomycetes, has presented his collection of over 4800 specimens, the majority of which were personally collected by Mr. Hagelstein and his associates in the States along the Atlantic Coast from Maine to Virginia, and in the West Indies. Among them, also, are about 1500 specimens from other parts of the world received in exchange. The Garden has acquired by purchase the collection of nearly 3000 specimens made by Dr. William C. Sturgis, the result of a lifetime's collection and study, and accompanied by his literature, notes, drawings, and the correspondence with other students covering a period of 40 years. Both collections are rich in type material, rare species and varieties, and unusual phases. The entire collection of the Garden, which includes also the specimens collected by the late J. B. Ellis, now comprises more than 10,000 specimens and is probably the largest and finest in North America, and one of the important collections of the world. It is catalogued and arranged so that any particular specimen may be found. There is a large amount of duplicate material—even in rare species—which is available for exchange with other institutions and students, and correspondence is invited.

Louise Beebe Wilder, horticulturist and author, died in New York on April 20. Mrs. Wilder had been a member of the Advisory Council of the New York Botanical Garden since April 1936. In recent years it is doubtful if any one individual had a greater influence on American horticulture than Mrs. Wilder. In 1936 she was awarded the Gold Medal of Honor of the Garden Club of America for her "outstanding achievement in introducing the growing of alpine plants in this country, for her general knowledge of horticulture, and for her many books on gardening." Her books and innumerable magazine articles, one of which had appeared every month for a number of years in House and Garden, were noteworthy in that they reflected exclusively her own experiences. In her small but remarkable garden in Bronxville she raised rare plants from all over the world, and she was able to tell others how they too could develop unusual and successful gardens.

The first letter in many months from Dr. A. C. Smith was written February 22 from John Melville's ranch, Wichabai, on the Rupununi River in British Guiana, where Dr. Smith was making his headquarters for an additional three months of botanical collecting after other members of the Terry-Holden Expedition had returned to Georgetown and New York. The letter was received by Dr. W. H. Snedigar, herpetologist of the American Museum of Natural History, also remained to collect in an adjacent region. The two men plan to start for home in June, when John Melville, who has lived in the interior of British Guiana for many years, will transport them down to the coast.

With Mr. Snedigar, Dr. Smith worked in the Shodikar region—Shodikar Creek is the last eastern affluent of the Upper Essequibo—and in the Akarai Mountains for three weeks, spending a couple of days on the Brazilian slopes in the Trombetas basin.

Dr. Smith is the first man ever to make a botanical collection in the region of the upper Trombetas River, which until two or three years ago was entirely inaccessible.

The summer meeting of the American Association for the Advancement of Science will be held at Ottawa from June 27 to July 2. The Section on Botanical Sciences will hold a symposium on "Physiographic Problems of Northeastern Canada." The Ecological Society of America will have scientific sessions on Tuesday, Wednesday and Thursday and field trips on Friday and Saturday. The American Society of Plant Physiologists, the American Phytopathological Society, the Society of American Foresters, and the Genetics Society of America will also hold sessions.

# THE TORREY BOTANICAL CLUB

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Of former volumes, 24–64 can be supplied separately at $6.00 each; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Single copies (75 cents) will be furnished only when not breaking complete volumes.

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(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

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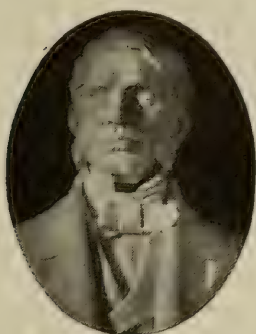
EDITED FOR

THE TORREY BOTANICAL CLUB

BY

GEORGE T. HASTINGS



John Torrey, 1796-1873

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# THE TORREY BOTANICAL CLUB

## OFFICERS FOR 1938



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All persons interested in botany are invited to join the Club. There are three classes of membership: *Sustaining*, at $15.00 a year; *Life*, at $100; and *Annual*, at $5.00 a year. The privileges of members are: (a) To attend all meetings of the Club and to take part in its business, and (b) to receive all its publications. Associates of the Club, $2.00 a year, have the privilege of attending meetings and field trips and of receiving the Bulletin of the New York Academy of Sciences.

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GEORGE T. HASTINGS
2587 Sedgwick Ave.,
New York, New York

# TORREYA

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## Rust Fungi in Norton, Massachusetts

Mabel A. Rice

Wheaton College, Norton, Massachusetts, lies in level country. Approaching by train from Boston one looks a regretful farewell to Blue Hill whose dome rises above a base line of swamp and wood. In compensation for this monotony the homesick botanist from the Berkshire Hills, fishing the swampy pools, finds a rich yield of pond scums; finally, she is almost content as the fields and woods prove a happy hunting-ground for rusts. These fungous parasites upon green plants are known to the world generally only through the wheat rust; and known there, perhaps, only as rusty, red or black spots on leaf and stem whereby the yield of the wheat grain is reduced. It is the seasons with over-wet harvests in which wheat rust especially flourishes. In the level, much-watered environs of Wheaton College a variety of rust parasites flourish.*

A certain botanist (35) explains that rusts "are dear to the botanical teacher because of their heterogeneously polymorphic ontogeny." For this reason, or for others which I will not pause to state, I have been pleased to find and to keep rusts as members of the Norton plant community. I report my findings in the list given below and proceed to add some words of introduction for those readers who would become acquainted with this plant community.

The list is in proper alphabetical order but I will take them as we meet them. First—on the campus the hollyhocks harbor a perennial rust. In a sheltered corner of a border against a brick building one may gather orange-flecked leaves in every month of the year. Even leaves dug from under a snow cover show orange pimples: spore clusters which in the spring will

* All of the rusts described as found near Norton are undoubtedly to be found in most regions where the same hosts grow, so may be looked for in the New York area. Editor.

break the leaf epidermis and be scattered upon new leaves to start an epidemic which, by midsummer, will have caused all the basal leaves of the hollyhocks to wither. This cosmopolitan has apparently colonized the world within the last century. Within the concise records of botanical journals, recording the occurrence of rust on plants of the mallow tribe, is hidden many a story of stow-away travel. (26) The earliest record proves it was growing in Chili in 1852. In 1857 it was reported on hollyhocks in Australia. The first record for Europe reports it in Spain in 1869. In 1873 it is reported from Bordeaux and Devonshire. By 1890 it had apparently colonized Europe and there is mention of it in Asia, Africa and the Canary Islands. In North American records the earliest date of its occurrence is 1888. (30) It evidently travelled westward. In 1905 it had not been found in Minnesota (33) but today it is found all over the United States. Many a gardener has come to accept yellowed leaves on the blossoming hollyhock spikes; the energetic gardener will need to give a weekly dusting of sulphur to his new plants if he will keep out the rust. (36) Even should this be effected at Wheaton we shall keep the rust in our community as the little round-leaved mallow, a weed of the campus green, is also host to the rust.

One needs microscopic mounts of cut leaves in order to see more of a rust plant than its fruit. The delicate, colorless strands of the fungus push their way between the cells of a leaf with a minimum of disturbance. They send only capillary branches through the cell walls and then, in contact with the living host cell, enlarge into swollen tips for feeding. These short branches, within the cell wall, but within the protoplasm only in the sense in which an ingested food particle is within an amoeba, are called haustoria. (49) By means of these the rust invader feeds without killing the host cells. The invaded cell is host perforce but the rust parasite feeds and drinks with a restraint which preserves the source of supply until, as the demands of fruiting time overcome the habits of restraint in the rust, water and sugar become scarce for two. Even then the drain upon the host is evident chiefly in the gradual drying out of the infected areas. It follows naturally upon these feeding habits of the rust parasite that a healthy plant is preferred as host: a reversal of the old dictum that the weakling is the natural prey to disease. (48)

The old Greek term, parasite, has undergone shifts in meaning since it was coined. Stripped of the connotation, flattery, it gives a graphic picture of the rust fungus which literally sits "beside the food" in the cells of a green plant. The rust fungus will take its food only from a living cell. Therefore rusts may not be grown on dead culture media in the laboratory as are bacteria. (43)

In the case of hollyhock rust a special interest attaches to the haustoria. The Swedish botanist, Jakob Eriksson, published studies of rust-infected hollyhock leaves in support of his "Mycoplasm Theory." (26) Eriksson was an authority upon cereal rusts and he formulated, in 1897, the "Mycoplasm Theory" to explain epidemics of grain rusts which he thought the rust spores alone were unable to initiate. (23) He described a formless fungous substance within the substance of the living host cells which he believed was handed on in dormant state from cell to cell of a growing plant, and from plant to seed. He figured these "internal germs" or "corpuscles speciaux" developing into definitely outlined spheres, lengthening into filamentous form within the host cells, penetrating the wall by capillary hyphae, finally developing a wealth of hyphae between the host cells—in short becoming the well known intercellular fungus which produces the eruption of spores upon the leaf surfaces. Marshall Ward in 1903 proved by a series of convincing drawings of infected grass tissue that Eriksson had reversed the story of rust development from a spore; that the "corpuscles" in cells of the leaf sections were merely the cut ends of haustoria; that the stalked filaments were not leaving the cells but were haustoria which had entered the cells for absorption purposes. (62) It is hard, however, to convince the originator of the fallacy of a pet theory. In 1904 and 1905 Eriksson again figured his "mycoplasm" in elaborate and accurate drawings of sections of rusted grain leaves: drawings which need only the addition of arrows of reverse direction to fit the accepted interpretation. (25) In 1911, still in elaboration of his theory, he published the afore-mentioned monograph upon the hollyhock rust; (26) also in 1917 and 1918 he figured the "mycoplasm" in another fungus, mildew of potato. (27) An Englishman again undertook a refutation. In 1920 Bailey chose the mallow rust for culture experiments. He took seeds from rusted plants and, by growing them in sterile globes, proved that the rust was not transmitted through the seed. (13) Nevertheless, in 1930, the year before Eriksson's death, in his second edition of Fungous Diseases of Plants, "mycoplasm" is described in the case of a variety of fungi, including hollyhock rust. (28) The theory is interesting as possibly a lingering trace of an earlier idea that fungi were a lower order of plant life spontaneously evolved by a diseased plant. (48)

Today, with the "Mycoplasm Theory" tabled, hollyhock rust still offers problems to the botanists. While rusts as a tribe specialize in different spore forms in order the better to keep in connection with their hosts, hollyhock rust bears only teleutospores. The story of its development is not yet fully told. Rusted hollyhock leaves offer their abundance for the problems. (3, 4)

Gardening and rust collecting are incompatible pursuits. This fact is brought home to me when one of the students in horticulture suggests cutting off and burning the "cedar apples" which prove the presence of rust infection in the red cedar trees in front of the library. Cut them off, and I should have to go farther afield to demonstrate rust galls to a class; or to watch the hard, brown balls take on the appearance of orange-colored chrysanthemums when, on some rainy day in May, the spores push out in gelatinous ribbons. Red cedar flourishes in the sandy environs of Norton and the coming of these orange, fungous balls on the dark trees along the country roads is, to the initiated, one of the annual spring events.

These spores, like those of the hollyhock rust, are teleutospores: "final spores" in the life cycle: but cedar rust is a plant of more diverse habits than the hollyhock rust. The spores require a change of host; they will produce infection only upon apple leaves. On the apple leaves the parasite ripens two other forms of spores: spermatia which ooze out on the leaf surface in tiny drops of nectar, and aecidiospores which form in little "cluster cups," aecidia. The latter spores carry infection back to the cedars and complete an interesting even though a vicious cycle. Thus the name of this rust is properly cedar-apple rust although the term, "cedar apple," has come to be applied to the galls upon the cedar trees. The apple host seems to fare worse than the cedar. Perhaps the shorter life term of the spring generation requires heavier feeding. At any rate the thickened, infected leaf areas lose their chlorophyll and the sugar-forming power of the tree must be much reduced. Our infected Bechtal crab shows poor health by its lessened flowering and its winter-killed branches. The apple rust lives for only one season but it is apt to recur annually in this region of abundant cedars. Their abundance makes the extermination of the cedar link impracticable; the apple growers instead must hunt for immune varieties of apple or keep busy with sprays. (20)

Red cedar is host to some twelve different species of the rust, Gymnosporangium. (9) Four of these occur in New England and I am chagrined to have found only two in Norton. The bird's-nest rust, *Gymnosporangium nidus-avis*, causes more disturbance to its host than does the cedar-apple rust, *Gymnosporangium juniperi-virginianae*. Not only do the leaves of infected branches develop the needle-shaped form characteristic of a seedling tree, an effect caused also by the apple-cedar rust, but the growth of the main axis is checked and the branches grow in a dense cluster: the "bird's-nest." (58) Red cedar is hardy stock. I have found it holding its own against these two parasites . . . with gay "cedar apples" on its green branches while half-dead "bird's-nest" clusters distort other branches. On these latter, gelatinous masses of teleutospores ooze out, in the spring, from cracks in the bark.

Around Norton shad bush is the most frequent alternate host for the bird's-nest rust. Both leaves and fruit show annually a heavy eruption of spermatia and aecidiospores. Shad bush is also alternate host to another Gymnosporangium of the Norton group: *Gymnosporangium clavariaeforme* which infects the prickly dwarf cedar or juniper. (58) Plants which were moved from the fields to the campus rock-garden develop each spring the characteristic masses of yellow teleutospores along the branches. Again the pathologist downs the gardener and keeps the rather scraggy juniper as a prized exhibit.

This is, indeed, a small list of Gymnosporangiums for Norton. I reflect regretfully upon time spent in the laboratory instead of in the field. We have white cedar as well as red cedar, and sweetfern in abundance but I have never found the white cedar rust which, unlike its thirty sister species, chooses sweetfern for its alternate host instead of one of the apple tribe. (34)

The proof of this alternation between white cedar and sweetfern as hosts for the rust, *Gymnosporangium Ellisii* was made in Arthur's laboratory at Purdue. (10) This is but one of many determinations of doubles in the rust world made since de Bary showed the way in 1865 by germinating teleutospores of wheat rust upon leaves of barberry and vice versa. (14) In this connection an amusing bit of ancient history in botany is recorded in the Gardener's Chronicle of 1867. An Englishman named Smith expresses doubt concerning the German de Bary's conclusions. He writes: . . . "If any botanist will cause an Aecidium-spore . . . to germinate on corn . . . and produce from its mycelial thread a Uredo-spore . . . the case will be proved, i.e., if the said botanist can permanently preserve his specimen on a microscopic slide, and send it to the British Museum for all comers to examine." (55) It may be noted that in Europe the term, corn, means any cereal except maize.

The barberry is allowed to rust undisturbed in the Wheaton Pines since wheat is not a commercial crop in this region. Two other grains also furnish us rust. Each fall college opens in time for us to find rust on leaves of late-standing corn. On the leaves of these dying corn stalks it is possible to find many examples of the "green island" phenomenon. (43) Even when the leaves are dry and yellow the infected area around each rust pustule is green. The fungus seems to serve as a water reservoir and, as the host plant ages, longer life is given the infected cells than those of the rest of the leaf. (49) The corn leaves bear both the brown pustules of uredospores which spread the infection on corn all summer and the black teleutospores which, after overwintering, can complete the rust cycle on the yellow-flowered Oxalis of our fields. This is another of the cycles established by Arthur (8) and although rust on Oxalis is of rare occurrence in the field it is easy to make the shift on Oxalis weeds in the planthouse. The overwintering which the teleutospores require may be effected in the ice-chest. One fall the class had the further good fortune to find crown rust of oats, so called because the thickened tip of each yellow teleutospore suggests a crown. The oats had been harvested but, judging from the condition of the volunteer tufts which had escaped the sickle, the crop must have been heavily rusted. That field has not again been planted to oats. I never learned whether the farmer gave it up because he found out the significance of a hedge of buckthorn just across the road. On this hedge and on buckthorn in the college woods one may find, each May, the alternate stage of the oat rust.

These grain rusts are of special interest because the records of their occurrence carry us back to the beginnings of knowledge about rust fungi. The Romans called rust Rubigo and worshipped the god Rubigo each April as a protection against rust. The name is perpetuated in the name of one of the wheat rusts, *Puccinia rubigovera*. (11) By the help of the microscopes of the eighteenth century rusts were recognized as plants and called fungi. The Italian, Fontana, in 1767, made a very creditable drawing of spores of wheat rust and states that they "are very minute plants that nourish themselves at the expense of the grain." Fontana was an enthusiast over microscopic study and recommends more looking and less theorizing: "The talents of many learned botanists could be used to greater advantage in the little-known fields of the vegetable kingdom, if, instead of furiously pursuing new systems and enriching with new barbarous words one of the most delightful and perhaps the most useful branches of the science of nature, they observed the structure of plants more closely . . . ". (31) Perhaps because men did not follow this advice, gross misconceptions about the nature of rust fungi persisted until de Bary, by his researches, made a real science of the study of fungi. (11)

At first no different species of the grain rust were distinguished but gradually it became clear that the grain rusts are strict specialists, that wheat rust will not infect oats, nor the reciprocal. As the facts stand today the story is even more amazing. The same Jakob Eriksson whose "Mycoplasm Theory" botanists did not accept is recognized as pioneer in the work of distinguishing "form species" of the cereal rusts: forms which look alike, which can be distinguished only "in that every form is almost exclusively confined to its particular cereal and that consequently it is able to infect no other cereal but that one." (24) Before 1890, Eriksson states, only three species of grain rust were recognized: one on oats, one on wheat and rye, and one, *Puccinia graminis* which was thought to be able to infect all the cereals and many species of wild grasses. By 1898 Eriksson had differentiated ten distinct forms of rust on the four cereals. (24) An American has been foremost in continuing this work with *Puccinia graminis*. In 1926 Stakman distinguished some fifty "physiologic forms" of *Puccinia graminis tritici* in the United States. (57) Work of the last ten years has raised the number to nearly one hundred fifty. These results are the outcome of an attempt to breed rust-resistant varieties of wheat. (29) It will be readily seen that this great number of biologic species of the rust has added difficulties to the solution of that problem.

Rust-resistant varieties have been much more successfully produced against the less highly specialized asparagus rust which we find in Norton on roadside escapes from gardens. The development of a resistant asparagus was the work of the United States Department of Agriculture in cooperation with the Massachusetts Agricultural Experiment Station. Asparagus varieties from all parts of the world were grown at Concord, Massachusetts. A cross between English and American strains produced the now world-famous Washington strains. (59, 60) Agricultural handbooks now advise the control of asparagus rust by the planting of rust-resistant strains; gardener's catalogues list Martha and Mary Washington asparagus.

Asparagus rust was described by de Candolle in 1805 (16) but the first record of its occurrence in America was in a report by Halsted in 1896 of a rust epidemic in New Jersey, Delaware, Long Island and New England. (38) This destruction of the eastern crop gave California a chance to develop the asparagus culture but the rust travelled westward and in seven years had reached California. The rust produces all spore forms on the one host but the summer uredospores are thought to be chiefly responsible for the spread of infection. Blown by moist winds they could colonize nearby fields, and so, slowly but independently, travel across the continent. The picture is graphically drawn by R. E. Smith. "When one sees the cloud of dust which arises from rust plants when disturbed, coloring . . . anything passing through the field a deep red color, flying away in the wind like smoke, covering the berries which contain the seed, covering and coloring the ground from which roots are dug for sale, and reflects that each minute particle of this dust is a rust spore, it would seem that the spread of the disease must occur in many ways through the agency of these summer spores.

Practically, however, there appears to be but one mode of distribution at all common, which is the distribution of uredospores by the wind." (54)

I have called asparagus rust a less highly specialized parasite. Evidence of this is seen in its lesser adjustment to life with its host. It is definitely toxic in its effect upon the invaded cells. The leaves of an infected plant soon fall. The plant thus loses the power of building food for next season's growth and the asparagus stock is weakened. In striking contrast to the asparagus is the rust of Pyrola, the little shin-leaf of our woods. Here is restraint in feeding and an almost entire absence of toxic action by the rust parasite which makes it likely that rusted Pyrola will long continue resident in the Wheaton Pines. All through the twenty-five acres of wooded land which adjoin the campus grow scattered patches of shin-leaf. The shining, evergreen leaves make a pleasing contrast to the ground cover. By the end of March, sometimes when the snow has barely gone, another color note is added for in many of the patches the under surface of each leaf is covered with an eruption of orange-colored spores. A week or two later pustules of the paler yellow teleutospores may, by aid of a hand lens, be distinguished among the uredospores. These teleutospores germinate while still on the Pyrola leaf and their secondary spores carry infection to spruce trees. Scales of young cones are said to be particularly susceptible. This spruce rust is well known in northern forests but I have never found it here. (32) The Pyrola rust apparently thrives without its alternate host. It lives as a perennial in the rootstock of its perennial host and each spring the abundant uredospores can infect other Pyrola plants. There are many perennial rusts but our interest in this one centers upon the long vegetative period of the fungus. It does not fruit on the young spring leaves but comes to fruition the following spring on the overwintered leaves. These wither normally in May as new leaves develop and the rust whose pustules have broken the under epidermis seems to make little difference in the time of their withering. (52)

Hepatica rust is companion in the spring to Pyrola rust but with a different sequence. Hepatica plants are not found in Norton but I have transplanted them from the Berkshire Hills to our Botanic Garden. The rust came with them and each spring certain plants send up rusted leaves as their first growth. The leaves are punctate first with tiny, sticky spermogonia; then between the spermogonia there develop the flower-like cluster-cups of aecidiospores. Even with the heavy spore production the leaves remain green but there is sufficient toxic action to stimulate greater growth with abnormal results. The leaves are smooth instead of downy, the blades are reduced in size and stand stiffly erect on long petioles. Blossoms are few on an infected plant; instead of blossoms a set of normal leaves follows the rusted ones; the rusted ones die off by the end of May and the rust, hidden in the rootstock, is seen no more until next spring. (52) I have watched the recurrence of rust on these same plants for half a dozen years but there has been no infection of the other Hepaticas. The aecidiospores need an alternate host, the plum or cherry for their growth. I have made this cross infection in the planthouse but I allow neither plum nor cherry near my bank of Hepaticas.

It is intriguing, although perhaps futile, to speculate over the choice of hosts by these rusts which require a change of host for the completion of their life cycles. A chance wind may explain the transfer of spores but there seems, in the dissimilar hosts, no common character by which to explain such limitations. (40) The contrast in hosts is particularly striking in the case of the rusts of coniferous trees. Aecidiospores from rust on the larch infect willow. When we explore the shores of the Reservoir, left dry in the autumn, we find the willow leaves peppered with yellow clusters of teleutospores for the larch. The seemingly wayward fancies of the cedar rusts have been mentioned. The spruce rust at least chooses a perennial evergreen from among the herbs at its base. The blister rust of the white pine, however, jumps to currant and gooseberry for its teleutosporic stage.

Here is another immigrant from Europe. In 1906 it was found in a plantation of white pine seedlings which had been imported from Germany; at about the same date it was found on imported white pine seedlings in other New England states and in New York. Its eradication has now become a forestry problem. The government, in an attempt to save the valuable white pine, has undertaken to eradicate the currant tribe, the lesser host. With the currant link removed, an infected pine tree is not a menace in a community but the tree is doomed once the main trunk is invaded. We hope that pruning has saved the one or two infected pines of this vicinity. Infection is most generally through the leaves or the bases of the leaf clusters. In mature trees it may be some years before the cambium, the growing layer of the trunk, is reached and killed by the fungus but seedling trees are quickly girdled and killed. (18)

The pitch pine is host to several rusts, each one with a different alternate host. From New Jersey southward there is a species which shifts to oak. Around Norton in May, I have found on needles of the pitch pine the tiny projections of aecidia of *Peridermium acicolum.* In the fall any clump of goldenrod may show the bright yellow clusters of its uredo and teleutospores on the under-leaf surfaces. (45) In the fall also one finds on leaves of sweetfern the slender, brown, hair-like clusters of teleutospores of *Peridermium comptoniae.* The aecidial stage of this rust deforms the pitch pine host; it causes a fusiform swelling of the main stem of young trees. (56)

These tree rusts have taken us far afield but if we walk again through college grounds we may add to our list two more rusts of double hosts. In May the elder bushes are in full foliage and both leaves and stems are swollen with a rust infection. Arthur in 1902 linked the elder rust with a teleutosporic stage on one of the sedges. His description of his preliminary guesses and his methods of vertification give incidentally a glimpse of a man with an absorbing interest. (7)

The fields in May are whitened by blossoming Houstonias. At close range one may distinguish among them clumps where the flowers stand taller than their neighbors and where the leaves have lost all green color. Such plants are found to be literally covered with eruptions of spermatia and aecidia; even the calyx of the flowers shows the infection. The rust here has much the same effect as has the absence of light upon plants. Lacking light a plant does not build chlorophyll and therefore cannot build sugars. The botanist calls this condition etiolation and explains: "An etiolated plant is growing to death at the expense of what organic carbon compounds it possessed at the beginning." (6) In the case of the rusted Houstonias the parasite is the cause of the etiolation yet in other respects this parasite shows the usual restraint and adaptation of a rust to its host. Under microscopic examination the infected cells show no abnormal effects other than lack of chlorophyll. The Houstonia rust shifts to another meadow plant. Blue-eyed grass, a neighbor in the fields, is the teleutosporic host. (53) A summer resident should certainly find it in Norton.

Rust of carnations, although of greenhouse cultivation, stands in our list since we find it frequently in nearby greenhouses. This cosmopolitan rust, a pest to carnation growers, came from Europe and seems to have left behind its aecidial host. (37) Indeed its claim to heteroecism (14) rests merely upon the reports of a few cross inoculations from *Euphorbia geradiana* to the carnation. (12) Both in Europe and America the rust continues upon the carnation by means of its repeating spores, the uredospores. For a fungus which can pass the winter under glass no other spore form, and no alternate host is necessary.

There are several single-host rusts at Wheaton. Hollyhock rust which we met at the start is one, and asparagus rust. Potentilla rust is another. As the March sun strikes along the foundations of our brick buildings flecks of orange appear on the green rosettes of the "five-finger" Potentilla. By April the uredospores are so abundant that patches of Potentilla in the turf near the rock garden seem touched with orange paint. Uredospores of this rust act like aecidiospores in that a cell fusion which precedes their formation gives them double nuclei. (17) Here is introduced the fascinating, unsettled question of sexual reproduction in the rusts. Structures which produce egg cells have not been found in rust fungi. When in certain rusts a fusion between cells (17) or in others a migration of a nucleus into a cell at the base of an aecidium was discovered (15), rusts were treated as examples of plants where a substitute fusion had taken the place of fusion between sexual cells developed on sexual structures. When Craige took his cue from the chance fly in the planthouse and mixed the drops of spermogonial fluid upon a rust-infected barberry leaf he discovered that spermatia function in producing aecidiospores. (19) This discovery that the spermatia, long considered functionless spores, have a part to play in reproduction has renewed the interest of botanists in bean rust (5, 6), in wheat rust on the barberry (1, 2), in corn rust on Oxalis (50), in all spermogonial-aecidial rust stages . . . but a discussion of this problem would keep us too long away from our campus wanderings. Rust of violets is good material for work upon reproduction (50) and Wheaton has an abundant supply. *Viola fimbriatula* blooms in April and along with its deep blue blossoms the spermatia and aecidiospores of rust make gay yellow spots on its leaves. The familiar, long-stemmed, blue violet follows with plenty of rust. Although building alterations destroyed a choice plot there are still rusted specimens in the rock garden. The little white violet of the woods is also host to the rust. It is upon leaves of this white violet that we are most apt to find the black teleutospore clusters in the fall. Thus we complete the cycle of violet rust.

In May a rust appears wherever dewberry trails over fields, across footpaths, or along roadsides. Its unfolding leaves are covered with a crust or caeoma of aecidiospores. This rust, *Caeoma nitens*, introduces still another problem. Its aecidiospores should reinfect dewberry and later, teleutospores from that generation should complete the cycle. Kunkel in a series of germination studies, where he watched under the microscope the germination of spores in drops of various nutrients, discovered that some of the aecidiospores of *Caeoma nitens* acted like teleutospores. These spores sent out a four-celled filament and formed the characteristic four spores by which a teleutospore starts a new rust generation. (41) Here is seen the scientist's "deep insatiable curiosity about the things of nature." (39) Kunkel examined spores of *Caeoma nitens* gathered from New Hampshire to Virginia and discovered a short-cycle and a long-cycle race. The decisive character is the habit of the germinating aecidiospores but he found also a slight difference in size and shape of the spores and a color difference. The spores of the short-cycle race match Cadmium orange; those of the long-cycle, Xanthine yellow. One may check ones color-sensitiveness to yellows by matching leaves of rusted dewberry and then verify the rust strain by sowing the spores in drops of water and watching their germination. There is, of course, a phylological interest here. Which is the primitive race? Kunkel thinks the short-cycle one the primitive and the one with an extra spore form the derivative. (42) *Caeoma nitens* is apparently trying out experiments. Pady reports that in new infections of blackberry canes the rust grows through the host cells instead of between the cells as is usual for a rust. It develops coiled branches within the cells; only after about the tenth day of an infection are these gradually replaced by intercellular runners with haustoria. This is evidently a device to further the quick establishment of the fungus in its host. (46)

Another rust, *Kuehneola albida*, infects the blackberry but this one we find in the fall. We prize it then for we can get a class exhibit as long as the reddened blackberry leaves hang on the canes. Clover rust is also on the campus late in the fall. We find it on both the white and the red clover. There is a nice problem here in distinguishing the form-species of *Uromyces trifolii*. (44) Snapdragons in the President's garden can usually be depended upon to give us samples of rust until frost kills the host. Snapdragon rust has reversed the usual course of emigration. It was reported in California in 1895 and by 1915 had colonized New England both in greenhouses and in out-of-door gardens. The rust perpetuates itself by means of the abundant uredospores; its teleutospores apparently do not germinate. As is the case with the carnation rust, teleutospores "are not a necessity for a fungus the host of which occurs both under glass and out of doors." (21)

Several of the rusts on native plants take kindly to plant-house culture. *Chrysomyxa cassandrae* was discovered in mid-winter on a plant of leather-leaf which had been brought in for forcing in a terrarium. Dandelion rosettes brought into the planthouse bloom and fruit in the winter. We have even raised a crop of seedling dandelion and have raised rust upon them: a chance infection from a rusted rosette. The rust of Jack-in-the-pulpit can be forced along with its host. The stage which bears spermatia and aecidiospores is perennial in its host. It is wise to locate the rusted plants in the woods when these spores cover leaves and spathes in May if one would find the underground corms for transplanting in the fall, for by that time the leaves are dead and the late spores, the teleutopsores, are scattered in the soil where they may infect new shoots as they push up in the spring. We do not need this late stage for the planthouse; we have only to dig the labelled corms and in February, in our terrarium watch the rust pustules appear even before the Jack leaves unfold.

This adaptable rust seems an interesting plant rather than a disease-producing fungus. Without attempting to minimize the loss to agricutlture from rusted grain, or to our forests from rusted pine, nevertheless, under the microscope a rust-invaded plant cell shows us a very delicate interrelation between host and parasite. I have even on occasion taken up literary cudgels in defense of Jack-in-the-pulpit rust when it has been used as an example of a toxic parasite. (22, 51) The development of mutualism is an interesting matter. It is chief among those other reasons because of which I welcome these twenty-six rusts as members of the Norton plant community.

| *Rust* | *Host* |
|---|---|
| 1. *Aecidium punctatum* Pers. | *Hepatica acutiloba* DC. |
| 2. *Aecidium sambuci* Schw. | *Sambucus canadensis* L. |
| 3. *Caeoma nitens* Burrill | *Rubus villosus* Ait. |
| 4. *Chrysomyxa cassandrae* Tranz. | *Chamaedaphne calyculata* (L.) Moench. |
| 5. *Chrysomyxa pyrolae* Rostr. | *Pyrola americana* Sweet. |
| 6. *Cronartium ribicola* F. de Waldh. | *Pinus Strobus* L. |
| 7. *Gymnosporangium clavariaeforme* DC. | *Juniperus communis* L. & *Amelanchier oblongifolia* (T. & G.). Roem. |
| 8. *Gymnosporangium juniperi-virginianae* Schw. | *Juniperus virginiana* L. & *Malus* sp. |
| 9. *Gymnosporangium nidus-avis* Thaxter | *Juniperus virginiana* L. & *Amelanchier oblongifolia* (T. & G.) Roem. |
| 10. *Kuehneola albida* Magnus | *Rubus* sp. |
| 11. *Melampsora Bigelowii* Thüm. | *Salix* sp. |
| 12. *Peridermium acicolum* Underw. & Earle | *Pinus rigida* Mill. & *Solidago* sp. |
| 13. *Peridermium comptoniae* Orton & Adams | *Myrica asplenifolia* L. |
| 14. *Phragmidium potentillae-canadensis* Diet. | *Potentilla canadensis* L. |
| 15. *Puccinia antirrhini* Dietel & Holway | *Antirrhinum* sp. |
| 16. *Puccinia asparagi* DC. | *Asparagus officinalis* L. |
| 17. *Puccinia coronata* Corda | *Avena* sp. |
| 18. *Puccinia graminis* Pers. | *Berberis canadensis* Mill. |
| 19. *Puccinia malvacearum* Mont. | *Althaea rosea* Cav. & *Malva rotundifolia* L. |
| 20. *Puccinia sorghi* Schw. | *Zea Mays* L. |
| 21. *Puccinia taraxaci* Plowr. | *Taraxacum officinale* Weber |
| 22. *Puccinia violae* DC. | *Viola* sp. |
| 23. *Uromyces caryophyllinus* Wint. | *Dianthus caryophyllus* L. |
| 24. *Uromyces caladii* Farl. | *Arisaema triphyllum* (L.) Schott. |
| 25. *Uromyces houstoniatus* J. Sheldon | *Houstonia caerulea* L. |
| 26. *Uromyces trifolii* Lev. | *Trifolium* sp. |

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Wheaton College
Norton, Mass.

## FIELD TRIPS OF THE CLUB

### Trip of March 20 to Franklin Lake, N. J.

Through some mischance no announcement of the trip was published in the papers so the leader was the only one present.

Nevertheless, I was determined to make the trip count for something, so I walked up to the Persimmon stand myself and took notes on the height, diameter, and other data for all the trees I could find. I found a very interesting situation. The trees which, as you know, grow on the western edge of the swamp, have the characteristic of sending out occasional new shoots from their roots which are running parallel to the surface of the ground, so that the continuance of the stand does not seem to depend on seeding, although in a few cases seeds may have germinated. It seems to be rather an establishment of the group due to this underground method of asexual reproduction, such as we get in locusts and sumacs, and, further, the trees seemed to have been there a very long time, much longer than appears from their diameters, for I found old trunks, weathered and bare, which are Persimmon wood. My theory is that a crow, or some other large bird, carried a Persimmon fruit there many years ago, and the stand has been derived from that single event.

There is a similar stand of Persimmons at Lighthouse Point, New Haven, which has always been of great intest to Connecticut botanists. Also, it would be interesting to find out other stations of the Persimmon in this region, which must be pretty close to the northern limit of the range. The trees at Franklin Lake do not seem to be very thrifty. I saw many cases of dying-back, due to the cold weather.

Arthur H. Graves

### Trip of April 10 to the Pine Barrens of N. J.

Attempting to meet the party near Cedar Bridge, the writer drove direct from Trenton, N.J. to the old location for *Corema* described by Redfield in the Bulletin of the Torrey Botanical Club, Vol. XVI, 1889. "road running west-northwest from Cedar Bridge . . . for about two and one-half miles to where the road is crossed by a north and south road, and following this for half or two-thirds of a mile south."

"This region is a most remarkable one, which cannot fail to impress the visitor with a sense of loneliness and sterility. It forms a part of the water-shed or divide between streams flowing into the Atlantic and those discharging into the Delaware River. Locally it is known as the West Plains, but these so-called "plains" are long, undulating swells of sand, sometimes rising to a height commanding extensive views over a desert of sand so sterile that even the trees of *Pinus rigida* which sparsely clothe it can attain only to a height of three or four feet. No sign of human life is visible, and one could easily imagine himself in the midst of a vast wilderness. We followed the rising swells of ground . . . both to the east and west of the road to the extent of at least half a mile, and for a like distance in the opposite direction without losing sight of the *Corema*, and we probably did not reach its limits. In some places the patches were separated by intervals of some rods, but often scores of them were seen at once, and in many places they became confluent in large masses, reminding one of the appearance of the plant at Plymouth, Mass."

The writer has found *Corema* at this place for the last five or six years, but only in the roadway or very close beside it. However, during the last year, some government agency with its usual lack of consideration in such matters, or its ignorance, has repaired the road and destroyed the last vestige of the plant in this locality. About half a mile further south, however, or exactly one and one-tenth miles from the main road, it can be found along both sides of the old road where the new did not follow it, and for some distance back on the south side of this road.

At this date it had passed its time of bloom. *Pyxidanthera* was only occasionally opened. Scattered plants of Arbutus were for the most part past bloom. Everywhere trailed the graceful *Arctostaphylos*, and in favored locations rose the upright stems of *Dendrium buxifolium* whose buds were beginning to show considerable color, and the green bristles of *Hudsonia ericoides* were pricking through its drab winter coverings.

W. L. Dix

### Trip of May 1 to Seven Wells, Dover Plains, N. Y.

Beginning at Pawling the party motored towards the Seven Wells which are about two miles below Dover Plains on the east slope of Chestnut Ridge. Before reaching this destination we stopped just outside Dover Furnace along Route 22 to inspect a field of Quaker Ladies nestled in a narrow valley. About two to three acres were completely white as though Spring's last snowfall still lay on the ground in thin drifts. The patches which varied from white to violet blue bore a delicious fragrance in the hot sun. Outcroppings of the late Cambrian limestone along the valley bore many Columbines and edgings of Early Saxifrage. Way up on the hillside Dogwood bloomed at frequent intervals, and at another corner of the little valley a group of Apple trees was in full bloom.

A diminutive violet, probably *Viola fimbriatula*, bloomed profusely among the Quaker Ladies and occasional patches of *Antennaria dioica* were already commencing to present ripe seed heads to the spring winds. The whole place seemed like a little Alpine meadow according to one of the guests.

One limestone outcropping was covered with walking fern. Here and there were tufts of *Campanula rotundifolia* which will later spread a tint of blue against the ledges of white. Some plants of Columbine had possession of one portion, however, and we all agreed that limestone is the best background for these graceful red and yellow flowers.

Driving on the party came to Seven Wells. We crossed west over the railroad and a quarter mile further on parked the car and began the steep ascent to the top of Chestnut Ridge.

Seven Wells gets its name from the huge potholes which have been eaten out by a glacial stream that followed one of the numerous faults in this region. The waters tumble from one pothole into another, some being connected by six foot wide and thirty foot deep flumes. Most of the potholes are at the head of the ridge. Lower down the waters rush noisily over a series of falls and delightful little pools to the Ten Mile River below. Hemlocks on both sides shaded and cooled the slopes of the stream and plenty of laurel clustered around the dark green conifers.

Our most notable find was three flowering plants of *Dirca palustris*, not a common plant in these parts. A few flowers of Trailing Arbutus appeared as holdovers in this cool ravine. Their odor was eagerly sniffed by the party. Clean fresh green mats of Canada Mayflower were beginning to flower. Pink

Lady Slippers had large buds, still green however. Trout Lily and Crinklewort appeared all over. Mountain Maple was noticeable in spots. Plenty of Red-berried Elder was in full bloom. Its refreshing perfume was noticed by all the party. Really, this spot seemed like a bit of the Catskills or Adirondacks transplanted way south. It seemed very wild and far away from the populated valley beneath.

Just before we reached where the stream dipped over the head of Chestnut Ridge the largest potholes came to view, some being almost thirty feet across. These are some of the largest in the east comparing with those at Lost River, New Hampshire.

Following the stream back we saw Marsh Marigold, Fringed Polygala, *Viburnum alnifolium* in blossom. Also *Panax trifolium*, *Comptonia asplenifolia*, *Viola blanda*, *pubescens*, *rotundifolia*, *cucullata*, *papillionacea*, and *conspersa*. The flowers of the Early Meadow Rue, were delicately beautiful especially the hazy purplish tinted staminate ones. *Anemonella thalictroides* and *Anemone quinquefolia* were very much in evidence. *Azalea nudiflora* was just commencing to bloom. Clumps of Golden Ragwort were almost open and likewise *Erigeron pulchellus*. Several fine clumps of Wild Ginger were also noticed.

We saw only the Purple Trillium and looked in vain for Canadian Yew in the Seven Wells locality, nor did we come across Goldthread. Possibly these and other plants of northern and cool mountainous altitudes may yet be located here. Certainly this ravine proved more interesting than the short spectacular beauty of the Old Stone Church Ravine at Dover Plains. In fact the Seven Wells locality took all our time and so we left the latter spot out of the trip entirely.

George Dillman

## The May 20–22 Week-end at Branchville, N. J.

Nearly sixty members and friends of the club, including members of the Newark Museum Nature Club, attended the thirteenth Nature Conference at The Pines. Mr. and Mrs. George T. Hastings were host and hostess for the conference, Mrs. Stephen Smith and Mr. W. M. Husk of The Pines gave the members the same considerate service we have become accustomed to in past years. Dr. Henry B. Kummel led trips on

Saturday and Sunday for those interested in geology, and on Friday evening gave a talk on the geology of northern New Jersey, illustrated with slides showing the geological history and present arrangement of the rocks of the region. Professor Olover P. Medsger led general nature trips both days and on Saturday evening gave an illustrated lecture on nature photography. Mr. and Mrs. S. Harmsted Chubb led early morning bird trips as well as morning and afternoon trips. They reported three black terns and a Florida gallinule with young at Culver Lake, the first report for these birds in the Branchville region. Five white-crowned sparrows, late migrants, were also seen. On Friday evening Mr. Louis Anderson showed a series of his beautiful colored lantern slides of insects and flowers.

George T. Hastings

### Field Trip of May 28–30 to the Catskills

Five members were present for this trip. On the 28th we collected in Woodland Valley, Westkill Notch, and Stony Clove; on the 29th in Watson Hollow and in the region of the Ashokan Dam; and on the 30th we climbed up Cornell Falls, collecting en route. The following mosses were of particular interest—*Neckera gracilis* (James) Kindb., *Rhacomitrium aquaticum* Brid., *Anomodon tristis* (Cesat.) Sulliv., *Rhapidostegium Novae-Caesareae* (Aust.) R. & C., *Rhabdoweisia denticulata* B. & S., *Forsstroemia trichomitria* (Hedw.) Lindb., *Pohlia cruda* (L.) Lindb., *Fissidens bryoides* (L.) Hedg. The following ferns were also of interest,—*Cryptogramme Stelleri*, *Woodsia ilvensis*, *Dryopteris Goldiana*, *Polystichum Braunii*, *Cystopteris bulbifera*. Of flowering plants a colony of over twenty-five *Habenaria orbiculata*, was of greatest interest. There was also a fine stand of *Linnaea americana*, and specimens of *Aconitum noveboracense* and of *Clintonia borealis*. Bird lovers were thrilled with nests of the junco and the black-throated blue warbler.

Inez M. Haring

### Trip of June 4 to Washington Valley, N. J.

Twenty-three members and guests were present on the trip to Washington Valley, near Watchung, N.J. Three hundred and forty-five different species and varieties of plants were identified, among which were such interesting ones as *Obolaria* *virginica, Fissipes acaulis, Chamaelirium luteum, Menispermum canadense, Celtis crassifolia, Dioscorea villosa, Myosotis laxa, Aureolaria virginica, Cimicifuga racemosa, Triosteum aurantiacum, Pinus virginiana, Viola emarginata, V. triloba, V. sagittata, V. palmata, V. pubescens, Viburnum trilobum,* and *Osmunda spectabilis.* The noteworthy stand of *Hieracium murorum* was seen in full bloom. *Thalesia uniflora* and *Selaginella apus* were found in abundance, as well as such naturalizations in the fields of Washington Valley and the slopes of both the First and Second Watchung Mountains as *Coreopsis grandiflora* var. *villosa, Elaeagnus umbellata, Berberis thunbergii, Hesperis matronalis, Salix lucida, Pinus sylvestris, Narcissus poeticus, Calycanthus floridus, Deutzia scabra, Spiraea prunifolia* var. *plena, Vinca minor, Asparagus officinalis,* and three species of *Ligustrum. Diervilla lonicera* and *Robinia viscosa* were found in full bloom on the Second Mountain, as well as two species of *Radicula. Callitriche palustris, Alisma subcordatum, Isnardia palustris, Acorus calamus, Eleocharis,* and *Sparganium* were studied along the brookside, as well as 5 or 6 species of *Salix* and, in the woods, 2 species of *Crataegus—C. crusgalli* and *C. uniflora.* Interesting cultivated plants studied included *Acer pictum, A. platanoides* var. *schwedleri, Castanea sativa* (in fruit), *Larix decidua, Anchusa italica, Cephalaria alpina, Echinops ritro, Lychnis maritima, Fraxinus excelsior, Ranunculus repens* var. *plena, Syringa villosa, Kolkwitzia amabilis, Cotinus coggygria, Myosotis arvensis,* and *Gypsophila muralis.*

H. N. Moldenke

## Trip of June 5 to Seeley's Notch, Scotch Plains, N. J.

Thirteen members and guests were present on the trip. Assistance was given in leading the group over the numerous trails and to the many interesting localities known best to local residents, by Mrs. Gladys P. Anderson of Westfield, Mr. James Kezer of Summit, and Mr. Ben Elliot of Scotch Plains. Mrs. Anderson called attention to numerous interesting lichens and mosses and other plants and Mr. Kezer exhibited a portion of his most valuable and excellent collection of the small mammals of the region, including some which were new records for New Jersey. Interesting plants observed included *Liparis liliifolia, Arabis canadensis, Boehmeria cylindrica, Menispermum cana-*

*dense* (in full bloom), *Hydrophyllum virginianum*, *Aralia nudicaulis* (in tremendous quantities), *A. racemosa*, *Ulmus fulva*, *Acorus calamus*, *Iris prismatica*, *Geum virginianum*, *Carpinus caroliniana* var. *virginiana*, *Staphylea trifolia*, *Rosa carolina*, *Taenidia integerrima*, *Viburnum rafinesquianum*, *Danthonia sericea*, *Aster patens*, *Penstemon hirsutus*, *Svida rugosa*, *S. amomum*, *Actea pachypoda*, *Asplenium platyneuron*, *Cystopteris fragilis*, *Woodsia obtusa*, *Adiantum pedatum*, *Comandra umbellata*, *Sericocarpus asteroides*, *Carex virescens*, *C. swanii*, *C. schweinitzii*, and extensive colonies of *Sisymbrium nasturtium-aquaticum*, as well as the naturalized *Hesperis matronalis*, *Iris pseudacorus* (in tremendous quantities), *Ilex opaca*, *Bignonia radicans*, *Lychnis flos-cuculi*, *Deutzia scabra*, and *Asparagus officinalis*.

H. N. Moldenke

## Trip of June 12 to Hacklebarney State Park, Chester, N. J.

Eight members and friends of the Club visited Hacklebarney State Park on the above date. The Park has been visited previously, April 10, 1932 under the leadership of Mrs. G. P. Anderson, and May 2, 1937 with the present leader. For most botanical purposes either of the above dates would be preferable to the present one, providing a more interesting display. We found the spring flowers and Azalea to be past while the Mountain Laurel was not along far enough to be conspicuous. Probably the most interesting flowering plant observed was the Penstemon which was seen in abundance in a field just outside the park boundary. Many of the common ferns were seen, the Christmas Fern being present in greatest abundance. Sensitive, Hay-scented, New York, Marginal Shield, Long Beech, Ebony spleenwort, Maidenhair, Polypody, Bracken, and some fine specimens of Rattle-snake Fern were found.

The Park is located in a gorge of the Black River and crossed by Rhinestone Brook and Trout Brook. The water is too rough for aquatic plants but occasionally on the banks a limited amount of marsh vegetation may be seen. In the most precipitous part of the gorge there is a well developed Hemlock ravine flora. A small area of abandoned land illustrates the succession under such conditions. Red Cedar and Grey Birch may be seen. The greatest area of the Park is an Oak-Hickory forest typical of the region in which the Park is located. It is in an advanced state of development with good reproduction and some invasion of the Beech-Maple association in parts of the Park. In earlier times there was an abundance of Chestnut, which succumbed to the blight disease and is now represented only by frequent dead trees, stumps, and sprout reproduction.

Among the most pleasing things at the Park is the hospitality of the superintendent, Mr. C. E. Pollock, and the way that he has developed the Park by cutting narrow footpaths with a minimum of disturbance of the native plants. There is almost no introduction of foreign species nor is there any attempt to rearrange the native ones, a pleasant contrast to the situation at many parks.

John A. Small

## PROCEEDINGS OF THE CLUB

### Meeting of March 1, 1938

The meeting of the Torrey Botanical Club held at the American Museum of Natural History on March 1, was called to order by the vice-president, Dr. Alfred Gunderson. There were 38 persons present. The minutes of the meetings of February 1st and February 16 were read and approved.

Dr. William G. Howe, Bronx, N. Y.; Dr. T. D. Earle, Dept. of Botany, University of Minnesota; Mr. Herbert A. McCullough, Pittsburgh, Penn.; and Mr. Kenneth Kopf, Milford, Conn. were unanimously elected annual members of the Club.

Herbert Pollack, Jackson Heights, Long Island; Sanford S. Tepfer, Brooklyn, New York, and Joseph Heikoff, Brooklyn, New York were elected associates of the Club.

A report from the committee appointed by the president to draw up suitable resolutions to be sent to the families of Dr. John K. Small and Mrs. Arthur H. Graves was read and was accepted by a rising vote of the Club. This action is here entered in the minutes of the Torrey Club:

"The hand of death has taken from our midst one of our oldest and most illustrious members. Dr. John K. Small was elected to active membership in the Torrey Botanical Club, 14 January, 1890, while he was still an undergraduate at Franklin and Marshall College, and for the succeeding forty-eight years took a deep interest in the welfare of this society. He was a voluminous writer, and more than forty of his important contributions to botanical science were published in our Bulletin. For fifteen years he served the Club as corresponding secretary.

We wish hereby to record our deep sense of loss in his death while still in the midst of a career of great productiveness, and direct that this action be entered in our minutes and a copy hereof be transmitted to his bereaved family.

On the death of Mrs. Graves, the wife of Dr. A. H. Graves of the Brooklyn Botanic Garden, the Torrey Club adopts these resolutions expressing deep regret and sympathy. Mrs. Graves, a native of Brooklyn, keenly interested in botanical work, was a director of the School Nature League, and for many years a member of the Torrey Club."

The auditing committee reported that the treasurer's books had been examined and found correct.

The scientific program which followed consisted of an illustrated lecture by Dr. R. P. Wodehouse of the Arlington Chemical Company on Pollen and Hay Fever.

Clyde Chandler
Recording Secretary

## Meeting of March 16, 1938

The meeting of the Torrey Botanical Club held at The New York Botanical Garden on March 16 was called to order by Dr. J. H. Barnhart, who acted as Chairman in the absence of the president and both vice-presidents.

There were 29 persons present.

Since there was no business to be brought before the Club, the scientific program was begun. This consisted of a lecture on the Genetics of the Japanese Morning-glory by Professor K. Miyaki of the Imperial University of Tokyo.

Clyde Chandler
Recording Secretary

## Meeting of April 8, 1938

The regular meeting of the Torrey Botanical Club held at the American Museum of Natural History on Tuesday evening, April 8, was called to order by the vice-president, Dr. Alfred Gunderson.

There were 31 persons present.

No business being transacted, the vice-president proceeded directly to the scientific program which consisted of a lecture on "Spring Flowers in Crete" by Professor and Mrs. Clarence H. Young.

Clyde Chandler
Recording Secretary

## A Correction

A Leaf Key to Florida Broad-Leaved Trees. In the review of Miss Barrett's booklet in the last number of Torreya the price was given as $1.50. The price is $1.00.

## An Appreciation of Raymond H. Torrey

Whereas, Our esteemed President and colleague, Raymond H. Torrey, has been a faithful and active member of the Torrey Botanical Club continuously since the year 1920, and

Whereas, He has served since the year 1923 on the Field Committee and since 1928 in the unremunerative and thankless capacity of its Chairman, during which time, chiefly through his indefatigable zeal and labors, the activities of this important Committee have been increased manyfold and the number of field trips and excursions held under its auspices now averages more than a hundred a year, and

Whereas, He has developed this important phase of the Club's services to its members to a point where it is not exceeded in efficiency and usefulness by the field work of any other comparable botanical organization in America, and the area covered by these trips has expanded from the region immediately in and around New York City until it now embraces the entire area from South Carolina and West Virginia to Newfoundland, and

Whereas, In the pursuance of the manifold duties of his office, in the planning, elaboration, and publication of the annual Schedule of Field Trips and other notices of trips, and in the tremendous amount of labor which he has expended in the service of the Club, he has apparently so seriously impaired his natural health and strength of body as to cause him to be physically incapacitated for the past few months, be it therefore

*Resolved*, That the Torrey Botanical Club formally record its cognizance of the facts enumerated above and place officially on record its grateful appreciation to Raymond H. Torrey for the labors of love which he has so freely expended on the Club and the devotion with which he has served its best interests, and be it further

*Resolved*, That the members of the Torrey Botanical Club, through the Executive Committee of its Council, express to Mr. Torrey their sincere wishes for a complete and speedy recovery to his accustomed health and vigor.

Executive Committee
CLYDE CHANDLER
HAROLD N. MOLDENKE
JOHN S. KARLING

NEW YORK CITY, MAY 25, 1938

The resolution printed above was prepared and a copy mailed to Mr. Torrey just three weeks before his death.

**Raymond H. Torrey**

Raymond H. Torrey, President of the Torrey Botanical Club, died at his home in Hollis, Long Island, on July 15 after an illness of several months, in his 58th year.

For years he had been a leader in work for conservation, in promoting interest in hiking about New York City, in trail building throughout the Appalachians, and in botanical work. His column, "The Long Brown Path" in the New York Post was a clearing house of information for hikers and naturalists. With Frank Place and Robert Dickinson he wrote the "New York Walk Book," of which the second edition was published in 1934.

The next issue of TORREYA will contain an account of Mr. Torrey's life and work, also an article he wrote for TORREYA some months ago on Collecting Cladoniae in Maine and Gaspé.

## NEWS NOTES

Dr. Edmund W. Sinnott will, after the first of July, divide his time between the department of botany of Barnard College of which he is head and the new laboratory of genetics being established at Columbia University. In the new laboratory he will work in collaboration with Dr. Leslie C. Dunn, of the department of zoology.

The Gray Herbarium of Harvard University reports that more than 58,000 plants were received during the academic year '96–'97. The herbarium now numbers more than 950,000 sheets of plants. The collection of American plants represents more than one hundred years of continuous growth. Collections were made in various parts of our country and others received from other parts of the country, from the Aleutian Islands to Brazil.

The Linnean Society of London celebrated its one hundred and fiftieth anniversary in the latter part of May. The Linnean Medal was presented to Sir D'Arcy W. Thompson. A symposium on "The Concept of Species from the Time of Linnaeus to the Present" was held on May 25 and one on "Geographic Isolation as a Factor in Species Formation" was held on May 27. Mr. John Ramsbottom, Keeper of Botany of the British Museum (Natural History), South Kensington, gave the presidential address on Linnaeus and the Species Concept. Delegates from many foreign countries were present, and congratulatory addresses and resolutions were received from many scientific societies.

Mr. T. H. Everett, Horticulturist of the New York Botanical Garden left on May 13 for a six weeks trip to England. He visited the Royal Botanic Gardens at Kew and Edinburgh and attended the Chelsea Flower Show. He also checked in private gardens the growth of plants he collected in the Rocky Mountains, which were sent to shareholders of the Garden's expeditions.

Dr. William J. Robbins, Director of the New York Botanical Garden, Dr. Karl M. Wiegand of Cornell University and Dr. Walter H. Snell of Brown University were the speakers at the installation of the honorary scientific fraternity at Wellesley College in May.

The latter part of March the Fairchild Tropical Garden was dedicated in Dade County, Florida. Dr. David Fairchild, whose friends had named the garden in his honor, gave the principal address. Other speakers were Col. Robert Montgomery who was largely instrumental in establishing the garden, Dr. L. H. Bailey and Dr. E. D. Merrill.

Dr. Beverly T. Galloway, formerly chief of the Division of Gardens and Grounds of the U. S. Department of Agriculture, died on the thirteenth of June in his 75th year. Dr. Galloway was connected with the Department of Agriculture from 1887 till he retired in 1933. For some years he was chief of the Division of Physiology and Pathology. When the Division of Gardens and Grounds was formed in 1900 he was made chief. He wrote on many botanical and agricultural subjects. In recent years he was interested in the study of hay fever and the plants causing it.

# THE TORREY BOTANICAL CLUB

Contributors of accepted articles and reviews who wish six gratuitous copies of the number of TORREYA in which their paper appears, will kindly notify the editor, when returning proof.

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## OTHER PUBLICATIONS

### OF THE

# TORREY BOTANICAL CLUB

### (1) BULLETIN

A journal devoted to general botany, established in 1870 and published monthly, except during July, August, and September. Vol. 64, published in 1937, contained 639 pages of text and 14 full page plates. Price $6.00 per annum. For Europe, $6.25.

In addition to papers giving the results of research, each issue contains the INDEX TO AMERICAN BOTANICAL LITERATURE—a very comprehensive bibliography of current publications in American botany. Many workers find this an extremely valuable feature of the BULLETIN.

Of former volumes, 24–64 can be supplied separately at $6.00 each; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Single copies (75 cents) will be furnished only when not breaking complete volumes.

### (2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–18 are now completed. Volume 17, containing Proceedings of the Semi-Centennial Anniversary of the Club, 490 pages, was issued in 1918, price $5.00.

Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

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New York, N.Y.

Volume 38 September-October, 1938 Number 5

# TORREYA

A Bi-Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

GEORGE T. HASTINGS

John Torrey, 1796-1873

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# THE TORREY BOTANICAL CLUB

## OFFICERS FOR 1938



### MEMBERSHIP

All persons interested in botany are invited to join the Club. There are three classes of membership: *Sustaining*, at $15.00 a year; *Life*, at $100; and *Annual*, at $5.00 a year. The privileges of members are: (a) To attend all meetings of the Club and to take part in its business, and (b) to receive all its publications. Associates of the Club, $2.00 a year, have the privilege of attending meetings and field trips and of receiving the Bulletin of the New York Academy of Sciences.

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Claims for missing numbers should be made within 60 days following their date of mailing. Missing numbers will be supplied free only when they have been lost in the mails.

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Matter for publication, and books and papers for review, should be addressed to

GEORGE T. HASTINGS
2587 Sedgwick Ave.,
New York, New York

TORREYA

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## RAYMOND H. TORREY

**A short account of his life and connection with the Torrey Botanical Club, from notes furnished by Mrs. Elizabeth Torrey**

Raymond H. Torrey was born in Georgetown, Massachusetts, on July 15, 1880, and died at his home in Hollis, Long Island on July 15, 1938. He was distantly related to Dr. John Torrey for whom the Botanical Club was named, as both were descended from Wm. Torrey who settled in Weymouth, Mass., in 1640. His mother was a descendant of Richard Warren, who landed at Plymouth on the "Mayflower," and of General Joseph Warren, who was killed at Bunker Hill.

His early education was received in Georgetown. While in grammar school he became acquainted with local botanists who were employed by Harvard College to collect fresh material then used in classes in botany. Mr. Torrey frequently went with them after school and on week-ends in search of specimens. He thus acquired when a boy an unusual knowledge of wild plants. He also began to realize the need of protecting our native flora as he found that some of the rarer species the college wanted had disappeared from near the town.

Upon graduation from high school he obtained employment on the local newspaper, performing the varied tasks of editor, reporter, typsetter, and on occasion operated the printing press and tended to the steam boiler which supplied the power. This journalistic experience aided him in obtaining a position on the Springfield *Union*. Later he came to New York and entered the employ of the New York City News Association, He attained the position of Night City Editor on the New York *American* and the *Herald Tribune*. He conducted a column in the New York *Post* for hikers and nature lovers for many years until his death under the name "The Long Brown Path."

It was not long after his arrival in New York that he became a member of the Torrey Botanical Club. Because of his interest in hiking and his knowledge of places of interest about the city he was made a member of the Field Committee, of which he was chairman from 1928 until his death. He probably led twice as many trips of the club during these years as any other leader. It was he who planned the longer trips taken during recent years, culminating in the two weeks trip to Gaspé and the Shickshock Mountains of Quebec, which is partly described in his article on Collecting Cladoniae in Gaspé of this issue of Torreya. He was largely responsible for the publishing of reports of field trips in Torreya. His own reports always contained interesting notes on the plants found, often correlated with the geology of the region.

Some years ago he became interested in lichens, especially the genus Cladonia and soon became an authority on this genus in the club area. He made an extensive collection of Cladoniae, exchanging specimens with others and corresponding with authorities on the genus throughout the world. He had been looking forward to the time when his other activities would cease sufficiently to permit him to arrange the large amount of material collected and distribute it among those institutions which were interested in it.

He spent much of his earlier life traveling through the woodlands and climbing most of the important peaks in New England. In co-operation with others he laid out and maintained an excellent system of trails, and particularly did he labor in bringing to realization the Appalachian trail from Mt. Katahdin in Maine to Mt. Oglethorpe in Georgia.

Later he was interested in laying out and maintaining trails about New York City. Those who accompanied him over the trails know of his fondness for wide views and of how he led to high points where the most beautiful outlooks were obtained. Companions of the trail frequently addressed him as "Baron," because of his interest in locating points of historical interest, especially those connected with Baron Hasenclever, the famous pre-Revolutionary iron-monger who established many of the mines, now abandoned, in the Ramapo highlands. While he frequently walked at a rate that taxed the powers of many hikers, he always observed the plants along the trail and was keen in noting any that were unusual.

In conjunction with Mr. Frank Place, Jr. and Dr. Robt. L.

Dickinson he was author of the "New York Walk Book," that has done much to stimulate interest in hiking about New York and is a prized guide for hundreds.

Some years prior to his death he gave up all the newspaper work in which he had been actively engaged, except "The Long Brown Path," and became the secretary of the American Scenic Historic and Preservation Society and of the Society for the Preservation of the Adirondacks. There came under his direct supervision and control such scenic and historic monuments as John Boyd Thacher Park in the Helderbergs, the Stony Point Reservation on the Hudson, Philipse Manor Hall, Letchworth Park, including Portage Falls on the Genessee River, Diamond Island in Lake George, Battle Island Park on Oswego River, and for a time, Watkins Glen in the Finger Lake Region. A student of state parks in the United States, he traveled extensively and set forth the result of his observations and conclusions in a publication entitled "State Parks and Recreational Uses of State Parks in the United States."

He was above all devoted to the preservation of the Adirondacks, and particularly the lands that constitute the "Forest Preserve" of New York State, which under the State Constitution (Article 7, Section 7) "shall be forever kept as wild forest lands." By reason of repeated attempts to encroach upon this preserve, Mr. Torrey was kept constantly on the alert in defense of the Forest Preserve. Just before his death he was particularly concerned, that the proposed new State Constitution should not in anyway weaken the article just mentioned.

He frequently brought to the attention of the club members cases where some scenic point on the Hudson or some section of the Adirondacks was threatened with destruction or exploitation and secured the club's support in endeavoring to save it. It was this work in behalf of conservation that gave him the greatest satisfaction, since he felt that in protecting our natural heritage he was contributing not only to the preservation and furtherance of the health and happiness of his contemporaries but also of those who would come after them.

A tablet in his memory will be erected on the top of Long Mountain, one of the lookout points he loved.

## Collecting Cladoniae in Maine and Quebec

Raymond H. Torrey

About 175 packets of Cladoniae, several new to the writer, some new to his helpful instructor, Dr. A. W. Evans of Yale University, with whom he shared them, and who confirmed or corrected determinations; and most of them robust and well fruited beyond their conditions of more southern latitudes and lower levels, were collected on a two weeks' trip of the Torrey Botanical Club, July 2–18, 1937.

The first collections were made on Mount Bigelow, near Stratton, in northwestern Maine, one of those fine summits in the western part of the State, which have not been well botanized, and which would probably yield many alpine and boreal species of plants on thorough search. The party climbed to the eastern summit, 4,050 feet, from the Dead River side, following the Maine sector of the Appalachian Trail. This 2,050 mile footpath from Mount Katahdin, Maine, to Mount Oglethorpe, Georgia, is maintained by outdoor clubs of the Atlantic seaboard states, federated in the Appalachian Trail Conference, with headquarters in Washington, D. C.

Cladoniae began to appear plentifully on the ledges near the edge of the timber at about 3,500 feet, on the southeast shoulder. Here were found *C. uncialis*, *rangiferina*, *fimbriata* and *mitis*. On the northeast slope, as the trail neared the summit, among low heaths, such as *Vaccinium vitis-idaea*, var. *minus*, *uliginosum* and *caespitosum; Empetrum nigrum*, and the Iceland Moss Lichen, *Cetraria islandica*, were Cladonia associations of more northern character, including *C. amaurocraea*, *C. gracilis*, var. *chordalis*, f. *leucochlora; C. deformis;* my old friend of Long Island and the New Jersey Pine Barrens, *C. squamosa*, f. *levicorticata*, m. *rigida*, which I meet from sea level to 5,000 feet; *C. chlorophaea*, f. *simplex*, almost equally ubiquitous; *C. pleurota*, *nemoxyna*, *ochrochlora*, *alpestris*, *rangiferina* and *uncialis*.

On the summit, near the fire observation tower, another old friend of wide latitude and altitude, was *C. cristatella*, ff. *beauvoisii* and *vestita;* with *C. gracilis*, var. *dilatata*, some very small in this exposed spot; *C. bacillaris*, *fimbriata* and *chlorophaea*.

Descending west along the Appalachian Trail, about a hundred feet below the summit, *C. amaurocraea* was found plentifully and in good condition, in the forms *celotea* and *furcatiformis*, with definite cups, and *oxyclada*, with subulate tips. The range of *C. amaurocraea* seems to be incorrectly given in our most recent American reference, Fink's "Lichen Flora of the United States," which states, on Page 253, that it is found "on soil, throughout the United States." Tuckerman's "North American Lichens," Part I, page 250, states the range better, as "on the earth in alpine districts," although, as will be recorded in this paper later on, I found it at Tadoussac, Quebec, at the mouth of the Saguenay River, only fifty feet above the level of the St. Lawrence. I have found it, or had it from others, in the northeastern states only from high summits in Maine, northern New Hampshire, northern Vermont and the northern Adirondacks. I have not heard of it from the high southern Appalachians, where other northern Cladoniae found refuge, like other northern plants, in the migrations northward after the last Ice Age. I doubt if it occurs, south of the stations mentioned, in northeastern North America. It becomes common at lower levels in Newfoundland, Labrador and Greenland.

A large and conspicuous Cladonia on this part of the trail was a clump of the long green podetia, some cupped, most of them subulate tipped, of *C. gracilis*, var. *elongata*, f. *esquamosa* (*C. elongata* of some authors), some of them four inches long. *C. rangiferina*, f. *stygia*, the mountain form with the lower parts of the podetia blackened; *C. gracilis*, var. *chordalis; C. alpestris*, and *squamosa*, also occurred.

In an old field, growing up with spruce, east of Stratton, were *C. alpestris*, *mitis*, *rangiferina*, and *multiformis*, ff. *finkii* and *subascypha*, the last found within the Torrey Botanical Club range, at moderate altitudes, around 1,200–2,000 feet.

Continuing by automobile through New Brunswick, to Gaspé, and from New Richmond up the old mine road along the Grand Cascapedia River, we left our cars at the Federal Lead and Zinc Mine, and took to our feet, our tents and duffle being toted in a wagon over the road past Lake St. Anne to our camp at the headwaters of the Madeleine River, south of Table Top, our principal objective on the trip. Climbing to the plateau, next day, we explored Mount Richardson, 4,150 feet, the highest knob on the southwestern corner of this large nunatak area, refuge of a Tertiary flora above the last ice sheets.

Here one of the interesting finds, as also at Tadoussac, a few days later, was a Cladonia which looked like *alpestris*, but on which Dr. Evans reported as follows:

"These certainly look like *C. alpestris*, but give a distinct reaction with P, [paraphenylenediamine] much more pronounced than the pale yellowish color obtained with *C. pynoclada* [a species also resembling *alpestris*, which I have been seeking for Dr. Evans]. Dr. Sandstede has recently sent me an antarctic specimen collected by Hariot in the Magellan region. This was determined by Vainio as *C. pycnoclada*, f. *flavida* (Mon. 1: 39). It gives, however, a distinct reaction with P and, according to Dr. Sandstede, has a bitter taste. He states that it ought to be separated out as a distinct species. Your specimens are more compact than the antarctic material, and I should hesitate to pronounce them the same. I have sent samples of both your plants to Dr. Sandstede and am anxious to hear what he has to say about them."

Another odd one looked like *C. crispata*, but was P yellow, unlike the reaction of that species. It has also gone to Dr. Sandstede. *C. crispata*, var. *virgata*, which is quite northern, was present; also a form new to me, f. *kairamoi*, more densely clustered and squamulose, *virgata* being smooth. *C. amaurocraea* was frequent, in the forms *oxyclada* and *furcatiformis*, and one, covered with galls, indistinguishable as to form. Other Cladoniae were *C. rangiferina*, f. *stygia; pleurota*, *gracilis*, var. *chordalis; squamosa*, *digitata*, *carneola*, *uncialis* and *mitis*.

On our departure from the high Shickshocks, we climbed over the bare summits of Mount Sterling, which, though only 3,150 feet, has much surface above timber, in loose slides, of unglaciated rock, and which gives magnificent views of Table Top, Mount Albert with its snow fields, and the gorge of the St. Anne River. On the summit were *C. amaurocraea*, ff. *furcatiformis* and *oxyclada; coccifera*, var. *stemmatina; gracilis*, var. *chordalis; uncialis*, *squamosa*, and *crispata*, var. *virgata*.

Descending one of the slides to the wagon road, handsome scarlet fruited *C. pleurota*, with crowded, red-tipped stipes around the rims of the cups, was frequent; also more *C. amaurocraea*, ff. *furcatiformis*, and *oxyclada; C. gracilis*, var. *elongata*,

f. *esquamosa; C. squamosa, uncialis, carneola* and my wide-flung friend of early lichen hunting, *C. cristatella*, ff. *beauvoisii* and *vestita.*

Along the wagon road were found *C. gracilis*, var. *dilatata; C. cenotea*, f. *crossota; C. chlorophaea*, f. *simplex; C. mitis*, and *C. crispata*, var. *virgata.*

A low granite knob, between the two steamboat landings at Tadoussac, where we awaited the boat up the Saguenay River, disclosed some interesting things in a couple of hours' collecting. Here was plenty of *C. amaurocraea*, in forms previously known to me and found earlier on this trip, ff. *furcatiformis*, and *oxyclada;* but also a new one, f. *fasciculata*, a puzzling one, with densely fascicled clumps, looking like *C. uncialis*, but with cups and rather large brown apothecia, thus unlike any form of *uncialis;* and with a cracked cortex and cottony medulla showing through. Also here was the species I thought *alpestris*, but which Dr. Evans thought possibly *pycnoclada*, subject to Dr. Sandstede's opinion. *C. gracilis*, var. *chordalis; C. mitis, tenuis, bacillaris* and *squamosa* were also present. The richness of this association suggests that this part of the north shore of the St. Lawrence, from Tadoussac along the new road only recently opened into a sparsely settled country eastward to Port Neuf, would be worth exploring intensively on another trip.

Turning southward across the Laurentides National Park, a rough plateau, from 1,500 to 3,000 feet, I found many places which appeared to have been burned years ago and were now returning in scattered spruce and fir, with much bare, tundra-like surface, richly covered with robust Cladoniae. *C. crispata*, var. *virgata* was very common, more than I ever saw elsewhere. *Cladonia deformis* was also frequent and of large size. Others, at a station near the Upika River, were: *C. mitis, rangiferina, alpestris; gracilis*, var. *chordalis; cornuta*, ff. *cylindrica* and *scyphosa* (which is also common along the mine road along the Cascapedia in Gaspé), and *uncialis.*

Farther south, on Route 54, to Quebec, at Porte de L'Enfer (Hell Gate), where the Jacques Cartier River gathers between high ridges, open, once badly burned spaces among the conifers were covered with dense carpets of Cladoniae, in which *C. crispata*, var. *virgata* was often dominant; also f. *dilacerata; C. gracilis*, var. *chordalis; C. uncialis, rangiferina, mitis*, f. *tenuis;*

*alpestris*, large, but weathered and twisted *C. deformis; cenotea*, f. *crossota; pleurota, carneola*, f. *simplex; C. cristatella*, f. *beauvoisii;* and *C. gracilis*, var. *chordalis*, f. *leucochlora*, new to me, with heavily squamulose podetia, and more *C. crispata*, var. *virgata*, everywhere one looked.

This was all very satisfactory collecting, but I hope to make more such trips into Quebec. The northern and higher end of Table Top ought to be good; the coast east of Tadoussac, and some of the higher ridges in the Laurentides National Forest, which would not be hard to reach from Route 54, which climbs straight over many of them, at altitudes up to 3,000 feet, so that one would only have to step out of his car and climb a few hundred feet to the highest points in this scenic region. It would be still better, no doubt, if we could follow all the way in the footsteps of André Michaux, up the Saguenay, across Lake St. Jean, up the Mistanissi and Peribonka waters, to the height of land and to the great Lake Mistanissi, emptying into James Bay, which the French botanist-explorer, the first scientist to see it, beheld 142 years ago.

HOLLIS, QUEENS, N. Y.

## A simple-leaved Baptisia from the coast prairies of Louisiana, and a supposed hybrid

Roland M. Harper

One or more species of Baptisia are characteristic features of the vegetation of the prairies of Long Island,[1] Arkansas,[2] Louisiana,[3] Oklahoma and Texas,[4] and perhaps other states west of the Mississippi River; but strange to say, none have ever been reported from the prairies of Florida, Alabama and Mississippi, though there are a few species in other habitats in those states.

In traveling through the coast prairies of Louisiana and Texas at various times, mostly in summer, when these plants were not in bloom, I have noted two or more species of Baptisia; and I had a chance to see some of them at close range in eastern Texas in 1918, and identified one as *B. leucophaea* Nutt., and guessed another to be *B. sphaerocarpa* Nutt.[4] These were presumably the same two previously seen from the train in Louisiana.[3]

On July 14, 1934, coming east on the Southern Pacific R.R. through the coast prairies of Texas and Louisiana, I noticed some of the same Baptisias again, at least three species. I stopped off at Lafayette, La., a little east of the prairies, and Miss Annie Frazier, who was teaching botany in the Southwest Louisiana Institute there at the time, kindly took me by automobile back into the prairies the same afternoon, to get a better look at the Baptisias and other plants. Near a crossing about half way between Crowley and Rayne, in Acadia Parish, which I had noted from the train a few hours before as a good Baptisia locality, we stopped to reconnoiter, and soon found what appeared to be three or four species. One was evidently *B. leucophaea*, but the commonest form was a taller and more bushy one with many or most of the leaves simple, and pods in erect racemes. I had never before heard of a simple-leaved Baptisia, except two southeastern species, *B. perfoliata* and *B. simplicifolia;* and although I was not equipped for col-

[1] Mem. Torrey Bot. Club **17**: 269, 271, 274, 280, 281, 283. 1918.

[2] Plant World **17**: 42. 1914.

[3] Torreya **20**: 73. 1920.

[4] Bull. Torrey Bot. Club **47**: 312. 1920.

lecting then, I took a few plants, and managed to make recognizable herbarium specimens of them. Specimens sent later to some of the leading American herbaria were pronounced indistinguishable from *B. sphaerocarpa*, except for the simple leaves (which were not universal).

But even that species had not been credited to Louisiana before, in Small's Flora of the Southeastern United States (1903), R. S. Cocks's notes on the prairies,[5] or his Leguminosae of Louisiana.[6] So it seemed very desirable to find out something about its flowers, to verify the identification; and an opportunity for that came in April, 1936, when I spent a week in southern Louisiana. On the morning of the 7th I went by bus from Lafayette to Midland, intending to walk back through the prairies of Acadia Parish to Rayne, 15 miles, passing the locality where I had collected in 1934. But I found so many interesting plants that I used up all the available time by the time I got to Crowley, about half way.

The prairies in that latitude have now been almost completely given over to rice, sugar-cane and other crops, and there is hardly any natural prairie vegetation left except along the railroad right-of-way (as was said to be the case in Illinois a quarter of a century ago); and that of course is now rather weedy in spots. But I hit exactly the right time to find the Baptisias in bloom, though cloudy and windy weather all day interfered a little with collecting and made photographing difficult.

The *Baptisia sphaerocarpa* (?) was abundant and conspicuous, with dozens of golden yellow flowers on each mature plant, and it is astonishing that it could have been overlooked by all the botanists who had passed that way on the railroad and highway, especially in earlier years when there was much more undisturbed prairie vegetation than there is now.

On looking at thousands of plants of it that day I saw that the unifoliate and trifoliate leaves often occurred on the same plant, but the former were more characteristic of the upper

[5] The flora of the Gulf Biologic Station. Bull. 7, Gulf. Biol. Sta. (at Cameron, La.), 42 pp. 1907. More than six pages are devoted to the flora of the prairies west of Lafayette, but no *Baptisia* is mentioned.

[6] Leguminosae of Louisiana. Nat. Hist. Surv. Bull. 1, La. State Mus. (New Orleans). vi+26 pp., 37 unnumbered plates on 19 unnumbered leaves. Sept. 1910. Nine species of *Baptisia* are listed, one of them new.

branches, and of small plants which looked as if they were not going to bloom that year. It seems likely that this perennial in the first year or two from seed may produce only simple leaves and no flowers, and that trifoliate leaves are most prevalent in the older plants. A condition analogous to this is known in *Erythronium* and *Trillium*, and perhaps many other genera of herbs, which produce small or simple leaves and no flowers in their first few years.

On the way to Midland by bus I had noted a few specimens of *B. leucophaea* along the highway (which closely parallels the railroad most of the way), and on walking back along the railroad I came to some specimens of it before I had gone a mile. It was much less abundant than *B. sphaerocarpa*, and also less conspicuous, on account of being lower, with racemes nodding so that their tips often rested on the ground, and the flowers being paler.

All the *B. leucophaea* there had lemon-yellow flowers, instead of cream-colored as in the Grand Prairie of Arkansas (and in the closely related *B. bracteata* of dry woods of Middle Georgia and Alabama), but that does not necessarily indicate that it should be regarded as a different variety, though it could perhaps properly be called a form, as in the case of *Sitilias caroliniana*, which has both yellow and cream-colored flowers in different plants, as I pointed out a few years ago.[7] I had seen the same form a few days before, with Prof. C. A. Brown, in cut-over long-leaf pine uplands in St. Helena Parish. (Incidentally that seems to be the first time it had been found east of the Mississippi River; and it is not mentioned in Small's Manual of the Southeastern Flora, 1933).

Continuing eastward, I soon began to see another Baptisia, that appeared intermediate between the two just mentioned. I did not pay much attention to it at first, thinking I would not collect it until I saw more of it, not wishing to endanger the supply if it was anything rare. But after walking four or five miles I noticed that there was no more *B. leucophaea* in sight, and the intermediate form was likewise missing. I was cogitating whether to go back to where I had last seen the unfamiliar plant, when I came upon *B. leucophaea* again, about a mile west of Crowley, and immediately the intermediate form too. I then decided to take no more chances of missing it, and col-

[7] Torreya **33**: 143–146. 1933.

lected as many specimens of *B. sphaerocarpa* (no. 3475) and the intermediate (no. 3476) as I could manage, leaving *B. leucophaea* because that was well known and my portfolio was already too full. Photographs of all three were attempted, but turned out poorly on account of the clouds, wind, and a little camera trouble.

As the intermediate form was found only in close proximity to the other two, and not where *B. sphaerocarpa* was abundant and *B. leucophaea* absent, it is a reasonable assumption that it is a hybrid. Apparently there are few if any definite records of hybrids in *Baptisia*, though Prof. Hitchcock found a plant in the vicinity of Manhattan, Kansas, which he believed to be a hybrid between *B. australis* and *B. leucophaea;*[8] and *B. microphylla* Nutt. (*B. stipulacea* Ravenel), found near Aiken, South Carolina, by several 19th century collectors, but apparently not by any one now living, is strongly suspected to be a hybrid between *B. perfoliata* and some other species. Hybrids have often been given specific names, but there seems to be no advantage in doing so when the parentage is reasonably certain. And it is not even necessary to describe this plant, for an average of the existing descriptions of the two parents should suffice.

The simple leaves of many specimens of *B. sphaerocarpa* have been mentioned above. That characteristic did not seem to be passed on to the hybrid, for all the leaves I saw on it were trifoliate. But, as already noted, the simple leaves are more characteristic of juvenile plants, and perhaps *B. sphaerocarpa* does not produce hybrid progeny until it has outgrown that stage. (That is something for the geneticists to work on, if they are interested.)

From the description of Small's *Baptisia Bushii*, from Texas, I guessed that that might be the same as my hybrid, for *B. leucophaea* and *B. sphaerocarpa* are both known from Texas, and may grow in proximity and hybridize there. But Miss Maxine Larisey, who is studying Baptisia at the Missouri Botanical Garden, has compared my plant with authentic specimens of *B. Bushii*, and thinks they are not the same. Perhaps this note will stimulate some trans-Mississippi botanist to investigate it, and some of the other problems outlined here.

University, Ala.

[8] A. S. Hitchcock, Bot. Gaz. **19**: 42. 1894. Also referred to incidentally in Robinson & Fernald's ("Gray's") Manual (1908), page 506.

## A quintuplet Trillium

THEODORE B. RUHOFF

The Wanderbird Hiking Club of Washington, D. C., made a trip on May 1, 1938, to the Shenandoah National Park, Virginia. We climbed Old Rag Mountain searching for rare flowers, particularly Trilliums. On the ascent we found a few showy Trillium (*Trillium grandiflorum*) but it was on our descent at an elevation of approximately 2,500 feet that I made a thrilling discovery. About two feet from the trail growing in a dry sandy loam, among small pieces of granite, I found a very double greenish white flower with fifteen petals. I called to my companion, Dr. Titus Ulke, the Wanderbird naturalist, who was several yards back of me on the trail, to come quickly to see what I had found. He called it a quintuplet Trillium. While digging the specimen for The National Herbarium, Dr. Ulke went further afield and found a second specimen, which he unfortunately lost on the way down the mountain. I presented my specimen to The National Herbarium, where it may now be seen.

The root became detached, so I have planted it in my garden and if I am fortunate enough to have it come through and bloom, I intend to present it to our Botanical Gardens, hoping to preserve this rare Trillium, and place it where all may see it.

The stem of the plant was 30 cm. high and bore nine leaves from 9 to 9.5 cm. long. The peduncle was 7.5 cm. long. There were six linear sepals and five whorls of petals, three in a whorl, linear-oblong, about 3.5 cm. long, 9–11 mm. wide, greenish white, with pink veins and a green stripe on the underside.

TAKOMA PARK, MD.

(Theodore Ruhoff is a young botanist of 15 years. Editor.)

## BOOK REVIEWS

### Plant Ecology—Weaver and Clements[1]

John A. Small

The first edition of this book appeared in 1929, and seems to have passed unnoticed by Torreya. Many Torrey Club members, particularly those who take their botany in the field, will find answers in the book to some of their queries. The first chapter deals with vegetation. It shows that the plant community is dynamic and subject to change and development. The next chapter is devoted to methods of studying vegetation to get quantitative data. The discussion is complete but somewhat conservative.

Many readers will have had the experience of returning after some years to an area only to find it quite changed, perhaps more delightful, perhaps disappointing. Such a change, if unmodified constitutes a normal succession, the subject of chapter 3. The authors then deal with the units of vegetation and the names by which they should be designated. This is a highly controversial matter among ecologists. The authors have stood by their own views, to which perhaps the majority of their American colleagues will subscribe. One wishes, however, that a term in as common usage as synusia had not been ignored, not to mention other terms. Some mention of the continental system of naming plant communities, if not a discussion of the various schools of phytosociological thought, would have tended toward completeness. Raunkiaer's life forms and biological spectrum are also omitted.

The fifth chapter deals with the initial causes of succession while the sixth treats the mechanics—migration, ecesis, and aggregation. This is properly followed by a discussion of competition and invasion. Economic, particularly agricultural and conservational, aspects of the subject are included. The soil receives a much more complete presentation than in the earlier edition. Modern concepts of soil science are recognized in some detail. The effect of the plant or community upon the habitat (reaction) and the ultimate dynamic equilibrium (stabilization)

[1] Plant Ecology. John E. Weaver and Frederick E. Clements. Second edition. McGraw-Hill Book Co. 1938. xxii–601 pp. illus. $5.00.

are considered in chapter 9. The relationship between animals and plants is termed coaction but chapter 10 is largely a very laudable treatise of the application of ecological principles to conservation. The underground parts of plants are treated at length. Then follow chapters dealing with the aerial environment—humidity, wind, and evaporation; temperature; light. Chapter 15 is a brief discourse on the use of plants themselves (phytometers) in studying the environment. The chapter on adaptation to water gives a basic presentation of ecological plant anatomy. The fact that plants and plant communities are indicators of the condition of the habitat is brought out in chapter 17. The reader will experience little difficulty in mentally transposing this chapter into plants and communities with which he is familiar. The last chapter introduces the reader to plant geography by briefly describing the climax formations of North America.

The book is well illustrated throughout by examples, tables, charts, line drawings, and photographs. Many of the topics are accompanied by directions for experimental procedure, as they were in the first edition. A few paragraphs at the first of the book outline a course with field work as the authors themselves conduct it. There is a bibliography of 1,035 citations for those who desire further work in the subject.

## Water Culture of Plants—Ellis and Swaney[2]

G. T. Hastings

Water culture in its various forms has attracted much attention in the last few years. Descriptions of culture solutions and methods of growing plants in them have appeared in various leaflets,—here we have a small book that attempts to give complete descriptions. The authors describe methods of growing plants in liquid and in sand or cinders irrigated with the solutions. The descriptions are evidently based on much experimental work done by the authors as well as work done experimentally or commercially by others. In addition one chapter is devoted to the effects of plant hormones in stimulating growth and the work of Dr. Blakeslee in developing new forms of double

[2] Soilless Growth of Plants. Carleton Ellis and Miller W. Swaney. 155 pages, 55 figures, 3 colored plates. Reinhold Publishing Corp. 1938. $2.75.

chromosome number by the use of colchicine. The last chapter gives chemical formulas for solutions used at the New Jersey Agricultural Experiment Station, Purdue University Department of Horticulture, the United States Department of Agriculture and the Boyce Thompson Institute.

Those who may wish to experiment with soilless growth of plants at home with a few window plants will find the book as useful as will those who wish to use the methods described on a larger scale. The authors are both chemists, which probably accounts for such botanical errors as "green algae (a fungus often clinging to damp flower pots)," "fungi causing algae growth," "chromosomes . . . minute units which . . . attach themselves to the genes" and a few others. It is to be regretted that the copy for the book was not read by a botanist before publishing, as these errors detract from an excellent book that admirably fulfills the purpose for which it was written.

## FIELD TRIPS OF THE CLUB

### Trip of Sunday, May 15 to Smithtown, Long Island

Five members and eleven guests decided to take for better or for worse the threatening weather of early Sunday morning and were on hand at the Smithtown station by eleven o'clock. Those with cars gathered in those who had arrived by train and the entire party drove west to that part of Smithtown, Suffolk County, known as the Head-Of-The-River to "Cedar Acres," the summer home of the leader. From this point the group botanized for about two and one half hours walking through the adjoining Wyandanch Club area which offered along and near the brookside excellent stands of *Caltha palustris*, *Sisymbrium nasturtium-aquaticum*, *Drosera rotundifolia* and *Toxicodendron vernix*. On the way back for lunch a much drier route was taken and the following plants were particularly observed: *Kalmia angustifolia*, *K. latifolia*, *Epigaea repens*, *Trillium cernuum*, *Viola cucullata*, *Ilex glabra*, *Arctostaphylos uva-ursi*, *Lupinus perennis*, *Prunus pumila*, *Myrica carolinensis*, *Comptonia peregrina*, *Uvularia sessilifolia*, *Comandra umbellata*, *Hudsonia tomentosa*, *Tithymalopsis ipecacuanhae*, *Viola pedata*, *Silene caroliniana*, *Trientalis americana*, *Pedicularis canadensis*, *Cypripedium acaule*, *Sisyrinchium graminoides* and *Linaria canadensis*.

The mycological enthusiasts reported *Urnula craterium*, *Tremellodon auranteum*, *Pholiota praecox*, *Hirneola auricula-judae*, *Schizophyllum commune* and *Gymnosporangium juniperi-virginianae*.

After lunch part of the group hiked about three miles to the Kings Park station and in between the showers attempted to botanize. Two members boarded the New York train and the others tramped back to Smithtown to join those returning by car. In spite of the weather photographs were attempted of groups of *Trillium cernuum*.

Elizabeth C. Hall

### Trip of May 28–29th to the Poconos

On Saturday a party of five met at Cresco. The afternoon was spent roaming over the delightful property of Hotel Cliff View, which extends from the road at an elevation of 1,200 feet back to the top of the cliff on Cresco Heights, over 1,700 feet above sea level. Identification of about fifty species was made by Dr. Chute and Dr. Small of the New Jersey College for Women.

The blunt lobed woodsia fern (*Woodsia obtusa*) was found on the wooded slopes, while at the top of the mountain, growing on a low ledge exposed to the sun, was a fine stand of the rusty woodsia (*Woodsia ilvensis*).

It was a delight to find, along the top of the cliff, the two northern species, *Potentilla tridentata* and *Arenaria groenlandica.* The latter, in full bloom, gave the appearance in places where water seeped from the very edge of the cliff, of miniature alpine gardens. The species appear to be confined to the narrow exposed treeless strip along the top of the cliff and although in fair abundance here should be given protection. In the woods a few feet from these northern species were found the pitch pine and the black scrub oak, typical of the New Jersey Pine Barrens.

Several plants of the pink lady slipper (*Cypripedium acaule*) were found and of course blueberry and huckleberry plants, since this is huckleberry country.

A brief sprinkle hastened the descent of the party to the hotel where an excellent meal was served by Mr. and Mrs. Dickey, who invited us to visit the property at any time.

The next day the party was increased by four, and a deep ravine three miles to the west was visited. According to tradition a cave said to exist near the top of the ravine was a hiding place and lookout for the Indians from whence they could swoop down on the settlers as they passed by with their cattle. From this the place came to be called "The Devil's Hole."

Rhododendron is plentiful on the sides of the ravine and must be a pleasant sight when in bloom. In the woods were seen several of the pink moccasin flower, called "Duck flower" by the Pennsylvania Dutch people. A small colony of walking fern, which the writer had located previously and thought he knew just where to find, eluded the first search and was only found on the return trip, growing on a boulder alongside the trail. The maidenhair spleenwort was found on the sandstone cliff nearby, while the lance-leaved grape fern (*Botrychium lanceolatum*, var. *angustisegmentum*) was found growing in the woods. Altogether about fourteen species of ferns were identified. Violets were plentiful, some species past blooming. *Trillium erectum* was found but with flowers dried up. A total of about thirty species of plants was noted, not including duplicates seen the day before.

Early in the afternoon a stop was made at a pleasant waterfall, wood gathered, and steak, coffee, etc., cooked over the open fire. After resting the return trip was made.

A portion of the party then drove westward over the Pocono Plateau, finding the rhodora, painted trillium and bunchberry in bloom. The occurrence of the painted trillium was noteworthy, coming up in great numbers in a recently burned over area. Perhaps it is normally just as plentiful, but being almost the first plant to appear against the black background presented a striking picture.

J. L. Rodda

## Trip of July 2–4, to the Pine Barrens

Some eight members and friends of the Club took part, off and on, in this week-end outing. Leaving Old Bridge, we followed a back road across a "pine barrens island" through pitch pine and oak with some of the characteristic ground plants such as Hudsonia. We came off the "island" at Tennent into the fertile Monmouth County region. A short stop was made at Tennent Church, this being only four days from the 160th anniversary of the Battle of Monmouth, and Independence Day week-end. At Smithburg we took the Court House Road which follows the Monmouth-Ocean County Line, continuing to Prospertown for our first botanical stop. The usual meadow and marsh plants were found back of the remains of the dam, but in the spillway near the old water wheel were a few plants of *Nymphoides lacunosum*. The water moss, Fontinallis grows here and the red alga, Batrachospermum.

Our next stop was at a lake about one mile east of Colliers Mill. This small lake is being closed over by a floating bog type of vegetation. At the east end this is composed of Sphagnum and Chamadaphne, at the west end the dominant plant is *Carex exilis*. The abandoned pits of a charcoal burner were found nearby. At Colliers Mill we met Ivins Grant and he invited us to have our lunch on the shore of the lake. Pondweed and white water lilies were abundant and Mr. Frazee found some water shield (Brasenia). After passing through more of the forgotten towns, climbing a fire tower, and crossing the west plains, we reach Simplace and stopped by a young cranberry bog. A natural bog was found across the road and here we observed *Narthecium americanum*, *Tofieldia glutinosa*, *Lophiola aurea*, *Polygala lutea*, *Drosera filiformis* and *Sarracenia purpurea* in flower. Schizea was present and interested the members of the party, but no more I think than did the large and luscious fruits of *Vaccinium corymbosum.*

In the east plains, we observed an extensive stand of Corema and the other characteristic plants of the area. Mr. Coles found a nest of the chewink, which was duly photographed and left. Anderson's tree frog was heard near the little pond but could not be located for study. Pine Barrens lizards had been seen commonly. We proceeded to Tuckerton over the back road. Here we were soon joined by Ora Smith who had responded favorably to the stimulus of a special delivery letter. Finding shelter along the Shore Road on the Fourth of July week-end is something of a problem but this detail was finally arranged and the latter part of the evening was spent on the dunes in the vicinity of Barnegat Light. This was found to be the optimum time for studying certain marine fauna.

Mr. and Mrs. William Gavin Taylor joined us Sunday morning and Mr. Frazee returned to the group. Some members of the party expressed a desire to compare the bogs of Cape May with those of the pine barrens so after a visit to Bass River State Forest to see the stands of several different pines and other conifers, we pushed south. A stop along Wading River afforded a study of marsh vegetation. Pontederia, in full flower, was the most common. Peltandra, Orontium, and Acorus represented the Araceae. Cattails were common. A single green orchid was seen. There was an abundance of white water lily as in all the bogs and marshes at this season. We drove through the cedar propagation project in Green Bank State Forest. In a nearby typical pine barrens stand Mrs. Eustachio found a puff adder or hog-nosed snake. This reptile went through all of its tricks of bluffing for us and was photographed in action.

In Cape May County we visited a bog near Bennett's and one in West Cape May. Plants seen which were less common or missing in the Pine Barrens included Spanish oak, shingle oak, persimmon, *Asclepias rubra*, *Sclerolepis uniflora*, and *Aletris farinosa*. The unusual orchids of these bogs were not in flower. Some species of Polygala were in flower as were Spiranthes, *Rhexia virginica*, *Proserpinaca pectinata* and Eriophorum. This was the only place where we saw *Tripsacum dactyloides*. After a short time on the beach at Cape May Point, collecting "Cape May Diamonds," we drove to Hammonton. Before retiring we saw some moving pictures of charcoal burning and a reel of kodachrome pictures of plants of the sand bars.

On Monday morning Mr. James Bassett showed us through his nursery and warehouses where many species of pine barrens and coastal plants are propagated or otherwise put to commercial use. Next we were the guests of Dr. Darrow, of the U.S.D.A., at his experimental plots near Weymouth. The newly developed varieties of cultivated blueberries were just about at their height and it was a pleasure to pass judgment on the quality and flavor of the various selections. From Weymouth we crossed through Batsto, and Washington to Martha. We examined the ruins of the old furnace and saw the display of bog plants again but in greater abundance and on a much larger scale than before. At the upper bog we crossed through a large savanna of several acres where *Narthecium americanum* was abundant. *Sabatia lanceolata* was common. We saw *Utricularia cornuta*, *U. fibrosa*, *U. subulata*, and *U. resupinata*. Around the furnace there was an abundance of ebony spleenwort and Opuntia. Back in the dry barrens we observed more dwarf chestnut oak than we had seen elsewhere.

JOHN A. SMALL

## NEWS NOTES

Dr. Paul R. Burkholder, associate professor of botany at Connecticut College, has been appointed associate professor at the University of Missouri. (Science).

Dr. A. A. Dunlap, assistant mycologist and plant physiologist at the Connecticut Agricultural Experiment Station, has taken up his work as chief of the division of plant pathology and physiology at the Texas Agricultural Experiment Station. (Science)

The Desert Laboratory of the Carnegie Institution and the Arnold Arboretum are co-operating in a botanical study of the Chihuahuan Desert in northern Mexico and adjacent parts of Texas and New Mexico. Dr. Forrest Shreve and Dr. T. D. Mallery of the Desert Laboratory and Dr. I. M. Johnston of the Arnold Arboretum have been doing field work during August and September in the states of Coahuila and San Luis Potosi.

Among the passengers on the ill-fated Hawaii Clipper that was lost near the Philippines on July 28 was Fred Campbell Meier who had been connected with the U. S. Department of Agriculture for twenty years. His work was connected with plant pathology. For some years he was greatly interested in collected spores and bacteria from high altitudes by means of "sky-hooks." In their trip across the North Atlantic the Lindberghs collected material for him. He had recently been given a grant by the National Research Council which would enable him to take leave from his official work and spend six months on his hobby. It was on the first trip after receiving the grant that he lost his life.

Darwin M. Andrews of Boulder, Colo., died on Aug. 14 in his sixty-ninth year. He was a student of the plants of Colorado and had worked at bringing native species into cultivation and improving them for horticulture.

Dr. Charles A. Shull of the University of Chicago is guest professor of the department of botany of Oklahoma Agricultural and Mechanical College. He will continue his work on Plant Physiology and The Botanical Gazette while there.

Professor Alfred Rehder, author of the Manual of Cultivated Trees and Shrubs, curator of the Arnold Arboretum, Harvard University, celebrated his seventy-fifth birthday on September 4. A dinner was given in his honor by the staff of the Arboretum. During the dinner he was presented with a substantial purse.

A new plan for the publication of Biological Abstracts has been adopted by the Board of Trustees. Beginning with 1939 the monthly issues covering the literature of all the life sciences will be continued at a uniform price of $25 to libraries and individual subscribers alike. In addition the following specialized sections of each issue will be published: General Biology, $4; Experimental Animal Biology, $9; Microbiology and Parasitology, $5; Plant Sciences, $6; Animal Sciences, $6; The section on Plant Sciences will include Phytopathology, Plant Physiology, Plant Anatomy, Paleobotany, Systematic Botany, Agronomy, Horticulture, Forestry, Pharmacognosy and Pharmaceutical Botany. The prices given are for the United States. Subscribers to any of the parts will receive indexes to the whole Biological Abstracts.

The hurricane of September 21 destroyed about half the trees of southern New England. Representing New England's forest interests, Ward Shepard, director of Harvard Forest, has been in consultation with the U. S. Forest Service, the Civilian Conservation Corps, the Works Progress Administration and other government agencies in regard to removing the fire hazard due to the fallen trees, salvaging all that can be made use of, and the rebuilding of the forests and wood lots. The hurricane showed that mixed forests withstood better than forests uniform as to species and age, so new plantings will attempt to be naturalistic with various species. Dr. Elmer D. Merrill, of Harvard, states that the Arnold Arboretum lost some 1,500 trees, including some of the oldest and largest trees in the arboretum, as well as some of the rarest ones.

Dr. T. H. Goodspeed, of the University of California, is leading an expedition to the southern Andes to collect relatives of the tobacco plant and other forms. Working southward from Buenos Aires the party will go through the Patagonian pampas to Tierra Del Fuego, then through the Straits of Magellan and north to the Chilean Lakes region.

Dr. E. C. Ogden, of the Gray Herbarium of Harvard, has been appointed instructor in botany at the University of Maine.

A. H. G. Alston, an assistant keeper in the department of botany of the British Museum (Natural History), is visiting northern South America collecting plants for the museum and studying ferns. He attended the first South American Botanical Assembly at Rio de Janeiro from October 12 to 19.

Dr. Francis Drouet has been appointed a member of the department of botany of the Field Museum of Natural History and will have charge of the collection of cryptogamic plants.

# THE TORREY BOTANICAL CLUB

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Of former volumes, 24–64 can be supplied separately at $6.00 each; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Single copies (75 cents) will be furnished only when not breaking complete volumes.

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Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

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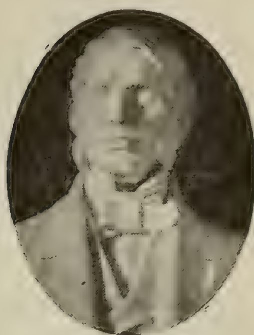
EDITED FOR

THE TORREY BOTANICAL CLUB

BY

GEORGE T. HASTINGS



John Torrey, 1796-1873

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GEORGE T. HASTINGS
2587 Sedgwick Ave.,
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# TORREYA

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## The Cladoniae of New Jersey—Supplement[1]

Alexander W. Evans

In 1935 the writer published a report on the *Cladoniae* of New Jersey (**25**)[2] and listed 39 species (including numerous forms) for the state. This report gave the results of exploration down to the close of 1934. The present paper gives the results of exploration during the years 1935, 1936, and 1937 and includes a few records of earlier date, which have come to light since the publication of the report.

The most intensive exploration for *Cladoniae* has been carried on by Mr. Raymond H. Torrey, who has sent in material from a long series of new stations. His careful field studies have been supplemented by the work of other botanists, several of whom have supplied specimens of more than usual interest. In the following list the records based on Mr. Torrey's material are indicated by dates only. All other records are cited with both dates and collectors' names. These collectors, in addition to those mentioned in the original report (**25**, p. 84), include the following: S. A. Cain, A. Cohn, R. Darrow, F. Drouet, G. B. Kaiser, G. E. Nichols, and S. F. Wright.

The supplement follows the arrangement of the report. It lists, not only the specimens actually studied by the writer, but also those mentioned in the reports of field trips of the Torrey Botanical Club, in so far as these have been published in Torreya. Species and forms which are not listed in the original report are marked by asterisks (*), even if they have already been noted in Torreya. Most of the records are based on specimens in the herbarium of Yale University.

The supplement adds seven species to the *Cladoniae* of New Jersey, thus raising the total number to 46. Two of these species,

[1] Contribution from the Osborn Botanical Laboratory.

[2] The numbers in bold-face type refer to the titles given in the original report and to the additional titles listed at the close of the present supplement.

*C. leporina* Fr. and *C. turgida* (Ehrh.) Hoffm., have already been reported from the state but were excluded from the report on account of the lack of corroborative specimens. It is an especial satisfaction to be able to reinstate these species as members of the New Jersey flora. The five species new to the state are *C. impexa* Harm., *C. scabriuscula* (Del.) Leight., *C. brevis* Sandst., *C. mateocyatha* Robbins, and *C. conista* (Ach.) Robbins.

Subgenus 1. CLADINA

1. Cladonia rangiferina (L.) Web. (**25**, p. 84). Morris: Green Pond (1937). Ocean: Lakewood (see Dillmann, **23**). Sussex: Kittatiny Mountain (*Cain*, 1935) and near Sussex (*Cain*, 1935.)

1a. Cladonia rangiferina f. crispata Coem. (**25**, p. 85). Sussex: Montague (1937).

1c. Cladonia rangiferina f. prolifera Flot. (**25**, p. 85). Morris: Green Pond (1937).

1d.* Cladonia rangiferina f. setigera Oxner (**6**, p. 36). Morris: Green Pond (1937). Sussex: Kittatiny Mountain (1936).

2. Cladonia sylvatica (L.) Hoffm. (**25**, p. 85). Atlantic: Elihu's Brook (1936). Burlington: Martha (1937). Morris: Green Pond (1937). Ocean: Bamber (*Drouet*, 1937), near Collier's Mills (1935), Island Beach (1936), and Lakehurst (see Torrey, **31**). Sussex: Montague (1937).

2a. Cladonia sylvatica f. pygmaea Sandst. (**25**, p. 85). Sussex: Montague (1937).

2c.* Cladonia sylvatica f. setigera Oxner (**26**, p. 7). Atlantic: Weymouth (1936).

3. Cladonia mitis Sandst. (**25**, p. 86). Cape May: Cape May Point (1935) and Steelmanton (1935). Ocean: Island Beach (1936). Union: Seeley's Glen, Watchung Mountains (*Mrs. Anderson*, 1934, not previously reported).

3b. Cladonia mitis f. prolifera Sandst. (**25**, p. 86). Burlington: Martha (1937). Cape May: Cape May Point (1935). Ocean: near Collier's Mills (1935). Union: Seeley's Glen, Watchung Mountains (*Mrs. Anderson*, 1934, not previously reported).

4. CLADONIA TENUIS (Floerke) Harm. (**25**, p. 86). ATLANTIC: Green Bank State Forest (1936) and Weymouth (1936). BERGEN: near Ridgewood (see Torrey, **30**). BURLINGTON: Chatsworth (*Darrow*, 1935) and Martha (1937). CAPE MAY: Cape May Point (1935) and near Fishing Creek (1935). CUMBERLAND: Sharp's Branch of Tuckahoe River (1935). OCEAN: Collier's Mills (1935) and Island Beach (1936). PASSAIC: Ringwood Mines (1935). SUSSEX: Kittatiny Mountain (1936).

4a. CLADONIA TENUIS f. SETIGERA (**25**, p. 87). ATLANTIC: Elihu's Brook (1936). CAPE MAY: Belle Plain State Forest (1935), Cape May Point (1935), and Steelmanton (1935). PASSAIC: Ringwood Mines (1935). SUSSEX: Kittatiny Mountain (1936).

4A.* CLADONIA IMPEXA Harm. (**4**, p. 386). The discovery of *C. impexa* in New Jersey is of unusual interest. Although the species is widely distributed in Europe, its range in the United States is still incompletely known, and many of the specimens which have been referred to it represent *C. sylvatica* or *C. tenuis* instead. This is the case, for example, with the specimens from Connecticut, listed by the writer in 1930 (see **26**, p. 16). Aside from the stations given below *C. impexa* is known in the United States only from Maine, New Hampshire, and Massachusetts. In the Cape Cod region, where it was first discovered by Mr. Robbins, it occurs in considerable abundance.

One of the most important distinctions between *C. impexa* and its immediate allies is of a chemical nature. In *C. sylvatica* and *C. tenuis*, for example, the bitter fumarprotocetraric acid is present, whereas in *C. impexa* this acid is completely lacking. The earlier writers depended upon a difference in taste in separating *C. impexa* from *C. tenuis*, but the application of paraphenylenediamine, as recommended by Asahina, makes the taste-test superfluous (see Torrey, **28**, and Evans, **26**, p. 25). If fumarprotocetraric is present, as in *C. sylvatica* and *C. tenuis*, this reagent gives an orange-red or brick-red color; if the acid is absent, as in *C. impexa*, the reaction is usually entirely negative. In giving a negative reaction with paraphenylenediamine *C. impexa* agrees with *C. mitis*, but the latter species is at once distinguished by differences in the branching of the podetia. The New Jersey material of *C. impexa* is referable to the following form:—

4Aa.* Cladonia impexa f. subpellucida Harm. Lich. France 233. 1907. Ocean: Forked River (*Cohn*, 1937, det. Sandstede). According to Harmand this form represents the typical development of the species. It is characterized by the translucent appearance of the main axis and larger branches; by the fact that the principal axils are usually closed; and by the straight or slightly curved terminal branchlets. The synonymy of f. *subpellucida* is not definitely settled, and some writers prefer for it the name *C. impexa* f. *laxiuscula* (Del.) Sandst. (see **4**, p. 387).

## Subgenus 2. PYCNOTHELIA

5a. Cladonia papillaria (Ehrh.) Hoffm. f. molariformis (Hoffm.) Schaer. (**25**, p. 87). Atlantic: Elihu's Brook (1936) and Port Republic (1936). Cape May: Cape May Point (1935), near Fishing Creek (1935), and Steelmanton (1935). Ocean: Jackson's Mills (1936). Somerset: near Somerville (*Wright*, 1935) and Warrenville (*Mrs. Anderson*, 1934, not previously reported).

5c. Cladonia papillaria f. papillosa Fr. (**25**, p. 87). Burlington: Martha (1937). Cape May: near Fishing Creek (1935) and Steelmanton (1935). Ocean: Barnegat (*Darrow*, 1935).

## Subgenus 3. CENOMYCE

### Section 1. Cocciferae

#### Subsection 1. Subglaucescentes

7. Cladonia bacillaris (Ach.) Nyl. (**25**, p. 88). Atlantic: Elihu's Brook (1936) and Green Bank State Forest (1936). Ocean: Island Beach (1936) and Lakewood (*Mrs. Harris*, 1908, not previously reported). Passaic: Ringwood Mines (1935). Sussex: Wawayanda cedar swamp (see Thomson, **27**).

8. Cladonia macilenta Hoffm. (**25**, p. 88). Ocean: near Lakewood (see Dillmann, **23**).

8a. Cladonia macilenta f. styracella (Ach.) Vainio (**25**, p. 88), Monmouth: Navesink (1936).

9b. Cladonia didyma (Fée) Vainio f. subulata Sandst. (**25**, p. 89). Burlington: Quaker Bridge (1936).

Subsection 2. Stramineo-flavidae

10. Cladonia pleurota (Floerke) Schaer. (**25**, p. 89). Burlington: Martha (1937). Morris: Towaco (*Drouet*, 1937). Ocean: near Lakewood (see Dillmann, **23**). Somerset: Warrensville (*Mrs. Anderson*, 1934, not previously reported).

10b.* Cladonia pleurota f. decorata Vainio (**4**, p. 402). Cape May: Belle Plain State Forest (1935).

12. Cladonia cristatella Tuck. (**25**, p. 90). Ocean: near Lakewood (see Dillmann, **23**). Sussex: Wawayanda cedar swamp (see Thomson, **27**).

12a. Cladonia cristatella f. beauvoisii (Del.) Vainio (**25**, p. 90). Atlantic: Elihu's Brook (1936) and Russia (1936). Bergen: near Ridgewood (see Torrey, **30**). Cape May: near Fishing Creek (1935) and Steelmanton (1935). Ocean: Bamber (*Drouet*, 1937), Lakewood (*Mrs. Harris*, 1908, not previously reported), and Island Beach (1936). Somerset: near Somerville (*Wright* 1935) and Warrensville (*Mrs. Anderson*, 1934, not previously reported).

12b. Cladonia cristatella f. vestita Tuck. (**25**, p. 91). Atlantic: Elihu's Brook (1936). Bergen: near Ridgewood (see Torrey, **30**). Gloucester: Sewell (*Kaiser*, 1910, not previously reported). Ocean: Island Beach (1936) and near Lakewood (see Dillmann, **23**). Somerset: Warrensville (*Mrs. Anderson*, 1934, not previously reported).

12e. Cladonia cristatella f. scyphulifera Sandst. (**25**, p. 91). Atlantic: Elihu's Brook (1936). Bergen: near Ridgewood (see Torrey, **30**). Ocean: Bamber (*Drouet*, 1937), Island Beach (1936), and near Jackson's Mills (1936).

13. Cladonia incrassata Floerke (**25**, p. 91). Atlantic: Elihu's Brook (1936) and Green Bank State Forest (1936). Burlington: Martha (1937). Cumberland: Sharp's Branch of Tuckahoe River (1935). Ocean: near Jackson's Mills (1935). Monmouth: Navesink Highlands (1936).

Subsection 3. Leporinae

13A.* Cladonia leporina Fr. in Tuckerman, Am. Jour. Sci. Arts **25**: 428. 1858. Cape May: Cape May Point (*Dillmann*, 1936, see Torrey, **29**; *Nichols*, 1937). Although Vainio (**22**,[1]

p. 221) places this red-fruited species in the subsection *Stramineo-flavidae*, on account of its yellowish color, it is very different from the other members of this group. In the writer's opinion it is distinct enough to be made the type of a new subsection, for which (as indicated above) the name *Leporinae* is proposed. In this subsection the primary thallus, which is foliose in character, is short-lived and difficult to demonstrate. The podetia, on the other hand, which are copiously branched, continue growing independently for a long time, although the older parts gradually die and decay. In general habit, therefore, the *Leporinae* resemble the *Cladinae* and the *Unciales*.

The podetia of *C. leporina* may occur singly but usually grow in irregular and intricate colonies. Robust examples may attain a length of 7–8 cm. and a diameter of 3–5 mm. in the larger axes, but many of the podetia are shorter and more slender. They are destitute of squamules and of cups and branch repeatedly by dichotomies or by whorls of three or more, and there is a marked difference in diameter between the ultimate branchlets, and the axes of higher rank. Most of the axils are closed but some are open, and lateral perforations are not uncommon. In the younger parts of the podetia the cortex, which is never sorediose, is continuous but usually presents a more or less rugulose appearance. This becomes much more marked in the older parts, where the surface is deeply and irregularly wrinkled. The internal surface of the podetia, owing to the absence of a cartilaginous layer, is distinctly arachnoid. *C. leporina* is negative with KOH but gives a yellow reaction with paraphenylenediamine. This color, however, does not deepen to orange or red.

According to Eckfeldt (see Britton, **3**) *C. leporina* has been collected at Atco in Camden County. In the absence of specimens from this locality the station at Cape May Point is the most northern station that can be definitely cited at the present time. In the southern parts of the United States, from North Carolina southward to Florida and westward to Texas, the species is abundant, especially in sandy areas near the coast; and it is known also from Cuba.

Section 2. Ochrophaeae

Subsection 1. Unciales

14. Cladonia uncialis (L.) Web. (**25**, p. 92). Atlantic:

Elihu's Brook (1936) and Green Bank State Forest (1936). BURLINGTON: Martha (1937). CAPE MAY: Steelmanton (1935). MORRIS: Green Pond (1937). OCEAN: near Collier's Mills (1935) and Lakewood (see Dillmann, **23**). PASSAIC: Ringwood Mines (1935). SUSSEX: Kittatiny Mountain (1936) and Montague (1937). These specimens are not referable to any definite form.

14a. CLADONIA UNCIALIS f. OBTUSATA (Ach.) Vainio (**25**, p. 92). BURLINGTON: Martha (1937).

14b. CLADONIA UNCIALIS f. SUBOBTUSATA Coem. (**25**, p. 92). ATLANTIC: Elihu's Brook (1936). BURLINGTON: Martha (1937). OCEAN: near Collier's Mills (1935).

14f.* CLADONIA UNCIALIS f. TURGESCENS (Del.) Fr. (**5**, p. 133). SUSSEX: Kittatiny Mountain (1937, det. Sandstede as f. *turgida* Schaer., a synonym of f. *turgescens*).

14g.* CLADONIA UNCIALIS f. SORALIGERA Robbins (**6**, p. 42). SUSSEX: Montague (1937), det. Sandstede).

15a. CLADONIA CAROLINIANA (Schwein.) Tuck. f. DILATATA Evans (**25**, p. 93). ATLANTIC: Elihu's Brook (1936), Port Republic (1936), and Weymouth (1936). BURLINGTON: Martha (1937). CAMDEN: Berlin (*Kaiser*, 1910, not previously reported). CAPE MAY: Steelmanton (1935). OCEAN: near Collier's Mills (1935), Island Beach (1936), and Jackson's Mills (1936). PASSAIC: Ringwood Mines (1935).

15c. CLADONIA CAROLINIANA f. TENUIRAMEA Evans (**25**, p. 93). ATLANTIC: near Risley's (1935). CAPE MAY: Cape May Point (1935) and Steelmanton (1935). OCEAN: Island Beach, (1936), Jackson's Mills (1936), and Lakewood (*Mrs. Harris* 1908, not previously reported).

15d.* CLADONIA CAROLINIANA f. DIMORPHOCLADA (Robbins) Evans (**5**, p. 137). BURLINGTON: Martha (1937). OCEAN: near Jackson's Mills (1936) and Lakehurst (see Torrey, **31**).

16b.* CLADONIA BORYI Tuck. f. LACUNOSA (Bory) Tuck. (**4**, p. 418). OCEAN: Island Beach (1936) and Point Pleasant (*Plitt*, 1907, not previously reported).

### Subsection 2. CHASMARIAE

#### Group 1. MICROPHYLLAE

17. CLADONIA FURCATA (Huds.) Schrad. (**25**, p. 94). SUSSEX: north of Andover (1937, mostly thallus) and Wawayanda cedar swamp (see Thomson, **27**).

17a. CLADONIA FURCATA var. RACEMOSA (Hoffm.) Floerke (**25**, p. 95). SOMERSET: Hall Mountain, north of Lebanon (1937).

17ab. CLADONIA FURCATA var. RACEMOSA f. SQUAMULIFERA Sandst. (**25**, p. 95). CAPE MAY: Cape May Point (1936). PASSAIC: Ringwood Mines (1935). SUSSEX: north of Andover (1937) and Kittatiny Mountain (1936).

17ac.* CLADONIA FURCATA var. RACEMOSA f. FURCATOSUBULATA (Hoffm.) Vainio (**4**, p. 422). CAPE MAY: Cape May Point (1935, 1936).

17ad.* CLADONIA FURCATA var. RACEMOSA f. FISSA (Floerke) Aigret (**5**, p. 153). SUSSEX: north of Andover (1937).

17A.* CLADONIA SCABRIUSCULA (Del.) Leight. (**4**, p. 426). Represented in New Jersey by the following form:—

17Aa.* CLADONIA SCABRIUSCULA f. FARINACEA (Vainio) Sandst. (**4**, p. 427). OCEAN: Island Beach (1936).

18. CLADONIA FLORIDANA Vainio (**25**, p. 95). ATLANTIC: Port Republic (1936). BURLINGTON: Hampton Gate (1936, see Torrey, **29**). OCEAN: Barnegat (*Darrow*, 1935) and near Lakewood (see Dillmann, **23**).

18b. CLADONIA FLORIDANA f. ESQUAMOSA Robbins (**25**, p. 96). BURLINGTON: Hampton Gate (1936). OCEAN: Lakehurst (see Torrey, **31**).

19. CLADONIA SANTENSIS Tuck. (**25**, p. 96). ATLANTIC: near Elihu's Brook (1936). Green Bank State Forest (1936), and near Risley's (1935). BURLINGTON: Martha (1937) and Quaker Bridge (1936, see Torrey, **29**). CUMBERLAND: Sharp's Branch of Tuckahoe River (1935). OCEAN: near Collier's Mills (1935).

20. CLADONIA SQUAMOSA (Scop.) Hoffm. (**25**, p. 96). CUMBERLAND: Sharp's Branch of Tuckahoe River (1935). MONMOUTH: Navesink Highlands (1936). OCEAN: near Lakewood (see Dillmann, **23**). SUSSEX: Montague (1937).

20b. CLADONIA SQUAMOSA f. PHYLLOPODA Vainio (**25**, p. 97). BURLINGTON: Chatsworth (*Darrow*, 1935, det. Sandstede).

20c. CLADONIA SQUAMOSA f. LEVICORTICATA Sandst. (**25**, p. 97). MORRIS: Green Pond (1937).

20ca. CLADONIA SQUAMOSA f. LEVICORTICATA m. PSEUDOCRISPATA Sandst. (**25**, p. 97). ATLANTIC: near Elihu's Brook (1936). CAPE MAY: Belle Plain State Forest (1935). CUMBER-

LAND: Sharp's Branch of the Tuckahoe River (1935). PASSAIC: Ringwood Mines (1935).

20cb. CLADONIA SQUAMOSA f. LEVICORTICATA m. RIGIDA (Del.) Evans (**24**, p. 97). ATLANTIC: near Elihu's Brook (1936) and Green Bank (1936). CAPE MAY: Belle Plain State Forest (1935) and Steelmanton (1935). MORRIS: Green Pond (1937). PASSAIC: Packanack Lake, Preakness Township (*Mrs. Anderson*, 1934, not previously reported and Ringwood Mines (1935). SOMERSET: near Somerville (*Wright*, 1936). SUSSEX: Montague (1937).

20cc.* CLADONIA SQUAMOSA f. LEVICORTICATA m. **pityrea** (Arn.) comb. nov. *C. squamosa* f. *pitryea* Arn. Flora 67: 84. 1884. *C. squamosa* f. *multibrachiata* subf. *pityrea* Harm. Lich. France 262. 1907. BURLINGTON: Martha (1937). MORRIS: Green Pond (1937). OCEAN: Island Beach (1937, det. Sandstede as f. *pityrea*). Podetia 10–2 mm. high, smooth or sparingly squamulose, cup-forming or radiately branched, and producing apothecia more or less abundantly. The last feature distinguishes m. *pityrea* from m. *pseudocrispata* and m. *rigida*.

20e.* CLADONIA SQUAMOSA f. DENTICOLLIS (Hoffm.) Floerke (**4**, p. 434). MORRIS: Green Pond (1937, det. Sandstede). OCEAN: Lakewood (*Mrs. Harris*, 1908, not previously reported).

20f.* CLADONIA SQUAMOSA f. PHYLLOCOMA (Rabenh.) Vainio (**4**, p. 434). SUSSEX: Kittatiny Mountain (1936, det. Sandstede).

20g.* CLADONIA SQUAMOSA f. MURINA Scriba (**4**, p. 437). CUMBERLAND: Sharp's Branch of Tuckahoe River (1935, det. Sandstede).

21a. CLADONIA DELICATA (Ehrh.) Floerke f. QUERCINA (Pers.) Vainio (**25**, p. 98). ATLANTIC: Elihu's Brook (1936) and Green Bank State Forest (1936). SUSSEX: Kittatiny Mountain (1936).

22. CLADONIA CAESPITICIA (Pers.) Floerke (**25**, p. 98). MORRIS: Towaco (*Drouet*, 1937).

Group 2. MEGAPHYLLAE

23. CLADONIA APODOCARPA Robbins (**25**, p. 98). BERGEN: near Ridgewood (see Torrey, **30**). MORRIS: Towaco (*Drouet*, 1937). PASSAIC: Ringwood Mines (1935). SOMERSET: Warrensville (*Mrs. Anderson*, 1934, not previously reported).

23A.* CLADONIA TURGIDA (Ehrh.) Hoffm. (**4**, p. 441). ATLANTIC: Green Bank State Forest (1936, det. Sandstede). The New Jersey specimens represent a small form of the species, in which the podetia seem to have been arrested in their development. It will be remembered that the earlier records for *C. turgida* in the state were uncertain (see **25**, p. 98) and that some of them at least were based on incorrect determinations.

Subsection 3. CLAUSAE

Group 1. PODOSTELIDES

24. CLADONIA MITRULA Tuck. (**25**, p. 99). BERGEN: near Ridgewood (see Torrey, **30**).

24a. CLADONIA MITRULA f. IMBRICATULA (Nyl.) Vainio (**25**, p. 99). BURLINGTON: Chatsworth (*Darrow*, 1935). CAPE MAY: near Fishing Creek (1935) and Tuckahoe State Forest (1936). SUSSEX: north of Andover (1937).

24b. CLADONIA MITRULA f. PALLIDA Robbins (**25**, p. 99), CAPE MAY: Tuckahoe State Forest (1936).

25a. CLADONIA CLAVULIFERA Vainio f. NUDICAULIS Evans (**25**, p. 100). ATLANTIC: near Port Republic (1936). CAPE MAY: Cape May Point (1935), near Fishing Creek (1935), and Steelmanton (1935). OCEAN: near Collier's Mills (1935) and Island Beach (1936). PASSAIC: Ringwood Mines (1935).

25b. CLADONIA CLAVULIFERA f. SUBVESTITA Robbins (**25**, p. 100). CAPE MAY: near Fishing Creek (1935).

25d*. CLADONIA CLAVULIFERA f. PLEUROCARPA Robbins (**4**, p. 447). OCEAN: Island Beach (1936).

26. CLADONIA SUBCARIOSA Nyl. (**25**, p. 100). BERGEN: near Ridgewood (see Torrey, **30**).

26a. CLADONIA SUBCARIOSA f. EVOLUTA Vainio (**25**, p. 100). CAPE MAY: Cape May Township (1936), near Fishing Creek (1935), and Tuckahoe State Forest (1936).

26b.* CLADONIA SUBCARIOSA f. SQUAMULOSA Robbins (**4**, p. 451). CAPE MAY: Cape May Township (1936).

26A.* CLADONIA BREVIS Sandst. (**5**, p. 156). OCEAN: near Collier's Mills (1935).

Group 2. Thallostelides

27. Cladonia verticillata (Hoffm.) Schaer. (**25**, p. 100). Ocean: Lakehurst (see Dillmann, **23**) and Lakewood (see Dillmann, **24**). Sussex: Wawayanda cedar swamp (see Thomson, **27**).

28. Cladonia calycantha Del. (**25**, p. 101). Atlantic: Elihu's Brook (1936), Green Bank State Forest (1936) Inskip (*Blake*, 1928, not previously reported), and Russia (1935). Burlington: Martha (1937) and New Gretna (*Musch*, 1928, not previously reported). Cumberland: Lawrence Branch (1936) and Sharp's Branch (1935) of the Tuckahoe River. Cape May: Cape May Point (1935) and Steelmanton (1935). Ocean: Bamber (*Drouet*, 1937), Island Beach (1936), and near Lakewood (see Dillmann, **24**).

28a. Cladonia calycantha f. foliosa Vainio (**25**, p. 101). Burlington: Martha (1937). Cumberland: Lawrence Branch (1936) and Sharp's Branch (1935) of the Tuckahoe River.

28A.* Cladonia mateocyatha Robbins (**4**, p. 461). The discovery of this species in New Jersey is not surprising, since it occurs abundantly both north and south of the state. The material is referable to the following form:—

28Aa.* Cladonia mateocyatha f. squamulata Robbins (**4**, p. 462). Somerset: Charlottesburg (*Wright*, 1935).

29aa. Cladonia pyxidata (L.) Hoffm. var. neglecta (Floerke) Mass. f. simplex (Ach.) Harm. (**25**, p. 103). Passaic: Ringwood Mines (1935).

30. Cladonia chlorophaea (Floerke) Spreng. (**25**, p. 104). Atlantic: Elihu's Brook (1936). Burlington: Chatsworth (*Darrow*, 1935). Cumberland: Sharp's Branch of the Tuckahoe River (1935). Passaic: Ringwood Mines (1935). Sussex: Wawayanda cedar swamp (see Thomson, **27**).

30b.* Cladonia chlorophaea f. simplex (Hoffm.) Arn. (**4**, p. 468). Cape May: near Fishing Creek (1935). Sussex: Kittatiny Mountain (1936) and Montague (1937).

30c.* Cladonia chlorophaea f. carpophora (Floerke) Anders (**4**, p. 470). Sussex: Kittatiny Mountain (1936).

31. Cladonia grayi Merrill (**25**, p. 104). Atlantic: near

Hammonton (1935). Ocean: Island Beach (1936). Passaic: Ringwood Mines (1935).

31a.* Cladonia grayi f. simplex Robbins (**26**, p. 19). Sussex: Montague (1937).

31b.* Cladonia grayi f. carpophora Evans (**26**, p. 20). Atlantic: near Elihu's Brook (1936). Cape May: near Fishing Creek (1935). Morris: Green Pond (1937).

31c.* Cladonia grayi f. squamulosa Sandst. (**5**, p. 160). Morris: Green Pond (1937). Somerset: near Somerville (*Wright*, 1935). Sussex: Kittatiny Mountain (1936).

31A.* Cladonia conista (Ach.) Robbins (**4**, p. 472). Represented in New Jersey by the following form:—

31Aa.* Cladonia conista f. simplex Robbins (**4**, p. 473). Ocean: Lakewood (*Mrs. Harris*, 1908, not previously reported).

32. Cladonia fimbriata (L.) Fr. (**25**, p. 104). Ocean: Lakewood (see Dillmann, **24**).

33. Cladonia nemoxyna (Ach.) Nyl. (**25**, p. 105). Passaic: Ringwood Mines (1935). Sussex: Montague (1937).

33a. Cladonia nemoxyna f. fibula (Ach.) Vainio (**25**, p. 105). Passiac: Ringwood Mines (1935).

35. Cladonia coniocraea (Floerke) Spreng. (**25**, p. 105). Ocean: Lakewood (see Dillmann, **23**).

35a. Cladonia coniocraea f. ceratodes (Floerke) Dalla Torre & Sarnth. (**25**, p. 105). Bergen: near Ridgewood (see Torrey, **30**). Cumberland: Sharp's Branch of Tuckahoe River (1935). Monmouth: Navesink Highlands (1936). Sussex: Kittatiny Mountain (1936) and Montague (1937).

35b. Cladonia coniocraea f. truncata (Floerke) Dalla Torre & Sarnth. (**25**, p. 105). Sussex: north of Andover (1937) and Kittatiny Mountain (1936).

35c. Cladonia coniocraea f. pycnotheliza (Nyl.) Vainio (**25**, p. 106). Bergen: near Ridgewood (see Torrey, **30**). Ocean: near Collier's Mills (1935).

36. Cladonia borbonica (Del.) Nyl. (**25**, p. 106). Bergen: near Ridgewood (see Torrey, **30**).

36a. Cladonia borbonica f. cylindrica Evans (**25**, p. 106). Ocean: Bamber (*Drouet*, 1937). Sussex: north of Andover (1937).

### Group 3. Foliosae

38. Cladonia strepsilis (Ach.) Vainio (**25**, p. 106). Cape May: Cape May Point (1935). Ocean: Barnegat (*Darrow*, 1935) and near Collier's Mills (1935). Passaic: Ringwood Mines (1935). Somerset: Warrenville (*Mrs. Anderson*, 1934, not previously reported).

38a. Cladonia strepsilis f. glabrata Vainio (**25**, p. 106). Atlantic: Port Republic (1936). Cape May: near Fishing Creek (1935).

38b. Cladonia strepsilis f. coralloides (Ach.) Vainio (**25**, p. 106). Cape May: Cape May Point (1935) and near Fishing Creek (1935). Somerset: near Somerville (*Wright*, 1935).

38c. Cladonia strepsilis f. subsessilis Vainio (**25**, p. 107). Cape May: Cape May Point (1935) and near Fishing Creek (1935).

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26. ———. Notes on the *Cladoniae* of Connecticut,—III. Rhodora **40**: 4–26. 1938.
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28. **Torrey, R. H.** Paraphenylenediamine, a new color test for lichens. Torreya **35**: 110–112. 1935.
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## Roadside Trees of Southern California

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Whenever one visits a different part of the country, among the interesting things to be seen are the new kinds of trees. Buildings are much the same in all parts of the country, but trees differ north and south, east and west. A visitor from the east to Southern California is probably impressed most by the palms that give a tropical aspect, but most of the other trees seen—acacias, eucalypti, pepper—are not hardy in the north and so, strange. Rarely one greets as friends from home silver maples, box elders, English elms, London planes or cottonwoods.

Of cone-bearing trees the most notable are the Deodars, slender pyramidal, wide-spreading at base, the branches gracefully drooping. They are frequently used as lawn trees and sometimes to border roads. Probably the best known road in California as far as trees go, is the "Mile of Deodars" or, "Christmas Tree Lane" in Altadena. At Christmas time when these trees are covered with colored lights, thousands of cars, their lights turned off, coast down this road nightly. *Cedrus deodar* is a native of the Himalayas. The closely related Atlas and Lebanon Cedars with shorter leaves and stiffer branches are less commonly grown. Pines are not common as street trees, but the Torrey Pine, *Pinus torreyana*, named for our own Dr. John Torrey, the 8 to 10 inch needles in fives, the Canary Island Pine with needles 9 to 12 inches long in threes and the Monterey Pine with needles half as long and in threes, are sometimes seen. The Beefwood or Horsetail tree, *Casuarina equisetifolia*, something like a pine in general appearance, has branchlets with the whorls of tiny appressed leaves looking so much like an equisetum that the specific name seems almost inevitable. It bears little cone-like fruits less than an inch long. It is a native of Australia and belongs with the dicotyledons.

A number of palms are grown in California but only four or five species are commonly planted along the streets. Most common and truly Californian are the two species of *Washingtonia*, *W. filifera*, with thick trunks up to three feet in diameter, with many thread-like filaments hanging from the broad palmate leaves, and *W. robusta*, with more slender trunks—in spite of its specific name—and few filaments on the leaves. Both of these California Fan Palms are tall, slender trees with crowns of large leaves which, when they die, remain hanging against the trunk forming exaggerated hula skirts that reach to the ground, unless—as is usually done—they are trimmed off to a greater or less distance from the base. Frequently reaching a height of 80 to 100 feet, these graceful palms give character to many streets, but little more shade than a row of telegraph poles. A small fan palm, rarely over 20 feet high, the leaves usually less than three feet in diameter, is the Windmill Palm, *Trachycarpus excelsa*, from China. The mass of black fibers and old leaf bases on the trunk distinguish it from any other palm. True date palms are grown for their fruit in Imperial Valley and may be seen occasionally as ornamental trees on lawns, but the Canary Island Date Palm, *Phoenix canariensis*, is a common tree along the streets. The pinnate leaves, often 20 feet long arch down and the thick trunks are entirely covered with the diamond-shaped leaf scars or the stubs of old leaves. A slender tree with smooth gray trunk ringed about every six or twelve inches with the narrow scars of former leaves, crowned with pinnate leaves 12 to 15 feet long, is the Plume Palm, commonly known by its scientific name, *Cocos plumosa*. (But more recently named *Arecastrum romanzoffianum*.) It is native to Brazil.

From Australia come the various species of Eucalyptus. With all of them—some ninety are grown in California but only four or five are common—the petals and sepals form a cap on the flower bud that falls off to let the large number of stamens expand. The species most commonly grown and one seen frequently, especially along roads outside the cities, is the Blue Gum, *Eucalyptus globulus*. The odd bark shreds off from the trunk, often in strips several yards long, leaving a smooth grey or whitish inner bark exposed. The leaves on mature trees are alternate, narrowly lanceolate, somewhat curved and yellowish green with distinct petioles, but on young trees and shoots they are opposite, broadly ovate, sessile and bluish green or almost white. Another species frequently seen along the streets is the Swamp Mahogany, *Eucalyptus robusta*, a large tree with rough dark brown bark and ovate leaves. In this the brown capsules are small, half an inch long, and shaped like small goblets, quite unlike the larger, bluish, angular capsules of the blue gum, or the large inch and a half long, urn-shaped capsules, of the following species. The Flowering Eucalyptus, *Eucalyptus ficifolia*, has large, showy clusters of flowers with bright red stamens, or in some cultivated varieties, pink, cream or white. It is commonly a small tree with furrowed grey bark and narrowly ovate leaves.

Another group of trees from Australia are the Wattles or Acacias of which three or four species are commonly planted as street trees and numerous others as specimen trees on lawns. Two of these are without leaves (botanically) as the dense shade they cast is due to the broad, flat petioles, phyllodia. On seedling trees and root shoots the true, twice compound leaves can be found. Sometimes a single shoot shows bipinnate leaves with short round petioles, leaves with longer, flattened petioles, broad petioles with one or two pairs of reduced pinnae at the tip and phyllodia with no leaf blades. The commonest of these Acacias, and one of the most frequently grown of all street trees, is the Blackwood, *Acacia melanoxylon*, which becomes a large tree with a spreading crown. The phyllodia are 3 or 4 inches long, ½ to ¾ inches wide. The Water Wattle, *A. retinodes*, is a smaller tree with narrower slightly longer "leaves." While the Blackwood bears its small, round clusters of creamy flowers in early spring, the water wattle has golden flowers almost all the year. The other wattles commonly planted have small, bipinnate leaves, bluish green and rather stiff. Bailey's Acacia, *A. baileyana*, has leaves with two to five pairs of pinnae, each with twenty or more short leaflets crowded together, while the Silver Wattle, *A. decurrens* var. *dealbata*, is a larger tree with eight to twenty pairs of pinnae, each of over thirty leaflets. All of these Acacias are covered in spring with very tiny yellow flowers crowded together in little globular heads born in racemes, often compound. Most of the flowers are staminate, but mingled with them there are a few perfect flowers. As with the Eucalypti it is the stamens of the flowers which are noticed, not the petals.

Another leguminous tree often seen is the Carob or St. John's Bread, *Ceratonia siliqua*, a native of the Mediterranean region. These trees usually show rounded crowns, partly because of pruning, and have once pinnate leaves of three to five pairs of oval leaflets, an inch or more long, with no terminal leaflet.

The inconspicuous red flowers are borne close to the branches, but the chocolate-colored pods 6 to 10 inches long are conspicuous on the pistillate trees. It is these pods with the sweetish pulp around the seeds, that are reputed to be the locusts that John the Baptist ate in the wilderness and they are most certainly the husks that the prodigal son was reduced to.

A characteristic tree with slender drooping branches covered with once compound leaves, the slender pinnae giving an almost fern-like appearance, is the Pepper tree, *Schinus molle*, a native of Peru and a member of the Anacardiaceae. It was brought to California in the early days by the padres. The hanging panicles of red berries on the pistillate trees are noticeable for much of the year. Where pepper trees line both sides of the road, the branches often meet overhead. Small leafy branches growing from the thickened base of the trunks make them irregular and knobby.

Another beautiful tree with twice compound leaves is the Jacaranda, *J. ovaliforme*, a native of Brazil, prized for the feathery foliage as well as for the large clusters of blue or violet flowers,—in size and shape much like those of its close relative, the Catalpa. The trees are well covered with flowers in June and July but a few clusters may be found on some trees at any time through the fall and winter. Less commonly seen is the Silk Oak, *Grevillea robusta* a tall tree with long leaves deeply dissected and so appearing to be twice compound. It is a native of Australia.

Two trees that resemble each other are the Rubber tree, *Ficus elastica*, from the East Indies and the Magnolia, *M. grandiflora*, from the southeastern U. S., for both have thick glossy, evergreen leaves. The first of these is rarely seen in the open, but its close relative, the Moreton Bay Fig, *Ficus macrophylla*, of Australia is frequent as a specimen tree on lawns and at times is grown as a shade tree along streets. Another pair of trees with a superficial resemblance are the Bottle tree, *Sterculia diversifolia*, a native of Australia, and the Camphor-tree, *Cinnamomum camphora*, a native of Formosa. Both have light green, ovate leaves 2 to 3 or 4 inches long, but those of the Bottle Tree are sometimes lobed irregularly, while the leaves of the Camphor-tree are always entire. Then the bark of the Bottle tree is smooth and light grey, that of the Camphor-tree dark grey, closely and shallowly fissured. The fruit of the former is a group of from 3 to 5 follicles, about 3 inches long which split open to show the double rows of yellowish seeds. These brown fruits, sometimes brightly painted, are an important part of the strings of dried fruits used for decorations and sold to visitors at the curio and gift shops. The leaf twigs and small black berries of the Camphor-tree have a pleasant odor of camphor when crushed.

And, to mention one last tree everyone is sure to notice on the streets, the native live oak, *Quercus agrifolia*, with thick, glossy green, oval leaves, entire or, more often with a few sharp teeth on the margins, is a handsome wide spreading tree. If the visitor to California wishes to recognize the trees a very convenient book is the *Manual of Pacific Coast Trees* by McMinn and Maino, which describes all of the native and the commonly cultivated trees to be found from Oregon to Southern California. Another book the visitor will find helpful in becoming familiar with the trees, and one that can be read with pleasure by tree lovers anywhere at any time, is *Trees and Shrubs in California Gardens* by C. F. Saunders.

In noting the trees commonly planted in California, it may seem as if but scant use is being made of the many splendid native trees of the region, but the same criticism may be made of street planting in other parts of the country where Norway Maples and Spruce, European Elm and Linden, London Plane, Horse Chestnut, Ginkgo and other introduced trees are more apt to be seen than the native ones.

New York, N. Y.

## FIELD TRIPS OF THE CLUB

### Trip of June 16–19 to Lancaster, Pa.

The Muhlenberg Botanical Club of Lancaster entertained members of three other botanical societies during this four day meeting. Seven members of the Torrey Club were among the thirty-five attending. From the "Willows," a tourist camp just east of Lancaster, the party on Thursday visited points of historic interest in Lancaster, including the birthplace of Henry E. Muhlenberg and a massive buttonwood near Rohrerstown—the largest tree in Pennsylvania. Several limestone localities were visited for their interesting plants, including Scott's Spleenwort, Rue Spleenwort and a fine stand of Smooth Cliff Brake growing on an old limestone bridge. Both the Smooth and the Purple Cliff Brakes grew close together in the mortar joints, affording an excellent opportunity to compare them.

In the evening Prof. Herbert H. Beck read an interesting paper on Muhlenberg the Botanist. This was followed by an informal talk by Dr. Edgar Wherry on the geology and plant associations of the areas which the group was to visit.

On Friday a visit was made to Bush River, Md., stopping several times along the way to explore localities of interest. The white spikes of *Aletris farinosa* were conspicuous at many points along the road. Two stations for Adder's Tongue fern were visited near Bush River. The high point of the day was the finding along the tidal shores of the river of *Isoetes saccharata*, *Lilaeopsis chinensis* and *Eriocaulon parkeri*, growing together at low tide level.

Saturday the serpentine barrens in southern Lancaster County were visited for their peculiar associations. One of the most interesting of the plants limited to serpentine rocks was the small *Talinum teretifolium* growing in the fields. Another interesting plant was *Cerastium arvense* var. *villossimum*. Other plants noted because of being in fine bloom were Goat's Rue in large masses, *Lobelia spicata* and *Campanula rotundifolia*. A side trip was made to nearby Maryland to see the Hairy Lip fern.

On Sunday an entirely different habitat was visited in northern Lancaster County, rich woodland and sphagnum bogs. One open bog was pink with Rose Pogonia. Other plants observed were *Calopogon*, *Habenaria lacera*, *Liparis liliafolia*, *Arisaema stewardsonii*, *Thalictrum revolutum*, and *Oxybaphus nyctagineus*.

W. L. Highton

## Trip of July 9 to the World's Fair Region

Of the approximately 1,000 species of wild plants within the city limits of New York exclusive of Staten Island, little less than ⅓ were noted in our trip to Corona and Flushing, by actual count 318. One hundred eighty-three of the total are regarded as native to the United States and 135 as adventive. Defining families and genera as in the *Illustrated Flora*, we examined 69 of the former and 198 of the latter.

We observed that within two years the alteration of this area will be complete. If not completely destroyed, the colonies of plants that flourished during the Age of the Meadows, a long time ago (1936), now are reduced to a few stray ditch dwellers that are neighbors to the steam shovel. We found no trace of *Guizotia abyssinica* that bloomed yesteryear, a composite (Helianthoideae) taller than one meter, many branched, with the appearance of an over robust *Bidens cernua*. *Solanum villosum* was covered with ashes simultaneously with the good fruiting *Sesamum indicum* and *Conium maculatum*. *Carduus nutans*, with its carmine centered nodding flower-buds, is out of our area, if not, as yet, from the city. Astoria still boasts many colonies of *Allionia nyctaginea*, but we failed to see this umbrellawort in Flushing; nor did we mourn the loss of *Bassia hyssopifolia*, since it is common in other regions. But our showy *Verbena stricta*, whose progress of inflorescence flared up the spike like blue flame, where else in the city can we find it? Our two undescribed Helianthus and *Liatris scariosa* may still be alive but we did not encounter them. The tall alyssum-fragrant *Lepedium latifolium* and chicory-blue *Lactuca pulchella*, though still plentiful, will now see their last hour any day. *Cycloloma atriplicifolium* is common on the south coast of Long Island, thus when the few remaining specimens in the area under consideration are obliterated we can still continue for several years to regard it as a member of our city flora; this is also true of *Plantago arenarea* and *Hieracium florentinum* which are now common in New York. This negative aspect of ours, the most important, certainly demonstrated that if you think of writing a good list of the plants within the city limits of New York, be quick about it friend! And such a catalogue should be valuable, since no detail is trivial about the greatest metropolis.

I submit a few notes on the identification of weeds: an herbarium is essential for any degree of certainty in determination, for plants not in manuals are frequently collected which key out adroitly enough and are described accurately enough in your book as some species which, though nearest to it in your flora, is not that being analyzed, as a comparison with herbarium material will prove. As should be expected, many weeds not in manuals are escapes from cultivation, so that Bailey's *Cyclopedia* may be consulted with profit. Coste's *Flore de la France*, accurately illustrated, describes plants from regions that contribute many weeds to our area, so that a reference to this work may solve the identification, as it did that of *Lepedium latifolium*. If the genus of your weed is not known, nor easily discovered in Briton's, Bailey's, or Coste's, then you may have to study Bentham and Hooker's monumental *Genera Plantarum* or Engler and Prantl's *Pflanzenfamilien*. Then, as the unfamiliar genus is likely to contain but few species, go directly to the herbarium for comparison. Should it chance that it is represented by many members, try a monograph, if there is one; if not, try to match it by diligent examination of every species in the herbarium. Failing in this, and not knowing any expert on the group to whom you can send a duplicate for determination, it's advisable to declare the specimen "a foreign plot" and forget about it.

Joseph Monachino

## Trip of September 25 to Watchung, N. J.

Fifty-eight members and guests were present. An excellent representation of the early autumn vegetation of this region was seen and those members who had been on spring and summer trips over the same trails were able to compare the lists of species observed then with those in evidence now. Many plants, of course, were in fruit, including wonderful specimens of flowering-dogwood, as well as *Viburnum acerifolium*, *Arisaema triphyllum*, *Smilacina racemosa*, *Phryma leptostachya*, *Circaea latifolia*, *Angelica villosa*, and *Mitchella repens*. A splendid colony of *Lespedeza frutescens* was found, as well as many specimens of *L. capitata* and *L. procumbens*. Tick-trefoils were much in evidence and were compared in their past-flowering stages—*Desmodium rotundifolium*, *D. canescens*, *D. ciliare*, *D. paniculatum*, *D. nudiflorum*, and *D. grandiflorum*. Eight species of goldenrod were seen in abundance: three species (*Solidago juncea*, *S. canadensis*, and *Euthamia graminifolia*) were already in fruit, while five others were in full anthesis (*Solidago rugosa*, *S. caesia*, *S. bicolor*, *S. nemoralis*, and *S. altissima*). The horse-balm (*Collinsonia canadensis*) was perhaps the most conspicuous plant in the woodlands, where also *Eupatorium urticaefolium*, *Carya alba*, and *Monotropa uniflora* were in evidence, with *Nyssa sylvatica*, *Rhus glabra*, *R. copallinum*, *Ilex verticillata*, and *Parthenocissus quinquefolia* conspicuous because of their brilliant foliage. The witch-hazel (*Hamamelis virginiana*) was found in flower, as well as *Lobelia siphilitica*, *L. inflata*, *Helianthus tuberosus*, and *Gerardia purpurea*. Glorious stands of fringed gentians were come upon unexpectedly in full flower and colonies of *Liatris spicata* in fruit. Some sneezeweed (*Helenium autumnale*) was still in flower and an introduced sunflower, *Helianthus laetiflorus*, made a splendid showing. Conspicuous grasses included *Sorghastrum nutans*, *Muhlenbergia schreberi*, *Leersia virginica*, *L. oryzoides*, *Andropogon scoparius*, *Paspalum laeve*, *P. setaceum*, *Agrostis alba*, and *Echinochloa crusgalli*. Many asters were at their prime, including *Aster puniceus* and *A. novae-angliae* in wet places: *A. lateriflorus*, *A. laevis*, and *A. vimineus* in grassy fields; *A. ericoides* and *A. multiflorus* in dry soil; and *A. cordifolius*, *A. divaricatus*, *A. macrophyllus*, and *A. undulatus* in the woodlands. Other interesting plants observed were *Eupatorium perfoliatum* and *Sparganium eurocarpum* in fruit, *Tracaulon sagittatum*, *Spiranthes cernua*, *Bidens leavis*, and *Geaster hygrometricus*.

H. N. Moldenke

## PROCEEDINGS OF THE CLUB

### Meeting of April 20, 1938

The meeting of April 20th held at the New York Botanical Garden was called to order by the Corresponding Secretary, Dr. J. S. Karling, after which Vice-president Mrs. Gladys P. Anderson presided. There were 28 persons present.

The following were elected annual members of the Club: Mr. Donavan S. Correll, Department of Botany, Duke University, Durham, N. C., Miss Anna E. Gale, 240 Northern Avenue, New York, N. Y.; Dr. Wilhelm Gustav Herter, Montevideo, Uruguay; Mr. Walter Jones, Plant Pathology Laboratory, Saanichton, British Columbia, Canada; and Miss Patricia Mahoney, 260 Convent Ave., New York, N. Y. The following were elected Associates of the Club: Mr. John M. Bachmann, The New York Botanical Garden, Bronx Park, New York, N. Y.; Miss Elizabeth Barrett, 51 Eppirt St., East Orange, N. J.; Miss Helen Blanchard, 561 West 143rd St., New York, N. Y.; Miss Lois Drosin, 302 West 86th St., New York, N. Y.; Miss Jane Glazer, 2062 Davidson Avenue, New York, N. Y.; Miss Dorothy M. Kelley, 214 Rutland Road, Brooklyn, N. Y.; Miss Grace Coit Meleney, 200 Chatterton Parkway, White Plains, N. Y.; Miss Antoinette Miele, 2043 Washington Ave., Bronx, New York; Miss Caroline Pomeranz, 2675 Creston Ave., Bronx, New York; Mr. Harry Shapley, 2710 Webb Ave., New York, N. Y.; and Mrs. Sofia K. Wolf, 3031 Brighton, 14th St. New York. The resignation of Dr. Paul R. Burkholder was accepted with regret.

The Corresponding Secretary was directed to appoint an official delegate of the Club to the 150th Anniversary celebration of the Linnean Society of London.

The scientific program consisting of a paper on Chromosomes and Environment was presented by Dr. Ake Gustaffson from the Institute of Systematic Botany and Botanic Garden of the University, Lund, Sweden.

Clyde Chandler
Recording Secretary

## Meeting of May 3 at the Museum of Natural History

The meeting was called to order by First Vice-president Dr. Alfred Gundersen at 8:15 P.M., with thirty-four members present. Since no minutes or business were presented, the meeting proceeded at once to the scientific program.

Dr. William J. Robbins, Director of the New York Botanical Garden, gave an interesting illustrated talk on the effect of thiamin on plant growth. The following is an abstract by Dr. Robbins: "Thiamin (vitamin $B_1$) or thiazole (one of the two intermediates of thiamin) is necessary for the growth of excised tomato roots. The tomato root synthesizes the intermediate pyrimidine but not the thiazole. The attached root depends upon the top of the tomato plant for thiamin (or thiazole) as well as sugar. Some fungi and *Torulae* which do not grow in solutions of mineral salts and sugar do so if minute quantities of thiamin or its intermediate are added to the medium. It is concluded that probably all organisms require thiamin. Some synthesize it from the basic materials of the medium, others can not. Those which can not must be supplied with the intermediate thiazole, the intermediate pyrimidine, both intermediates or the thiamin molecule as such, depending upon their synthetic power."

J. S. Karling
Corresponding Secretary

## Meeting of May 18, 1938

The meeting was called to order at 3:30 P.M. by the corresponding secretary at the New York Botanical Garden, with eighteen members present. Dr. J. H. Barnhart was elected chairman pro tem. The minutes of the previous meeting were read, and prior to their adoption Dr. B. O. Dodge pointed out that recently the minutes of the regular Club meetings had been unnecessarily brief. In the discussion that followed the idea was generally expressed that additional comments on the character of the scientific program should be included.

The following candidates were unanimously elected to active membership in the Club: Mrs. Elizabeth G. Hartman, 30–31 Hobart St., Woodside, L. I., and Mr. George H. Peters, 175 E.

Seaman Ave., Freeport, L. I. The following candidates were elected Associates: Mr. Samuel Bender, 1849–74th St., Brooklyn, N. Y.; Miss Emma Johnston, 166–17 33rd Ave., Flushing, L. I.; Mr. Theodore G. Adams, 199–8th Ave., Brooklyn, N. Y.; Miss Hannah Redlefsen, Montefiore Hospital, Gun Hill Road, New York; Miss Martha H. Hollinshead, 504 Camden Ave., Moorestown, N. J.; and Miss A. Jean Crozier, 99–21 Bell Boulevard, Bayside, L. I. The resignation of Miss Grace Randall, 117 Lincoln Street, Passaic, N. J., as an Associate was announced.

The Corresponding Secretary then announced that Dr. Edna Lind of Sheffield, England, had been appointed official delegate of the Club to the 150th Anniversary Celebration of the Linnean Society of London.

The Scientific Program consisted of an illustrated and interesting lecture by Dr. Gordon Utter of the Brooklyn Botanic Garden and Hunter College on Culture and Inoculation Studies on Races of the Loose and Covered Smuts of Oats. Dr. Utter gave data and illustrations to show that successive culture generations failed to remain constant in characteristic. Sixteen new smut types were produced which exhibited recombinations of factors for symptoms, morphology, and pathogenicity.

The meeting adjourned at 4:45 P.M.

J. S. Karling
Corresponding Secretary

## Meeting of October 4, 1938

The first meeting in the fall of 1938, held in the Children's Garden Club room of the Brooklyn Botanic Garden, was called to order by President Gunderson at 8:15 P.M. with 34 persons present.

Resolutions to be sent to the wife of our late President, Raymond H. Torrey, were read by Dr. J. S. Karling, after which they were unanimously approved by a rising vote of the Club.

Minutes of the previous meetings were read and after due corrections were adopted by the Club.

The following candidates were elected to membership: Annual—Mr. Frederick W. Lewis, 39–40 Little Neck Parkway, Little Neck, N.Y.; Mr. James Merry, Botany Department, University of Michigan, Ann Arbor, Mich.; Mr. Rutherford Platt, 102 East 22nd Street, New York, N.Y.; Mr. Louis Robinson, 2675 Morris Avenue, Bronx, N. Y.; Mrs. Charles Y. Tanger, 318 N. President Avenue, Lancaster, Penn.; Mr. W. Gordon Whaley, Department of Botany, Columbia University, New York, N.Y.; Prof. Dr. Lorenzo R. Parodi, Calle Rio de Janeiro 1932, Buenos Aires, Argentina; Miss Clara Ketcham, Bennett Avenue and Columbia Street, Hempstead, N.Y.; and Dr. Norwood C. Thornton, 1086 North Broadway, Boyce Thompson Institute, Yonkers, N.Y.

Associates—Mr. Cornelius F. Daley, 538 Godwin Avenue, Wortendyke, N.J.; Miss Henrietta W. Dotson, 23 Lexington Avenue, New York, N.Y.; Miss Maud Harty, 203 Davis Ave., Kearny, N.J.; Miss Alexandera Kalmykow, 473 West 158th Street, New York, N.Y.; Dr. J. P. Carabia, N.Y. Botanical Garden, Bronx Park, New York, N.Y.; Mr. Charles P. Dring, 224 East 47th Street, New York, N.Y.; Mr. Frank G. White, Apartment 62, 180 Claremont Avenue, New York, N.Y.; Mrs. Eva R. Cohn, 2827 Valentine Avenue, Bronx, N.Y.; and Dr. Mark Cohn, 2827 Valentine Avenue, Bronx, N.Y.

The resignation of Miss Esther Holm was accepted by the Club.

The revised Constitution was read after which Dr. Karling made the motion that the Club adopt the changes and additions of the Constitution and By-Laws. The motion was seconded by Dr. Hazen and carried unanimously.

Mrs. Gladys P. Anderson recalled that only a chairman need be appointed for the field committee. Dr. Harper reported that the Council had discussed the advisability of deferring the appointment of a chairman until the next Council meeting.

Dr. Hazen nominated Mr. James Murphy as a member of the Council to fill the vacancy brought about by the adoption of the revised Constitution which states in Article XI that the last two ex-presidents shall be members of the Council. The Secretary was instructed to cast the ballot. It was so done.

The scientific program consisting of a series of reports by members and guests on their summer collecting experiences and botanical explorations was very informal.

Dr. Harper with his usual enthusiasm impressed collectors with the importance of collecting and adding specimens to the local herbarium. He gave an account of his visit to the Botanic Gardens at Charleston, South Carolina and to a new Botanic Garden of Japanese Iris in the little town of Sumter. Cypress swamps seem to be a good habitat for Japanese Iris.

Dr. Hazen attended the meetings of the British Association for the Advancement of Science held in England. Though many of his favorite collecting places had been destroyed by modern architectural developments he found other places to collect his algae and by using fast transportation afforded by the Queen Mary was able to bring his specimens back in very good condition.

Dr. B. O. Dodge attended a mycological foray held in the forests of Quebec.

Dr. Copeland explored a sizeable bog in northern Maine where he collected lichens.

Dr. Cheney was again at the Marine Biological Laboratory where he continued his work on alkaloids, collected mints and tried his skill in color photography.

Dr. Graves continued his work on the breeding of chestnuts and reported that he now has hybrids which are absolutely resistant to the blight.

Dr. Karling collected from a lake in Connecticut a species of fungi which has been reported only once before and then from the Belgian Congo.

Dr. Thomas inquired as to methods of preserving fungi. It seems as though present methods are inadequate.

Other members and visitors told of their enjoyment of field trips and collections made in the vicinity of New York. Dr. Moldenke collected approximately a hundred species during the summer.

The Treasurer read a letter to the Club from Mr. George T. Hastings who is usually present at the fall meeting of the Torrey Club but was unable to attend this year. Mr. Hastings is spending six months in the western part of the United States.

The meeting then adjourned. All those present were invited to remain for a few minutes during which time appetizing refreshments were served by the Brooklyn Botanic Garden.

Clyde Chandler
Recording Secretary

## NEWS NOTES

A CONFERENCE on Plant and Animal Communities was held at the Biological Laboratory of the Long Island Biological Association at Cold Spring Harbor from August 29 to September 2. Besides papers on types of plants and animal communities and theories regarding their formation and organization, field trips were conducted to regions where different habitats with their characteristic communities were studied.

A DEPARTMENT of forestry has been established at the Illinois Experiment Station, with Dr. John N. Spaeth, who has been assistant professor of forestry at Cornell University, as director.

IN Pasadena, California, a group of four one-story buildings have been erected for the Pasadena Flower Show Association. The buildings are grouped around an open quadrangle containing several fine live oaks with a curving pergola at the back of the group. The buildings are the gift of Mrs. Fannie E. Morrison and were completed just in time for the fall flower show from October 27 to 30. They will be used for the annual spring and fall shows of the association and be available for special exhibits at other times.

WORK is in progress at the Brooklyn Botanic Garden on new architectural features of the horticultural section. There are to be new water basins, fountains, seats and columns. The pair of coupled columns at the south end of the Long Green are fourteen feet high and are similar to those in the Boboli Gardens in Florence. The two single columns at the north end are thirty-five feet high. These improvements are a gift from Mrs. Dean C. Osborne. A new gate or portal on Eastern Parkway is also planned.

THE 125th anniversary of the Nikitsky Botanical Gardens in the Crimea was observed by the establishment of five new gardens, supplied with plants from the parent institution. During the past decade over 1,000 new species and varieties of plants have been tested in the gardens, and 233 new kinds were introduced into general cultivation in the USSR as a result of these tests. (Science)

Dr. C. L. Huskins, professor of genetics at McGill University, is at present visiting professor of botany at the University of California, taking the place of Dr. T. H. Goodspeed who is now in charge of a botanical expedition in the southern Andes.

Dr. B. E. Dahlgren, curator of botany at the Field Museum of Natural History, Chicago, has returned from northern Brazil. He secured many photographs showing the vegetation of the state of Para and much material that will be used in making dioramas showing tropical plants in their native habitats.

Dr. Harold St. John, of the University of Hawaii, returned in September to Honolulu from a four-months collecting trip to Rotuma Island, an isolated volcanic island in the southern Pacific, populated by a few whites and about 3,000 Polynesians. Its flora was completely unknown. Dr. St. John brought back some 5,000 specimens of native and introduced plants, many are species new to science.

Guy N. Collins, Principal Botanist in the Division of Cereal Crops and Diseases of the Bureau of Plant Industry in the U. S. Dep't. of Agriculture, died on August 14 at his home at Lanham, Md., in his sixty-sixth year. He had worked on problems of inheritance in maize and the use of biometrical methods in genetic studies. His work helped found the present system of producing hybrid corn commercially.

Dr. Philip A. Munz, professor of botany at Pomona College, author of the Manual of Southern California Plants, sailed on December 3 for South America. He will spend several months along the east coast studying evening primroses. His work on this group is being carried on under a Guggenheim fellowship.

## Errata

Page 55, March-April,—For Dr. R. A. Harper read Dr. Roland M. Harper.
Page 73, May-June—For $1.50 read $1.00.
Page 107, July-August—For April 8 read April 5.

## Dates of Publication of Torreya, 1938

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| Number 1, January-February | February 26, 1938 |
| 2, March-April | April 14, 1938 |
| 3, May-June | June 6, 1938 |
| 4, July-August | September 3, 1938 |
| 5, September-October | October 24, 1938 |
| 6, November-December | December 17, 1938 |

# INDEX TO TORREYA—VOLUME 38

Names of species or varieties described as new or new combinations are in **black-faced type.**

# THE TORREY BOTANICAL CLUB

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The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–18 are now completed. Volume 17, containing Proceedings of the Semi-Centennial Anniversary of the Club, 490 pages, was issued in 1918, price $5.00.

Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

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Correspondence relating to the above publications should be addressed to

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New York, N.Y.

# TORREYA

A BI-MONTHLY JOURNAL OF BOTANICAL NOTES AND NEWS

John Torrey, 1796-1873

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

GEORGE T. HASTINGS

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Volume 39 January-February 1939 Number 1

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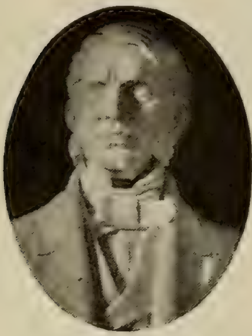
BY

GEORGE T. HASTINGS



John Torrey, 1796-1873

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# TORREYA

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## Some plants of New York

Robert T. Clausen

Since the publication by Muenscher and Clausen (1934) of some notes on the flora of northern New York, further collecting in various parts of the state has yielded a number of interesting items which are here listed with annotations. These notes may be considered supplemental to those of 1934, also to the Biological Survey Reports by Muenscher (1935, 1936, & 1937) and McVaugh (1938). Names of collectors most frequently cited are abbreviated as follows: *C*, R. T. Clausen; *Cu*, O. F. Curtis, Jr.; *M*, W. C. Muenscher; *S*, S. J. Smith; *T*, Harold Trapido; and *W*, W. C. Wilson. Unless otherwise noted, all collections are in the herbarium of the Department of Botany, Cornell University.

Isoetes Tuckermanni A.Br. Reported by House (1933) from Camp Riverdale, Hamilton Co., and from the south inlet of Titus Lake, Franklin Co.; also by Muenscher (1930, 1933, & 1935) from Lake Champlain, Clinton Co.; Harris Lake, Essex Co.; Upper Saranac Lake Outlet, Franklin Co.; Piseco and Catlin Lakes, Hamilton Co.; and Chatiemac Lake and Valentine Pond, Warren County. The writer has examined material from all localities cited by Muenscher except Upper Saranac Lake Outlet. He also has studied the following additional collections: Middle Saranac Lake, Franklin Co., 1929, *M*, *Manning*, and *Maguire 41;* Lake Neatahwanta, Fulton, Oswego Co., 1887, *W. W. Rowlee;* and Three Mile Bay, Oneida Lake, Oswego Co., 1927, *M 16804*.

As observed by the writer in the Stoner Lakes, plants of *I. Tuckermanni* appeared much like small specimens of *I. echinospora*, but had the leaves decidedly recurved. The megaspores vary from being irregularly reticulated to having jagged crests.

Thuja occidentalis L. Steuben Co.: Atlanta, 1937, *C & T 2695;* Wayland, 1924, *M 15185*. Reported by House (1924) as rare southward and westward. Common on the Ontario Plain and in swamps of the Mohawk drainage, but in the herbarium of Cornell University represented from the southern tier of counties only by the collections cited.

This species forms dense stands on the marly flats along the Cohocton River. Associated with it are *Abies balsamea* (*C & T 2697*) and *Larix laricina* (*C & T 2692*). In the moss under the white cedars, *Mitella nuda* (*C & T 2691*) is frequent. Other associated species are *Carex flava*, *Salix candida*, *Myrica Gale*, and *Viburnum Opulus*.

Potamogeton bupleuroides Fernald. Schuyler Co.: in shallow water at southeast corner of Waneta Lake, 1934, *C 1321*.

In the Cornell Herbarium, this species is otherwise represented from south-central New York only from Cayuga and Seneca Lakes. It was neither collected by McVaugh (1938) in the Chemung and Allegheny watersheds, nor by Muenscher (1936) in the Susquehanna watershed.

Zannichellia palustris L. Steuben Co.: Cohocton River about one mile west of Atlanta, 1937, *C & T 2687*. Reported as very local in the Delaware and Susquehanna watersheds by Muenscher (1936) and from only one stream, Tributary 22 of the Chemung River south of Elmira, by McVaugh (1938).

Poa nemoralis L. Westchester Co.: dry wooded ridge, Crestwood, Yonkers, 1935, *R. Osgood & C 1759*. Reported by Taylor (1915) as a waif, by Wiegand and Eames (1926) as scarce in the Cayuga Lake Basin, and by House (1924) as rare as an introduced plant in waste places or on ballast, Staten Island and Yates County.

Poa saltuensis Fernald & Wiegand. Tompkins Co.: Caroline Depot, 1935, *C 2161 & 2162;* Ringwood, 1935, *C & E. Lawn 2138*.

The three collections cited are of interest because they demonstrate the unsatisfactory nature of the anther and ligule characters which have been used, along with the nature of the flowering glumes, to separate *P. saltuensis* from *P. debilis*. Fernald and Wiegand (1918) describe the anthers of *P. debilis* as 0.6–0.8 mm. long and the longer cauline ligules as 2–2.5 mm. long, while for *P. saltuensis* they give measurements for anthers as 1–1.2 mm. long and for ligules as 0.3–1.5 mm. long. In *C*

*2162* the anthers are 0.8 mm. long, but the ligules only 1 mm.; in *C 2161*, the anthers are intermediate, 1 mm., and the ligules likewise 1 mm.; while in *C 2138*, the anthers are 1.2 mm. and the upper ligules 2 mm. In view of this situation, it seems that the relationships of these two species require careful reviewing, particularly since the character afforded by the flowering glumes seems not always satisfactory.

Muhlenbergia uniflora (Muhl.) Fernald. Ulster Co.: on cliff, Shawangunk Mountain, near Maratanza Lake, 1935, *M & Cu 5156*. Although known from numerous localities in the north, also from Westchester Co. and Long Island, this appears to be the first record for the region of the Catskill Mountains.

Panicum linearifolium var. Werneri (Scribn.) Fernald. Suffolk Co.: edge of sandy field near Patchogue, 1925, *M 16042*. Ulster Co.: scrub oak thicket among rocks northeast of Ashokan Reservoir, 1925, *M 16043*. Westchester Co.: in sandy soil of vacant lot, Tuckahoe, 1935, *G. Voetsch & C 1753*. Designated by Taylor (1915) as rare and local in the New York region.

Carex castanea Wahlenb. Tioga Co.: edge of thicket along road two miles west of Richford, 1937, *C & S 2633*. Although reported by House (1934) as locally abundant across the northern part of the state and in central New York, it is not recorded by Clute (1898) or by Wiegand and Eames (1926), and the southernmost station listed by House is Peterboro in Madison County.

This represents the first collection from the southern tier of counties.

**Carex complanata** ssp. **hirsutella** (Mackenzie) n. comb. (*Carex hirsutella* Mackenzie in Bull. Torrey Club **50**: 349. 1923) Schuyler Co.: field on east side of Waneta Lake, 1934, *C 1339*. Tompkins Co.: Bull Hill, Newfield, 1935, *C 2184*. Reported by Wiegand and Eames (1926) as scarce (7 stations) in the Cayuga Lake Basin and by Clute (1898) as rare at Barton and not frequent at Elmira.

Study of the series of specimens of *Carex complanata* and of *C. hirsutella* available in the herbarium at Cornell University indicates that these two populations intergrade in the area where their ranges overlap, particularly in Virginia, and in western North Carolina and Georgia. Since the plant with glabrate leaves with revolute margins is the dominant form on the southeastern coastal plain, while the plant with pubescent, flat leaves is the only one represented in the north, it seems best to consider these two geographically correlated races as subspecies.

Carex cumulata (Bailey) Mackenzie. Fulton Co.: Gloversville, *Ollson*. Ulster Co.: bog near Maratanza Lake, 1935, *M & Cu 5164*. Cited by Mackenzie (1922) from Albany, Dutchess, Oneida, and Washington Counties.

Cyperus ferax Rich. Bronx Co.: sandy beach, City Island, 1918, *A. Gershoy*, Greene Co.: on sand bar in Hudson River between Hudson and Athens, 1935, *M & C 4366*. Montgomery Co.: Yosts, 1935, *M & C 4605*. Onondaga Co.: Salina, *G. W. Clinton;* Syracuse salt marsh, 1902, *K. M. Wiegand 16*. Queens Co.: wet sand in salt marsh, Jamaica, 1929, *W. C. Ferguson 8058*. Reported by House (1924) only from Suffolk Co., but by Wiegand and Eames (1926) as locally frequent in the Cayuga Lake Basin.

Eleocharis obtusa var. jejuna Fernald. (See Svenson in Rhodora **31**: 215–216. 1929.) Tioga Co.: edge of small, muddy pool near Spencer Lake, 1935, *C 2050*.

As Svenson (l. c.) states, this appears to be an ecological phase of the species and probably does not merit nomenclatorial recognition. The collection cited is apparently the first for New York.

Stenophyllus capillaris (L.) Britton. Cayuga Co.: Farleys, 1938, *C & S 3521;* Willets, 1927, *M & P. R. Burkholder 16925*. Cortland Co.: Chicago (Gracie) Station, 1929, *K. M. Wiegand 17359*. Tompkins Co.: Varna, 1935, *C 2048*. Although reported from only one locality by Wiegand and Eames (1926), this species has greatly increased in recent years and now is widespread and fairly common in the cinders along railroads throughout the Cayuga Lake region.

Xyris montana H. Ries. Sullivan Co.: floating sphagnum bog, Amber Lake, 1935, *M & Cu 5175*. Not recorded from southern New York by Taylor (1915) or House (1924).

Uvularia perfoliata L. Ontario Co.: Bristol Springs, 1938, *C 3432*.

This collection is interesting because it represents a variegated foliage variety. All of the plants in a large patch on the south slope of the ravine south of Bristol Springs were variegated, but farther up and down the ravine the plants were normal.

Trillium grandiflorum (Michx.) Salisb. Ontario Co.: Bristol Springs, 1938, *C 3438*.

In an oak-chestnut woods on the summit of Gannet Hill, 1½ miles west of Bristol Springs, about every eighth White Trillium was abnormal. Commonest variations were petals with green median bands, long stalked leaves, and a tendency towards narrower, longer leaves. It is of interest that usually where these abnormalities occur as here, at Big Gully in Cayuga Co. and elsewhere, they are frequent in a small area, while for miles around, only normal individuals will be found.

Urtica urens L. Schenectady Co.: in rich soil on farm 5 miles east of Schenectady, 1935, *M 5193*. Reported by House (1924) from Long Island and from Rensselaer and Livingston Counties.

Polygonum cilinode Michx. Tioga Co.: woodland slope about four miles northwest of Richford, 1936, *W. G. Norris & C 2208*. Not listed from the Cayuga Lake Basin by Wiegand and Eames (1926), but reported by Clute (1898) as rare in Chenango and Susquehanna Counties.

Oxybaphus nyctagineus (Michx.) Sweet. Tioga Co.: along railroad north of North Spencer, 1935, *C 2250;* also 1937, *C & T 2661*. Tompkins Co.: Ithaca, 1932–35, *M 17860*, *18529*, *&* *18828*. Now also represented in the herbarium of Cornell University by specimens from Albany, Greene, and Onondaga Counties. Previously reported by Muenscher and Clausen (1934) from three stations in Montgomery Co., by Zenkert (1934) from Erie County, and by House (1924) as adventive in western New York, near New York City, and at Greendale, Columbia County.

Clematis verticillaris DC. Ontario Co.: exposed ledges of High Point northwest of Naples, 1935, *W & C 1612*. Reported by House (1924) to be rare and local in the western part of the state.

Alyssum alyssoides L. Cortland Co.: gravel bar opposite Glen Haven, Skaneateles Lake, 1932, *K. M. Wiegand 17889*. Genesee Co.: limestone barrens, Le Roy, 1935, *M 18858*. Also represented in the herbarium of Cornell University by specimens from Albany, Onondaga, and Suffolk Counties. Reported by

House (1924) from Ithaca, several localities in Monroe Co., and about New York City.

Alyssum gemonense Linn. Oneida Co.: on cliffs in gorge at Trenton Falls, 1934, *M & C 4653;* also 1935, *M 18859.*

This probably constitutes the first record for this species in the state. Although it must have been introduced, it seems well established on the limestone ledges on the west side of the gorge.

Arabis lyrata L. Ontario Co.: exposed ledges of High Point northwest of Naples, 1935, *W & C 1625.* Reported by House (1924) as rare and local in western New York.

Sedum sarmentosum Bunge. Westchester Co.: Crestwood, Yonkers, 1935, *R. Osgood & C 1901.*

This cultivated species seemed established in rich soil in a dry woodland at Crestwood. The writer has also found it naturalized in Passaic County, N. J. and a report has reached him that it is established at one station in Cincinnati, Ohio.

Geum canadense var. Grimesii Fernald & Weatherby. Tioga Co.: roadside ditch two miles west of Richford, 1938, *S 964* (Bailey Hortorium).

This represents the first collection of var. *Grimesii* in New York. The upper internodes of the styles are very sparingly short pubescent and the carpels are hispid above, glabrous below.

Geum virginianum L. Tioga Co.: Newark Valley, 1938, *C & S 3495:* two miles west of Richford, 1938, *S 999* (Bailey Hortorium). This is not listed by Clute (1898) or by Wiegand and Eames (1926).

Rubus illecebrosus Focke. Schenectady Co.: a weed in grass, 1417 Union Street, Schenectady, 1935, *M & W. T. Winne 5235.* Cayuga Co.: waste land, Moravia, 1934, *J. Mosher 18571.* This is not listed by House (1924).

Lathyrus pratensis L. Otsego Co.: in low fields and along roadside, Richfield Springs, 1935, *M & Cu 5245.* This species, which is not listed by House (1924), is also represented in the herbarium of Cornell University from Remsen, Oneida Co., *D. M. Griffiths 14807*, and from Cooperstown, Otsego Co., *F. L. Barlow 10193.*

Floerkea proserpinacoides Willd. Schuyler Co.: ledges one mile south of southeast corner of Seneca Lake, 1932, *K. M.*

*Wiegand 18047*. Yates Co.: in deep ravine of Plum Point Creek, west of Himrod, 1936, *W & C 2113*. The writer also has observed this at Wilseyville, Tioga County, in the Susquehanna watershed. Reported by Millspaugh (1887) from Cayuta Creek, as infrequent by House (1924), and as scarce in the Cayuga Lake Basin by Wiegand and Eames (1926).

EUPHORBIA DENTATA Michx. Columbia Co.: along railroad tracks, Hudson, 1934, *M & C 4676*. Onondaga Co.: Syracuse, 1902, *K. M. Wiegand 4*. Reported by House (1924) only from Despatch, Monroe County.

VIOLA ARVENSIS Murr. This species is now a common field and roadside weed in parts of central and western New York. Recent collections have been made in Chemung, Ontario, Schuyler, Tioga, and Tompkins Counties.

PIMPINELLA SAXIFRAGA L. Fulton Co.: common in grasslands on both sides of road for ½ mile north of Dolgeville, 1934, *M & C 4697*. Reported from the eastern and southern sections of the state by House (1924).

RHODODENDRON MAXIMUM L. Chenango Co.: west side of deep swamp north of Mud Pond, Union Valley, 1937, *C & J. L. Edwards, 2602*. Reported as rare by Clute (1898) and not listed from this locality.

PRIMULA MISTASSINICA var. NOVEBORACENSIS Fernald. This recently has been obtained again at two historical stations: gorge of Fish Creek, Taberg, Oneida Co., 1935, *M 18969;* dripping ledges at top of talus slope on north side of large ravine on west side of Hammondsport, Steuben Co., 1935, *W & C 1687*.

PRIMULLA POLYANTHA Mill. Schuyler Co.: apparently escaped from cultivation and established in field by roadside on west side of Connecticut Hill, 1936, *W & C 2114*.

POLEMONIUM REPTANS L. Tioga Co.: rich alluvial woods on east side of Doolittle Creek, 1¼ miles north of East Candor, 1938, *C, T, & J.T.Baldwin, Jr., 3415*. Reported by Clute (1898) as "found sparingly throughout our range," but in the herbarium of Cornell University there are no specimens from east of this station.

ARTEMISIA FRIGIDA Willd. Along Cayuga Inlet, Ithaca, 1934, *M 18651;* also 1935, *M 19014*. Otherwise reported only from Rochester, House (1934).

Aster junceus Ait. Sullivan Co.: in peat bog, Highland Lake, 1935, *M & Cu 5321*. House (1934) gives the range southward to Columbia, Greene, Tompkins, and Tioga Counties.

This seems to be the first collection of the species in Sullivan County.

Aster ptarmicoides (Nees) T. &. G. Saratoga Co.: along Mohawk River at Waterford, 1934, *M & C 4747*, Designated by House (1924) as infrequent or rare and reported only from Washington Co. in eastern New York.

Eupatorium rugosum Houtt. Oneida Co.: gorge of East Branch of Fish Creek, Taberg, 1935, *M 19020*.

This collection is of interest since the leaves of the young plants are dark purple. To the writer it seems undesirable to further clutter taxonomic literature with Latin names for such minor variations which may appear sporadically throughout a species population and which probably are of slight survival value.

Hieracium florentinum All. Tompkins Co.: sandy alluvium in valley of Salmon Creek about two miles north of Ludlowville, 1936, *A. Miller & C 2219*. Although reported as rare by Wiegand and Eames (1926), who list only one station in the Cayuga Lake Basin, this species is now becoming more common in that area.

Hypochaeris radicata L. Bronx Co.: waste ground, Throgs Neck, 1935, *R. Osgood & C 2014 & 2015*. This is also represented in the herbarium of Cornell University by specimens from Erie, Oneida, Onondaga, Schuyler, Suffolk, and Tompkins Counties.

This weed is truly common in waste places on the east side of the Bronx. Both Taylor (1915) and House (1924) report it as rare or infrequent in the state.

The writer wishes to express his thanks to Professor W. C. Muenscher for permission to report on various of his collections represented in the herbarium of Cornell University.

Bailey Hortorium,
Cornell University,
Ithaca, New York

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## Planting ferns for pleasure

Martha H. Hollinshead

The rootstock is the thing to consider when planning a fern garden at home. It takes experience to move wild plants to tame places. Suitable soil, shade, and moisture are necessary but the root system must have room to develop.

*Dennstaedtia* has a hardy, branching rootstock which monopolizes the space assigned to it and some of it has to be uprooted from time to time to keep it in bounds. It is a good fern to transplant because it is so adaptable. It grows in the sun by roadside ditches and in stony pastures. It grows in the shade and hangs its green drapery over the rocky sides of glens where there are waterfalls. The frond is beautifully cut, light green in color, bleaching in age to straw color. The light green mingles pleasingly with the bluish-green Aspidiums in the woods. The frond tapers toward the apex and occasionally there is a forked specimen, like one I found at Buck Hill Falls. Always it has its characteristic odor, which is not like hay at all. Only one species, *D. punctilobula*, is native to the United States and Canada; others are found all over the world from the Himalayas to the Andes and south to Madagascar. It is such an interesting fern that it should not be exiled from the home grounds even though its rooting system is so exasperating.

The Cinnamon Fern has a rootstock that creeps along just below the surface of the soil, dies off at one end, shows scars of old crowns in the middle and sends up a new crown of fronds each year from the living portion. This takes space. In suitable surroundings *Osmunda cinnamomea* will live twenty-five years or more after transplanting and holds its own in a bed where lily of the valley, ivy, and spurge are sharing the sustenance but it does not grow six feet tall as when better fed. It starts to grow in April and clothed in wool, remains almost stationary if the weather is cold and stormy. If it is warm and sunny the fern may grow a foot high by the end of the month. The sporangia are dehiscent by the middle of June. Late September frosts turn the fronds brown, though when sheltered they may linger on into November.

Nearly forty years ago some Interrupted Ferns were dug up in a meadow, hauled in a barrow and planted in a sheltered corner of a house. They are flourishing today, dominating the place and leaving no room for weeds to grow. The only other plant among them is a sturdy Jack-in-the-Pulpit which was probably planted when they were. The soil was suitable as the house is on the edge of a wood. Every year the ferns grow a crop of spores in the middle of the frond. The sporangia are mature in May but there are quantities of brown spores to be had in August. The forty years does not mean the age of the ferns for the clumps were large when transplanted. They are huge now and the fronds suggest palm leaves, the connecting rootstock is four inches thick.

From the porch to the drive was a boardwalk. *Onoclea sensibilis* grew under this and peeped up between the boards. There is no record of their planting but topsoil was brought from the nearby woodland to make the terrace and the fern roots probably came with it. Sheltered by the boardwalk which also conserved moisture a number of sensitive ferns appeared. The grass and lawn mower finished the rest. Now the boards are gone, the path is little used and the ferns are dwarfed and impoverished. They miss the weekly drenching when the laundry tubs were emptied. Thirty-five years is not bad for age, however. Three different fern gardeners have told me that they did not know how they acquired *O. sensibilis*. Like Topsy it just grew. It is no trouble and satisfactory in the fern bed. It sometimes holds its spores until the following year thus prolonging its power of reproduction. The sterile fronds turn pale after even a light frost; the fertile stand upright through the winter.

One enthusiastic fern transplanter reports a dozen kinds "all doing nicely." Among them are the Ostrich Fern, Royal Fern, Chain Fern, and Crested Shield Fern. Her *Adiantum* with its dark stipe and black roots sends up fresh fronds all summer "year after year." Another discriminating fern lover set out *Pellaea atropurpurea* next the wall of the house, bolstered it with a piece of coral and pieces of limestone rock and has enjoyed it for eleven years. Her walking fern survived long enough to root from the tip twice. The New York Fern and the Lady Fern, though re-transplanted, are fifteen years old. The Royal Fern is twenty-five; the *Dennstaedtia* has twenty transplanted years.

*Osmunda regalis* is not so easy to grow as its plebeian relatives, for it naturally is found at the water's edge and needs wet soil. It calls for a pool which is not always available. The rootstock is often erect and sends out branches; from these, new crowns grow. Thus the clump may be divided for more plants. Traveling by rail from Yarmouth to Halifax one sees *O. regalis* growing in profusion adding much to the beauty of the landscape and so there is no surprise in seeing the fern featured in the Public Gardens of Halifax.

An effective planting of *Pteris latiuscula* was among rhododendrons which were planted as a hedge to screen the street from a city lot. The ferns grew tall and rather sparsely, the rhododendrons and tree roots seeming to keep the fern roots in check; for the bracken has a rootstock that is smooth, long, and creeping. It is difficult to dig up and once established difficult to get rid of. It can burrow downward for several feet it is meets an obstruction and pass under the same or it may creep around it. One is sometimes surprised to find shrubby *Pteris* plants in a potato patch or a sandy wood-road through a woodland. One planting of Pteris usually satisfies the owner of a fern garden.

Bracken in British Columbia grows in great thickets and does not by choice (although it grows there) inhabit neglected, half cultivated land. It reaches its greatest luxuriance in rich forest mold along trails, by streams and rocky hollows where sun and air reach it fully. I have seen it growing beside young hemlocks and rivaling them until they were eight or ten feet tall. Many a fire-hollowed tree trunk had a bracken growing from its centre. On the other hand a scrubby growth of this fern may appear on a burned over hill top where there are no other plants except dog-bane, wild strawberry and Listera under the coming growth of scanty pines. Though a coarse fern it is very beautiful when a scattered growth of it is seen on a hillside. I, personally, would not omit it from the fern garden. It is so self-reliant.

There are many other ferns besides those mentioned that will grow well for the amateur. Given space enough and running water a real fernery could be established where one would be tempted to collect, for example, variations of lady fern or make picturesque plantings of evergreen species for Winter enjoyment.

MOORESTOWN, N. J.

## Botrychium Multifidum in Pennsylvania

W. L. Dix

*Botrychium multifidum* (Gemel.) Rupr., *ssp. typicum* has been found by me in two separate localities near Lake Shehawken in northeastern Pennsylvania. This I believe is quite a southerly extension of its usual range and its only reported occurrence in Pennsylvania. Previously Herkimer County, New York, over one hundred miles farther north, has been its southernmost locality authoritatively reported. Both of these new stations are in open pastures, one at an elevation of about nineteen hundred feet above sea level, the other at sixteen hundred feet in a thick bed of moss (*Polytrichum commune*). These plants were collected during the last week of August, and the spores were already beginning to ripen.

*Botrychium multifidum ssp. siliafolium* (Presl.) Clausen was found in a wooded area in rather wet soil near this last locality early in August by Dr. Wherry and me. We also found at the same time in the same place several plants of *Botrychium simplex var. tenebrosum* (A. A. Eaton) Clausen. All these Botrychiums have been identified by Dr. Clausen.

This locality is especially favorable for Botrychiums. In a small area on an open hillside, largely in deep beds of Hairy-cap Moss, grow over a thousand, by actual count and estimation, of *B. dissectum* and *B. obliquum.*

Within a few miles of Lake Shehawken I have collected *Athyrium pycnocarpon* (elevation 1700 feet), *Polystichum Braunii* (elevation 1800 feet), and *Thelypteris simulata* (elevation 2050 feet), all rare ferns for this territory. The collection of these last three ferns has been reported in the American Fern Journal.

# BOOK REVIEWS

## Guide to eastern ferns*

Arthur H. Graves

A handy little book which one can carry in his pocket is the "Guide to Eastern Ferns," by Dr. Edgar T. Wherry, Associate Professor of Botany at the University of Pennsylvania. An interesting feature is the nomenclatural history which prefaces the description of each species. For example, under *Polystichum acrostichoides*, the common Christmas Fern, it is stated: "Michaux observed this fern during his explorations in Pennsylvania, Carolina and Tennessee, and named it *Nephrodium acrostichoides* in 1803. It was transferred to *Polystichum* by Schott in 1834." Another feature, which is helpful to those who have, or would like to have a "fern garden," is the information as to the soil requirement for each species—whether acid-loving, lime-loving, or indifferent. Fern gardeners will find also, at the end of the book, general directions for the cultivation of ferns, including the method of growing them by starting with the spores. In addition, lists of species are grouped here according to their soil requirements.

The book covers not only ferns but also fern allies. Each of the hundred species is illustrated by a clear line drawing, with one or more smaller insets showing the position or nature of the sori, or other important characters. (Except that in the case of 8 species of Isoetes, only the spore characters are figured, since these species are very similar in general appearance.) An unusually full glossary of technical terms preceding the main body of the text will prove helpful to beginners. Instead of technical "keys," short statements about the systematic arrangement and the phylogenetic position of each group of the ferns and fern allies are given.

It is well known that Dr. Wherry has devoted considerable attention to the cultivation of wild plants. At the same time he is recognized as an authority on the group of the ferns. It is therefore fortunate that he has combined these fields in this little book, which will be very useful to fern lovers and fern gardeners.

* Guide to Eastern Ferns. Edgar T. Wherry. Science Press, Lancaster, Pa. 1937, 220 pages. $1.00.

## Ferns of the Southeast*

FARIDA A. WILEY

In this posthumous volume another splendid botanical manual is added to the already monumental works of the late Dr. Small. This, the third manual of his to be published in a series devoted to the Pteridophyta of the eastern United States, is like the others in that it is designed for use either by the amateur or advanced student.

When we consider how very prolific are the plant forms of Florida alone and multiply that fact by the very diversified area possibilities included in the geographical territory east of the Mississippi river and south of Virginia and Kentucky, it is not surprising to find 189 species and several sub-species of ferns and fern-allies described in this book. In this section of the country are many type provinces such as Coastal Plain, Piedmont, Blue Ridge, Appalachian Valley, Appalachian Plateaus and Interior Low Plateaus as well as the latitudinal zones of the temperate and sub-tropical regions. Of the large numbers of species described, 29 have never before been included in any fern manual and 12 are here described for the first time. What possibilities await the botanist and fern enthusiast in that peninsula of Florida where these new species have been found! It is of interest to note that over half of the species included in Dr. Small's "Ferns of the Vicinity of New York" are also found in these southern areas. In fact 36 of the plates are the same in both books but the text pertaining to these has been somewhat revamped. Except for a few of the quill worts, (Isoetes) each species is excellently illustrated in full page line drawings which emphasize the diagnostic characteristics of each. If the species are not too similar these line drawings will in many instances suffice for identification without having to refer to the very complete technical descriptions. For the uninitiated in the intricacies of genera characteristics, an illustrated key based on structure is given. Throughout this key are parenthentical explanations for technical terms used, such as sporangia, (spore-cases) or sori, ("fruit dots") which will save the student the trouble of referring to an index. This key would have been even more useful if the page reference to Order, Family and Genera had been given for each.

* Ferns of the Southeastern States—John Kunkel Small. The Science Press, 1938. 517 pp., $3.50.

Other supplements include a lengthy glossary, a list of the "Authorities Cited in This Work," an excellent "Taxononic List With Citations" by J. H. Barnhart, which might have been more usable if it had been alphabetically arranged, and about fifteen pages devoted to the cultivation of these southeastern ferns.

As was rather characteristic of the author, there are a number of changes in nomenclature, mostly reverting to earlier classifications. Quoting from his introduction—"in this text an attempt has been made to interpret the fern-plants involved in more simple or natural generic concepts." He uses *Osmundopteris virginiana* (L) Small, for the Rattlesnake fern, instead of *Botrychium virginanum* Sw. For the Resurrection or Southern Polypody, *Polypodium polypodioides* Watl., he uses *Marginaria polypodioides* (L) Tidestrom and for *Selaginella Eatoni* he goes back to the old generic name of *Diplostachyum*. Common names are relegated to the end of the taxonomic descriptions and, usually, preference is given to the names that have been prevalently used for a long time.

Botanists may not always agree with Dr. Small's plant habit preferences as for example, when speaking of the habitat for *Thelypteris simulata* (Davenp) Nieuwl. (Massachusetts or Bog Fern) he states that it is found in "drier locations than are suited to the marsh fern," *Thelypteris Thelypteris* (L) Nieuwl. It may be able to survive in drier areas, but certainly the more healthy colonies prefer to have their "feet" in the water. Sphagnum bogs, partially grown over, seem to be the ideal location for this species.

However, these minor differences of opinion or disadvantages in arrangement are lost in the authoritativeness of the whole. This manual will no doubt be one of those "must have" additions to the library of botanists and fern enthusiasts.

## An index to American ferns*

George T. Hastings

It is thirty-seven years since Maxon and Gilbert published lists of American ferns and thirty since Clute completed a check

* Index to North American Ferns. Maurice Broun. Published by the compiler at Orleans, Mass. 1938, 217 pages. $2.50.

list in the Fern Bulletin. During this time new species and many varieties and forms have been described and much learned of the ranges of our ferns. An up-to-date list of ferns was therefore greatly needed and Mr. Broun has met this need in a thoroughly satisfactory manner. The list includes all known forms of Pteridophytes north of Mexico. The nomenclature followed is that of Christensen, though numerous forms and varieties have been changed in rank or their species name changed and so the names are given as new combinations. The arrangement is alphabetical throughout, though a systematic outline of the orders and genera is given at the beginning. As in many cases the generic names used are not those found in common manuals, the index, complete as to names of forms and varieties and synonyms, will be found very useful. For each species and form the habitat and range is given. This feature is largely the contribution of Dr. Edgar T. Wherry. "Whenever practicable, Dr. Wherry states the ranges so as to show the direction of migration." Thus the range of the Virginia Chain Fern, *Anchistea virginica*, is given "on the Coastal Plain from Florida to Texas, and to Long Island, and sporadically northward to Nova Scotia and inland to Bruce Peninsula, Ontario and to southern Michigan."

Hybrids are marked with an X, introduced species and varieties with (*). The introduced forms are mostly escapes from cultivation in Florida or adjoining states; exceptions are the European Hart's Tongue, *Phyllitis scolopendrium*, intentionally introduced in the north, and *Marsilia quadrifolia* first found in Connecticut in 1862. Incidentally the number of introduced species given in the table at the end of the book as 21 should be reduced to 16 as five forms of *Isoetes* are put in the column of introduced species instead of native forms where they belong. The list might be further reduced to 15 as it is stated that *Salvinia natans* was "collected in Perry Co., Missouri, in 1886, and not otherwise known in North America."

In all 335 species are listed as native, with 109 varieties and 222 forms. The volume should be on the "must" list of every student of ferns.

## FIELD TRIPS OF THE CLUB

### Trip of August 6, 1938, to the Vicinity of Albany, N. Y.

The week-end trip in the vicinity of Albany, was under the leadership of Dr. Homer D. House, State Botanist. It proved to be a most enjoyable occasion with two sunny days, in a region new to the club members. The lobby of the Wellington hotel, Albany, was the meeting place and after our group was photographed for a local afternoon paper a start was made by cars with the first stop at Glenmont, a few miles south of Albany, where on the Norman's Kill shale formation was observed "rock-garden like" growths of *Selaginella rupestris*, *Cerastium arvense*, *Woodsia ilvensis*, and other unusual species. From Glenmont the group motored to the vicinity of Clarksville where a portion of the gorge of the Oniskatou creek was traversed, interesting for its mosses, lichens and liverworts, with such flowering plants as *Kalmia latifolia*, *Amelanchier amabilis* and *Serapias helleborine* among the many species collected or observed. From Clarksville the party went to the John Boyd Thacher Park, near New Salem, where several hours were spent along the top of the Helderberg escarpment, and also following the trail beneath the overhanging ledges. This is a wooded area of cliffs, small waterfalls and brooks, and much geological and fossil history has its origin in the studies made here in past decades. After twenty years of use as a public park, the native vegetation plainly shows in many places the effects of abuse, but most sections of the park away from the main trails are still intensely interesting for the large variety of mosses and lichens, flowering plants and rock-loving ferns, such as *Camptosorus rhizophyllus*, *Asplenium ruta-muraria*, *A. trichomanes*, *Polypodium* and others. On our return toward Albany a short detour was made taking us to the summit of Wolf hill, one of the highest elevations of the northern escarpment of the Helderbergs, where *Habenaria hookeri* and *Arctostaphylos uva-ursi* were noted. The evening was spent in Doctor House's office in the State Museum in a discussion of the day's collections.

Meeting in front of the State Museum early Sunday morning the first stop was made on the plateau just west of Berlin. This area is a poorly drained region with many boreal species, including *Abies balsamea*, *Picea rubra*, *Aster acuminatus*, *Oxalis mon-*

*tana* and others species characteristic of the Adirondack region. With a steep descent into the valley of the Little Hoosick River we turned northward to Petersburg and then up the long winding "Mohawk trail" to the Petersburg Pass summit on the Massachusetts line. The elevation here is about 2000 feet. There is a good lunch room here and an observation tower and parking place for many cars. Our route took us northward along the ridge trail through dense growths of low blueberries, *Potentilla tridentata*, *Rhinanthus crista-galli*, and many species of grasses and sedges.

In some places plants of *Microstylis ophioglossoides* were observed along the trail, and near the end of this walk about a mile north of the pass Dr. House pointed out two interesting ferns, *Botrychium obliquum* (and its variety *dissectum*), and *B. multifidum*, closely resembling each other but different in texture, the latter having fleshy, evergreen fronds and the other of much thinner texture as well as having longer and more pointed segments than *B. multifidum*. There were fifteen members and friends present on this week-end trip.

A. T. Beals

### Trip of September 10 Along the Long Island Terminal Moraine North of Hollis

Twelve members and the leader took the walk Saturday, September 10, along the Long Island terminal moraine, beginning at 188th Street, Queens, just north of the Grand Central Parkway. The walk led through what is now called Cunningham Park, a wooded area showing on every hand a morainal configuration—large and small kettle holes, irregular topography, and boulders heterogeneous as to shape, size, and constitution, hailing from somewhere to the northward. This long ridge, extending through a large part of Long Island, is of extreme interest, geologically, and it is indeed fortunate that at least part of it has been preserved by the creation of Cunningham Park. We hope that it will be allowed to remain in as nearly its natural formation as possible. Botanically, the flora of the kettle holes is of the greatest interest. In one, in which water stands, evidently permanently, we found an almost exclusive population of what appears to be *Polygonum muhlenbergii* (Meisn.) Wats. which agrees closely with *P. emersum*, Britton. The lovely rose-colored tint of the flower spikes is similar to the shade of the Lady's Thumb, *P. persicaria*, and the colony was so dense that this shade was imparted to the whole area. Nearby, along the shore, was an attractive little Labiate, *Stachys hyssopifolia*, which we had seen further to the eastward near the large public parking space. It seemed to be well established here.

The usual fall-flowering goldenrods were seen, especially *Solidago rugosa*, *juncea*, *canadensis*, *caesia*, *graminifolia*, and *tenuifolia*—the last two growing near together, just east of the parking space, and well represented. Flowering plants of Culver's-root, *Veronica virginica*, were also found. Others identified were *Lespedeza frutescens*, *Cassia nictitans*, and *Lactuca spicata*. Along the roadside on the return to Hollis, a rather unusual grass *Setaria italica*, (L.) Beauv, was found, apparently an escape. This is cultivated under the names of Millet, German Millet, or Hungarian Grass.

Arthur H. Graves

## Trip of September 10 to the Shawangunks

On the morning of September 10th a small group met at Lake Minnewaska for a weekend of exploration in the vicinity of this glacial mountain lake, long famous for its summer resorts.

*Arenaria groenlandica* var. *glabra* was quite plentiful on the dry conglomerate rock slopes. Millbrook Mountain (elevation 1620 ft.) was reached by dipping down through Kill Clove. This great escarpment faces southeast and its 600 foot sheer drop is said to be one of the highest in the eastern states. Lunch was eaten on its summit where the magnificent panorama of Wallkill and Rondout Valleys could be fully enjoyed. The Catskill Mountains were visible far to the northwest.

The afternoon trail led along the top of the Cliffs to Gertrude's Nose, long famous as the far inland station of *Corema conradi*. This rare plant was found abundantly in a restricted area on the dry sterile soil at the end of the point. Associated with it was *Cetraria islandica*. In a nearby swamp was found *Liriodendron tulipifera* up to 18 inches in diameter at waist height. Several sterile fronds of *Anchistea virginica* were discovered. *Ilex monticola*, beautifully fruited, was collected along drier ledges.

Lodging was secured at the Mountain Rest House and Cottages. The evening was spent at Lake Mohonk looking at the extensive and historically interesting botanical library of the late Daniel Smiley.

Sunday's route led along an old wood road which parallels the Peters Kill stream. *Virburnum lentago*, *Gentiana clausa*, *Lobelia cardinalis*, *Picea rubens*, *Hieracium paniculatum*, *Solidago puberula*, and *Polygala sanguinea* were noted.

*Sparganium chlorocarpus* var. *acaule* was found growing in a small brook. *Juncus brevicaudatus* (reported by House "southward to Orange County"), *Carex scoparia*, *C. folliculata*, *C. lurida* var. *gracilis*, *C. crinita* var. *gynandra*, *C. brunnescens* var. *sphaerostachya* (known from Catskills and the Poconos, "south to Dutchess County", House) and *Scirpus atrovirens* were noted.

Lunch was eaten at Rainbow Falls which is formed by the outlet brook of Awosting Lake dropping over the cliff into Huntington Ravine. The following were noted on the damp ledges near the foot of the falls, *Hypericum canadense*, *Carex canescens*, *Scirpus cyperinus*, *Agrostis scabra* (Willd.) (a northern species reported by Fernald, Rhodora 35: 208 (1933) "south to Pennsylvania") and *Drosera intermedia*.

In the ravine were *Lycopodium clavatum* and *Trillium undulatum* while in the wettest part was a fine stand of *Rhododendron maximum*.

Awosting Lake, on which is located a boys' camp, is noted for its clear waters and beautiful deep blue color. Near its shores were *Vaccinium corymbosum* and *Rhodora canadensis*. The latter has a very restricted distribution in New York State.

In Fly Brook Swamp a fairly large stand of *Dryopteris simulata* was found. *Carex cumulata* (Bailey) Mack. was collected from rocky openings at the swamp margin. (Mackenzie in House, p. 171. "In moist soil. Rare. Karner, Albany County; and Whitestone, Oneida County. Pine Plains, Dutchess County.") Common in this swamp were *Oxycoccus macrocarpus* and *Myrica gale*.

Throughout the whole trip the blueberries and huckleberries received careful attention, but for their gastronomic delights rather than their taxonomy.

In closing the account of this trip it seems fitting to mention

Mr. Torrey's name. For several years he had wished to make it having been attracted by the name "Dark Hole" (Huntington Ravine) on maps of the region and by reports of rare plants with northern affiliations. For some months before his death. Mr. Torrey had been corresponding with the writer about details, as he was counting on leading the trip botanically while I served as guide. While resting on Gertrude's Nose surrounded by *Corema* our thoughts were of him and his interest in this plant. The following is quoted from one of his letters:

"The ticket on the specimen of Corema, in the Gray Herbarium, Cambridge, Mass., collected about 1880, by whom I have forgotten, bears this inscription: "In rupibus siliceis, super vallem Palmaghat, in montibus Shawangunk."

DANIEL SMILEY, JR.

### TRIP OF OCTOBER 3 TO FRANKLIN CLOVE, N. J.

Members of the New York Mycological Society and of the Torrey Botanical Club joined in a mushroom foray on October 3rd, 1938, in the vicinity of Franklin Clove, New Jersey. This geological freak forms a transverse ravine bisecting the first Watchung Mountain about three miles west of Paterson, so that one can walk from one side of the trap rock ridge to the other on an almost level trail. In this cleft are to be found many varieties of ferns and unusual wild plants, among them *Atragene americana* (*Clematis verticillaris*). More than fifty species of mushroom were collected. The *Armillaria mellea* and *Mycena galericulata* were abundant.

Near the south end of the Clove at the swamp's border were seen five persimmon trees bearing fruit.

Thirty-seven persons were present. Among them Dr. H. N. Moldenke, Messrs. James Murphy, G. G. Nearing. The presence of these gentleman gave an opportunity for identification of many plants other than mushrooms.

W. S. THOMAS

### TRIP OF OCTOBER 28–30 TO MOHONK LAKE, N. Y.

Fifty members and friends of the club joined in the various walks. The program extended from Friday evening to Sunday afternoon. Acommodations were at the Lake Mohonk Mountain House.

The Saturday morning route covered $3\frac{3}{4}$ miles and gave extensive views out over the valleys on each side of the Shawangunk (pronounced Shongum) range. The trail led down through the Gate of the Winds, a natural cleft in the quartz conglomerate, which produces strong updrafts. The descent is accomplished by 153 rustic steps. Glen Anna, a deep ravine with a nearly pure stand of hemlock, was visited. The return trail led along the brink of the eastern cliffs of Sky Top and allowed a spectacular view of the results of glaciation and differential erosion to these Silurian ridges. Fine specimens of *Asplenium montanum* were seen. In a small brook near Glen Anna (elevation about 1100 feet) a large specimen of Purple Salamander (*Gyrinophilus porphyriticus*) was collected. This is the first record which the leader has for these mountains.

The afternoon walk was to the south to the lower slopes of the ridge. Here the soil is on the alkaline side as compared with the strongly acid reaction found along the upper slopes. On Oakwood Drive the party was met by two large "straw rides" drawn by teams of horses. Everyone piled on. The novelty of riding behind horses on these old fashioned vehicles was much enjoyed. A strange specimen of *Ilex* with yellow fruit and ribbed nutlets was collected. This is being reported elsewhere.

In the evening the leader projected for the group some of his Kodachrome slides taken at Mohonk. The autumn foliage and a series of brilliant sunsets caused particular comment. After this show, cider and doughnuts were served in honor of Hallowe'en.

The Sunday morning route led to Rhododenron and "Sleepy Hollow" Swamps. These are both strongly acid and have interesting plant associations. The mosses were abundant and beautiful. A Witch Hazel was discovered whose blossoms were definitely pink in color. This also is being reported in detail separately.

Evidences of the September hurricane were noted in many places. Fortunately wind damage was confined to forest trees. The red oaks seemed to be more effected than any other species. It was noted that although the apparent direction of the wind was from the west, the majority of the uprooted trees were on the southeast slope of the mountain.

Daniel Smiley, Jr.

## Field Trip of November 6

Eleven members and friends of the club assembled at the Wanaque-Midvale Station to meet Mr. Worth Smith who substituted for J. Ashton Allis as leader of the outing. We drove up to the Ringwood Mines where the cars were parked through the courtesy of Supt. S. H. Morrison. It was overcast and the wind was in a threatening quarter but we started out optimistically for Cedar Pond. Passing the idle marching of the old mine we followed a wood road to the northwest, travelling through second growth oak-hickory forest. The heavy litter of leaves obscured the ground plants but a few species of polypores and a good crop of oyster mushroom were observed. After crossing into New York State we passed a bank with a nice showing of *Biomyces roseus*. Other lichens nearby were various species and forms of Cladonia. The trail soon came out on a more or less passable road, the old road from Hewitt to Sterling Furnace. The road passed over a height of land and along the descent a spring was found to the right of the road. After crossing a stream we left the road turning left up the brook. Some distance up stream a beaver dam was found and evidence of fresh beaver work. A considerable flooded area forced a detour across rough country over a ridge covered with huge boulders. This was not without its reward for the rocks were well populated with smooth and corrugated rock tripe. After the detour the trail led steeply upward to the pond. Cedar Pond has an altitude of 1029 feet. It is wooded to the water's edge. There is a good stand of rhododendron, mountain laurel, some hemlock and to the north of the pond a swamp of southern white cedar. Across the pond and beyond to the northeast the fire tower on Stirling Mountain could be seen. After a leisurely lunch we walked perhaps one third of the way around the lake which is probably not over a quarter mile across at any point. The return trip started about 2 o'clock and under the stimulus of rain we made good progress. A short cut took us down to the old road near the trail back to the Mines, which were reached in about an hour.

After what drying was possible we drove up to Ringwood Manor and spent about an hour inspecting the Manor House and grounds. All hands seemed to consider the outing a success, the weather notwithstanding. John A. Small

## PROCEEDINGS OF THE CLUB

### Meeting of October 19, 1938

The meeting held at The New York Botanical Garden was called to order by President Gunderson at 3:40 P.M. with 38 persons present.

The minutes were read and approved.

Dr. Gunderson stated that he had received a letter from Dr. John A. Small in response to his request that Dr. Small accept the appointment of Chairman of the Field Committee. Dr. Small thought the appointment should not be a hasty one.

Dr. Moldenke announced that Mr. Frank Place and Dr. William S. Thomas are acting as a committee to receive voluntary contributions for the Torrey Fund, the interest of which is to be used yearly.

The memorial service and unveiling of a monument erected in memory of Mr. Torrey, whose ashes are to be scattered by Mr. Frank Place on top of Long Mountain, will take place Sunday October 30 at 10 A.M.

The scientific program consisted of a report on the research work done by Mr. James W. Marvin on the Shape of the Pith Cells of *Eupatorium purpureum* and some related phenomena. The following is an abstract by the speaker:

"The shape of undifferentiated cells as they occur aggregated into tissues has for a long time been interpretated as largely a surface tension phenomenon. The Orthic Tetrakaidecahedron of Lord Kelvin with eight hexagonal and six square faces is considered by some to be the fundamental shape for undifferentiated cells.

In an experiment in which lead shot of equal size were compressed at various pressures, an increase in the number of contacts from slightly more than eight to about fourteen occurred; this shows that, in a system where surface tension plays a relatively small part, compression to the point where all of the spaces between the spheres are eliminated gives approximately fourteen contacts or faces per shot. However these shot had a relatively large number of pentagonal faces and were not orthic tetrakaidecahedra.

Pith cells of *Eupatorium purpureum* were examined also and three dimensional models of the cells were constructed. A study of one hundred of these models showed them to have an average of slightly more than thirteen contacts per cell, and a large number of pentagonal faces."

Clyde Chandler
Recording Secretary

## Meeting of November 1, 1938

The meeting held at The American Museum of Natural History was called to order by President Gunderson at 8:15 p.m. with 41 persons present.

Dr. Thomas explained briefly that voluntary contributions are being received to establish a fund in memory of the late President Torrey. The interest from said fund is to be used each year to send a child to a camp in the country for two weeks.

Other business of the Club was deferred to the next regular meeting so that more time might be devoted to the scientific part of the program which consisted of a talk by Dr. H. B. Douglas on "Showy Flowers of Florida." Dr. Douglas showed Kodachrome slides of many of the flowers which have been introduced into Florida from various parts of the world.

Clyde Chandler
Recording Secretary

## A Correction

Volume 38, number 6, November-December, 1938 was published on January 19, 1939, not in December, 1938, as given on page 166 of Volume 38.

## NEWS NOTES

### Raymond H. Torrey

A limited number of reprints of the article on Raymond Torrey in the October, 1938, Bulletin of the Torrey Botanical Club, bound in paper covers, complete with portrait and bibliography, can be secured from the treasurer, Dr. Harold N. Moldenke, New York Botanical Garden. The price is 25 cents a copy.

At the site of the Golden Gate International Exposition on Treasure Island in San Francisco harbor, ground was broken on November 26 for the Floricultural Building. The first shovelful of earth was turned by Miss Alice Eastwood, curator of botany in the California Academy of Science for the past forty-six years.

Dr. Ruth M. Addoms, assistant professor of botany at Duke University, is spending part of a semester's sabbatical leave in the laboratory of Professor J. H. Priestly at the University of Leeds.

Dr. John H. Whittier has retired after serving for twenty-four years in the department of botany at Chicago Teachers College. His place is taken by Dr. Howard J. Dittmer, formerly of the State University of Iowa.

Dr. William D. Merrell, professor of botany since 1899 at the University of Rochester, has been granted a year's leave of absence. He will retire from active service and become emeritus profesor in June, 1939. (Science)

The Rancho Santa Anna Botanic Garden in Santa Anna Canyon, California has one visiting day a week during the spring and summer. On these days displays of wild flowers, as many as two hundred at a time, properly labeled, are arranged in the Propagating Nursery and Administration Building. Mimeographed leaflets are prepared for distribution each week describing one native plant and giving directions for its cultivation. One object of the Botanic Garden is to increase the use of native plants in gardens and parks throughout the state.

Edward A. White, professor of floriculture at Cornell University, has been awarded the gold medal of the Massachusetts Horticultural Society "for outstanding service in the field of horticultural education." Professor White organized the first department of horticulture in the United States at the Massachusetts Agricultural College in 1907. (Science)

The new Washington Avenue gates at the Brooklyn Botanic Garden are ready for use. The north entrance is near the Japanese Garden, the south one near the Children's Garden. Both have three gates, one for entrance, one for exit and a central one for baby carriages. The entrance turnstiles have automatic counting devices so that each visitor is registered.

Dr. J. J. Thornber, professor of botany at the University of Arizona, announces that the university will begin this spring the cultivation of desert plants that may be of commercial value. The plants to be grown include guayule and milkweeds for rubber, and other plants that may be valuable for medicine and fiber. It will be several years before it will be known if these plants can be grown successfully.

At the meeting of the American Association for the Advancement of Science during Christmas week the following officers of the Botanical Section (Section *G*) were elected: president, Dr. E. N. Transeau, Ohio State University; secretary-treasurer, Dr. J. T. Buchholz, University of Illinois.

The officers of the Botanical Society of America for 1939 are,—president, Dr. K. M. Wiegand, Cornell University; vice-president, Dr. M. L. Fernald, Gray Herbarium, Harvard University; secretary, Dr. G. S. Avery, Jr., Connecticut College; treasurer, Dr. Paul Weatherwax, Indiana University.

Work has been begun at the New York Botanical Garden on the new roads that are to run on either side of the grounds. When these are completed the garden will be enclosed in a fence, with two gates on the south, two on the west and one on the east. There will be no roads through the garden for traffic, the present ones being in part retained as service roads. A large part of the northern end of the garden is being given up, including the areas where the Japanese cherries and Conservatory Range number 2 are located.

# THE TORREY BOTANICAL CLUB

Contributors of accepted articles and reviews who wish six gratuitous copies of the number of TORREYA in which their paper appears, will kindly notify the editor, when returning proof.

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# OTHER PUBLICATIONS

### OF THE

# TORREY BOTANICAL CLUB

## (1) BULLETIN

A journal devoted to general botany, established in 1870 and published monthly, except during July, August, and September. Vol. 65, published in 1938, contained 692 pages of text and 35 full page plates. Price $6.00 per annum. For Europe, $6.25.

In addition to papers giving the results of research, each issue contains the INDEX TO AMERICAN BOTANICAL LITERATURE—a very comprehensive bibliography of current publications in American botany. Many workers find this an extremely valuable feature of the BULLETIN.

Of former volumes, 24–65 can be supplied separately at $6.00 each; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Single copies (75 cents) will be furnished only when not breaking complete volumes.

## (2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–18 are now completed. Volume 17, containing Proceedings of the Semi-Centennial Anniversary of the Club, 490 pages, was issued in 1918, price $5.00.

Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

Volume 19, no. 1, 92 pages, 1937, price $1.50. Volume 19, no. 2, 178 pages, 1938, price $2.00.

(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

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# TORREYA

A Bi-Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

GEORGE T. HASTINGS

John Torrey, 1796-1873

CONTENTS



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TORREYA

Vol. 39 March–April, 1939 No. 2

## Guide to the Lichens of the New York Area

G. G. Nearing

Based on what they look like. Botanists may continue for a long time debating what lichens are, but their appearance is not subject to debate, and is therefore a good, practical basis for identification.

Group 1. Stalked Lichens, much of which are not supported on the stalks, but spread around their base, as either a crust or a mat of leaf-like flakes, from which the stalks spring. (Mostly Cladoniae, to which Torreya has already published a key.)

Group 2. Stalked Lichens growing on the ground as bushy tufts, with all of the lichen that is plainly visible supported on the stalks. (Mostly Cladoniae, to which Torreya has already published a key.)

Group 3. Stalked Lichens altogether supported on the stalks, growing nearly always on trees or wood, as upright, bushy, or hanging, beard-like tufts.

### The Usneas

When Longfellow wrote of "the murmuring pines and the hemlocks bearded with moss," the moss he referred to was largely not moss in the botanical sense, but lichens of different species, including Usnea, Alectoria, Ramalia. Not only in the north woods, but in our own mountains, in our bogs and coastal swamps, we find Usnea here and there on the trunks and branches of trees, sometimes high up, but usually not above the limits of frequent fog. While many species have been named, these do not divide sharply, and it is convenient for the average botanist to recognize only certain distinct types by name, leaving less well marked forms to the specialist.

*Usnea florida* (L.). Flowering Lichen

The tufts of *Usnea florida*, in contrast to most of the Usneas (which droop) stand out stiffly, and more or less upright from the bark on which they grow. Stalks are usually 4 or 5 cm. high, but may reach two or three times that size.

The general color is greenish gray (ashy gray in dry weather), often blackening along the stalks or occasionally stained reddish in places. The main stalk, frequently 2 mm. or more in thickness, is rounded, sometimes cracked in rings, showing a white core within, due probably to being pulled by climbing animals, or by ice. Its surface is beset with tiny warts visible under the hand lens, and with profuse branches, branchlets and fibrils, most of which stand out nearly at right angles to the stalk from which they spring. Various parts may or may not be dotted with dusty white specks known as soredia.

The fruit, a thin disk up to 1 cm. or more in diameter, flesh-colored, buff, pale greenish or pinkish, its irregular rim usually fringed with rather long fibrils, does indeed suggest a flower. *Usnea florida* will be found without fruit more often than with.

When very small, compact, and intricately branched, it may be called *Usnea hirta* (L.). These two are the only erect Usneas, all other forms drooping downward.

### *Usnea barbata* (L). Bearded Lichen

Hanging downward like a beard, slender, flexible, blowing in the wind, of any length up to a meter or two, typical *Usnea barbata* is easily distinguished from typical stiff, erect *U. florida*. It is less densely branched as a rule, and the smaller fruits, rarely seen, occur along the branches rather than at their tips, otherwise much like *U. florida*. If you call all drooping forms *Usnea barbata*, you will not be far wrong, for the other species are often considered mere varieties of it.

*Usnea plicata* (L.) is coarser than *U. barbata*, with larger fruits, and in fact looks more like *U. florida* except that it is flexible, hangs downward, and fruits along the branches. *U. longissima* Ach. has scales instead of warts, and fruits at the tips, though fruits, as in *U. barbata*, are rare. *U. angulata*, also without warts, has somewhat angled stems, and though drooping like *U. barbata*, is rigid like *U. florida*. *U. cavernosa* Tuck. differs from *U. barbata* in having the stem conspicuously pitted near the base. It is interesting to observe these minor variations, and those who wish may call the above-described forms by their names as separate species.

*Usnea trichodea* Ach. Hair Lichen

Differs from all other Usneas in its extreme slenderness, the main stalk often only 0.2 mm. thick, and tapering to hair-like tips. Not so common as the others northward, it is fairly abundant in the pine barrens. Typically very pale green or soft greenish gray. The fruits, usually along the stem, but rare, average smaller, not over 4 mm. diameter, round and smooth, of the same color as the stems, and with few or no fibrils on the rim. The fibrils of the branches also may be widely scattered. Though distinct in its slenderness, *U. trichodea* has forms which approach *U. barbata*, and may be called by either name.

Spores of the different species of Usnea do not differ materially from each other. All are ellipsoid, colorless, undivided, about 6 to 10 by 4 to 8 microns, and come 8 in each sack. They may usefully be studied under the compound microscope to distinguish Usnea from possible confusion with Ramalina and Teloschistes, which have 2-celled spores.

The conspicuous character by which Usnea may be distinguished from other lichens in Group 3, is the presence of fibrils and branchlets standing at right angles to the stalks and branches, and fringing the fruit-rims. Ramalina and Evernia (Group 4), beside lacking the Usnea fibrils, have their stalks variously flattened, angled and channeled.

Alectoria, the only other lichen easily confused with Usnea, usually turns brown in contrast to Usnea's greenish gray, and through Alectoria bears fibrils, these do not usually occur along the main branches. While the surface of Usnea tends to be dull, that of Alectoria becomes polished and shining. In the New York area, Alectoria is usually more slender than any Usnea except *U. trichodea*. For a decisive test, however, pull a stalk until it breaks. Usnea is constructed like a telephone wire, with a tough, hard, pure white core, surrounded by more brittle "insulation," Alectoria more like a garden hose, either hollow, or partly stuffed with weak threads.

Along the southern coast, beginners may confuse the hanging Usneas with the so-called moss which everywhere droops from the trees, but which is neither a moss nor a lichen. It is

*Tillandsia usneoides* (also known by various other scientific names) and bears small, yellowish flowers. It has narrow leaves along the stem.

*Alectoria jubata* (L.). BROWN MANE LICHEN

Hanging downward from the bark of trees in bogs and swamps, or on mountain tops, will be found occasional tufts of the BROWN MANE, consisting of tangled and branching hairs somewhat like Usnea. In the New York area, the stalks remain slender, rarely more than 0.3 mm. in diameter, and usually not more than 10 or 15 cm. long. Under a lens the surface is seen to be smooth and shining, usually browned or blackened, as though scorched by fire. This color will distinguish it from Usnea, as will also the hollow stalk, lacking Usnea's tough core. Farther north, Alectoria becomes larger and more robust.

Fruits, rare in the New York area, are chestnut brown, up to 3 mm. in diameter, with an inconspicuous rim and no fibrils. Spores much like those of Usnea, one-celled, colorless, 6 to 9 by 4 to 6 microns.

*Alectoria chalybeiformis* (L.) is only a subspecies of *A. jubata*, usually tufted instead of hanging, and sometimes growing on mossy rocks as well as trees. It is often covered with white specks which under the lens show as rounded patches of soredia. These are rare on *A. jubata.* It does not fruit.

*Alectoria sarmentosa* Ach., STRINGY LICHEN, rare south of northern New England, is straw-colored or greenish instead of the characteristic brown of *A. jubata*, and has fruits up to 7 mm. in diameter, with brown spores 20 to 48 by 12 to 24 microns. These very large, dark spores easily distinguish it from any other hanging lichen.

Alectorias are well marked and distinct from other lichens. Their round stalks separate them from most Ramalina, Evernia and Teloschistes species, the hollow structure, and the usually browned and shining surface from Usnea. When not growing on trees, the color and the manner of branching, ending in hair-like fibrils, prevent confusion with the Reindeer Mosses of Group 2.

*Teloschistes chrysophthalmus* (L.) GOLD EYE LICHEN

This little tufted species, often only 1 or 2 cm. long, may stand upright or hang down like a miniature Usnea, and in some of its forms could easily be mistaken for Usnea, in others for Ramalina. Its stalks are typically about 1 mm. through, irregularly angled, flattened and channeled, their tips ending in more or less lengthened fibrils or threads. Found on trees in swamps and bogs, but not often. The color varies from pale greenish or grayish to yellow, a distinct yellow form with rounded and longer branches called var. *flavicans*.

When in fruit, there is no mistaking it, for the little disks, up to 5 mm. across, are golden yellow to orange, and no similar stalked lichen in the New York area is so colored. The rim may be torn or toothed, or decorated with fibrils. The spores, 10 to 18 by 5 to 8 microns, show a peculiar polar structure, as in other lichens with an orange tint, two cells, one in each end, separated by a wide wall which occupies most of the center of the spore, and through which runs a distinct longitudinal line, a narrow tube connecting the cells. These spores are strikingly different from those of other stalked lichens.

Greenish gray forms can be confused with Ramalina or Usnea unless fruits are present. Unlike Ramalina, the tips often end in fibrils. Unlike Usnea, the stalks are usually more or less flattened. And there is usually a tinge of yellow present to distinguish it from either. So rare is this species in the north, that there is little likelihood of finding it at all.

*Ramalina calicaris* (L.). Twig Lichen

Of all the larger stalked lichens which grow on trees, Ramalina is the commonest and most generally distributed. It can be looked for on the trunks, branches and twigs of trees and bushes along the seashore, in swamps and bogs inland, and on all the higher mountains. Its greenish or grayish tufts commonly range from 1 to 5 cm. or more in height and spread, and may be dense or straggling. The stalks may be nearly round, or variously flattened, angled, channeled or veined. The main stalks, typically 1 to 3 mm. across, may be found considerably wider in flattened forms. Once seen it is not easily confused with any other lichen except *Evernia prunastri* and *Teloschistes chrysophthalmus*.

In *R. calicaris* and its subspecies, the fruits are at first neatly rounded cups with a smooth rim, but later the center may swell up and cover the rim. The disk is faintly colored, usually a shade paler than the branches, or whitish, buff or slightly flesh-color, mostly smaller than 5 mm. diameter.

The several subspecies or varieties into which *Ramalina calicaris* has been divided may be noted if desired. *R. fcrinacea* (L.) is dotted over with white specks (soredia) which are never large, as in *R. pollinaria*, while the non-inflated stalks distinguish it from *R. dilacerata*. *R. canaliculata* (E. Fries) has the stalks distinctly channeled, and the fruits apparently on the tips, but actually on the sides of branchlets which are bent backward, an arrangement not confined to this form. *R. fastigiata* (Pers.) is a similar densely tufted form with more or less rounded stalks, and fruits usually along the branches. *R. subamplicata* (Nyl.) has flattened and almost leaf-like stalks, with fruits along the surface and the margins. It suggests Group 4, but both sides of the stalk have the same structure and appearance, while in Group 4 the two sides tend to differ.

The microscope quickly distinguishes Ramalina, because spores have two cells with a simple dividing wall, not thickened as in Teloschistes. Size 9 to 18 by 4 to 7 microns, often with tapered ends and somewhat curved at times. No other stalked lichen growing on trees has spores of this kind.

A form with much longer spores, 18 to 32 by 3 to 6 microns, is distinguished as *Ramalina stenospora* Mueller, NARROW-SPORE TWIG LICHEN. It is not common, and not otherwise different from *R. calicaris*.

*Ramalina fraxinea* (L.), ASH TWIG LICHEN, was listed by Tuckerman as a subspecies of *R. calicaris*, and resembles *R. subamplicata*, with broad, leaf-like stalks, but the branches sometimes spraying into rounded, much divided tips. The fruits become much larger, often more than 1 cm. in diameter. These characters are so easily seen that *R. fraxinea* may usefully be called a distinct species. Its spores are like *R. calicaris*.

The smaller *Ramalina pollinaria* (Ach.), POWDERY LICHEN, usually but 1 to 2 cm. high, will sometimes be found in the crevices of cliffs, or rarely on trees. I have seen it only near Shoshola Falls, Penn., but it is reported from southern New England. Its stalks are slightly swollen, not much branched. It may be identified by the specks and relatively large, powdery patches of soredia, as much as 2 mm. across, spreading over its surface, and bursting from the tips. The soredia are much

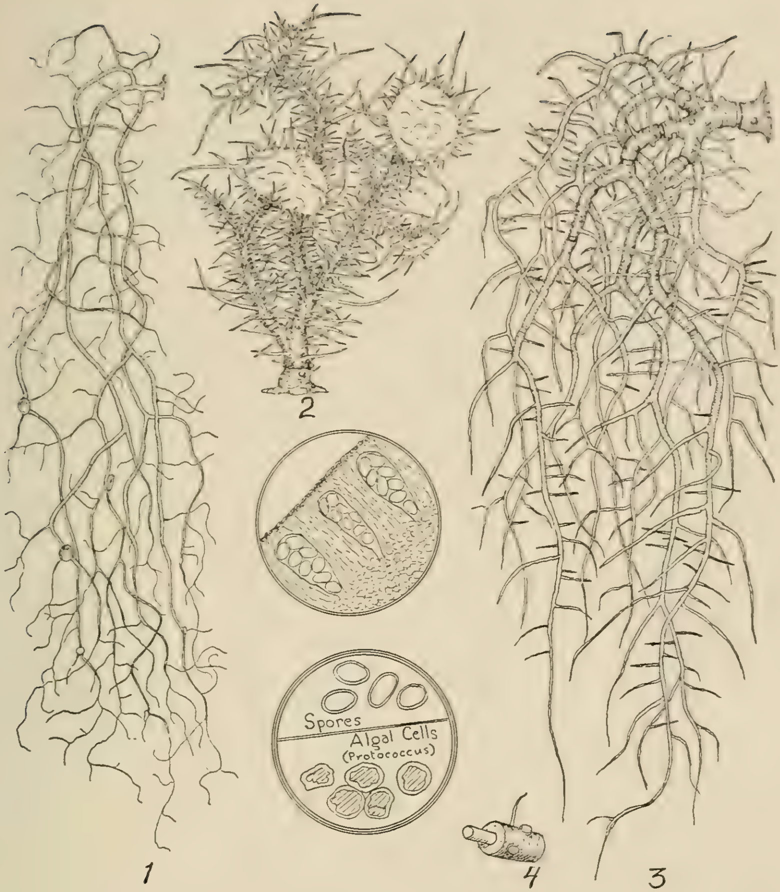


PLATE 1

Fig. 1. *Usnea trichodea* showing small fruits along the stalks.

Fig. 2. *Usnea florida* with densely bristly stalks and large fruits. Upper circle. Section of the fruit surface of *U. florida* showing spores in the spore sacks. (As seen in a hasty, thick section.) Lower circle. The same spores compared with the greenish cells of Protococcus always present.

Fig. 3. *Usnea barbata.*

Fig. 4. Structure of an Usnea stalk, showing the tough, white core surrounded by a corky outer layer.

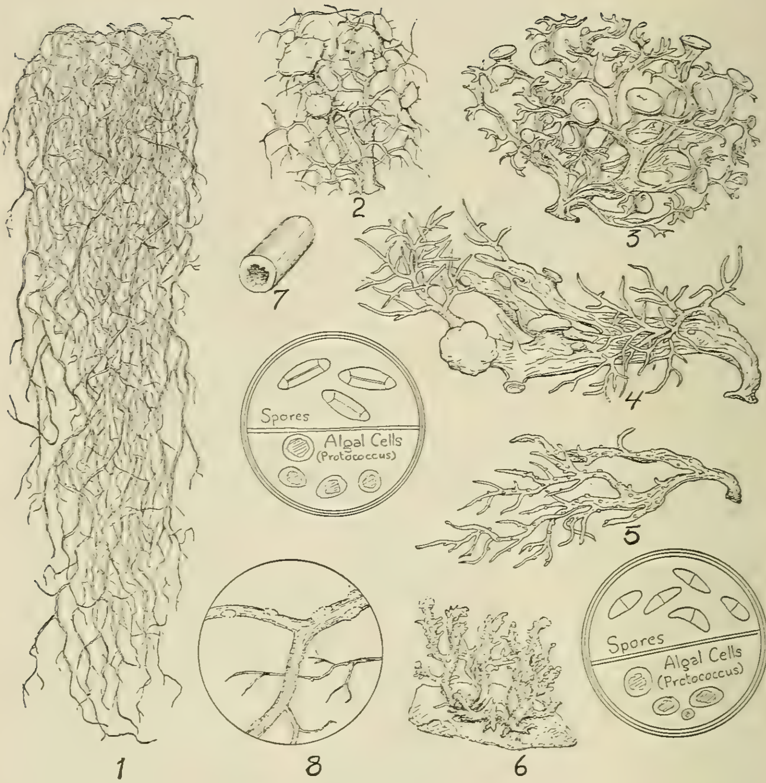


PLATE 2

Fig. 1. *Alectoria jubata.*

Fig. 2. *Teloschistes chrysophthalmus* with fruits (golden yellow). Upper circle. Spores of *T. chrysophthalmus* showing polar structure.

Fig. 3. *Ramalina calicaris* with smooth, young fruits.

Fig. 4. *Ramalina fraxinea* showing widely flattened stalks, and older, swollen fruits. (An extreme form.)

Fig. 5. *Ramalina farinacea* showing small dots of dusty soredia.

Fig. 6. *Ramalina pollinaria* (local form) with larger areas of soredia along the stalks and bursting from the tips. Lower circle at right spores of R. calicaris.

Fig. 7. Structure of *Alectoria jubata* showing the hollow stalk.

Fig. 8. Detail of *Alectoria chalybeiformis* showing rounded soredia.

larger than in *R. farinacea* and *R. dialacerata*, the only other local species which bear them. The European form of *R. pollinaria* looks entirely different.

In the mountains farther north, rarely in southern New York and New England, will be found *Ramalina dilacerata* (Hoffman), Torn Lichen, a small form with swollen, hollow stalks, spraying out into rounded and tapered tips, and dotted with white specks of soredia. The small fruits are borne only on thickened tips. The inflated stalks are its chief distinguishing character.

All Ramalinas are distinguished from Usnea and from Teloschistes by their lack of hair-like fibrils, from Usnea and Alectoria by their usually flattened and angled stalks, from Evernia and Cetraria by the structure of the stalk (See Group 4) and from all similar lichens by the character of the 2-celled spores.

Ridgewood, N. J.

(Group 4 will be similarly described in an early issue if members are interested.)

**Constitution and By-laws of the Torrey Botanical Club as revised in October 1938**

## CONSTITUTION

### Article I—*Name*

The name of this Society shall be The Torrey Botanical Club.

### Article II—*Objects*

The objects of the Club shall be to collect and diffuse information on all topics relating to botany and to promote an interest in this science.

### Article III—*Officers*

The officers of the Club shall consist of a President, a First Vice-President, a Second Vice-President, a Treasurer, a Corresponding Secretary, a Recording Secretary, an Editor, a Business Manager, and a Bibliographer. The officers shall be elected annually by ballot, and shall hold their offices for one year, or until others are installed in their places.

Vacancies occurring in any of the offices of the Club shall be filled by election by the Council. The person so elected shall serve until the next annual election, or until a successor is chosen.

### Article IV—*President*

The President shall preside at all meetings of the Club and Council, and shall appoint all committees not otherwise provided for.

### Article V—*Vice-Presidents*

In the absence or disability of the President, his duties shall be performed by the First Vice-President, and in the absence or disability of the latter, the Second Vice-President shall serve.

### Article VI—*Treasurer*

The Treasurer shall collect and have charge of all funds and securities of the Club. Out of such funds he shall pay the ordinary current expenses of the Club and such other sums as may from time to time be ordered. He shall report to the Council all members three months in arrears for dues. No payment exceeding twenty-five dollars ($25.00) shall be made by the Treasurer, except as authorized by the Annual Budget, unless first approved by the Council. The Treasurer's books shall be audited at least once every year by an Auditing Committee appointed for that purpose. The Treasurer shall render a report of the finances of the Club at the Annual Meeting, or oftener if requested, and at any other time he may desire. The Treasurer shall have charge of all reserve stocks of publications of the Club except the Index Cards.

### Article VII—*Secretaries*

The Corresponding Secretary shall have charge of the Charter, Seal, Constitution, By-laws, and Archives of the Club. He shall give due notice of all meetings, conduct the correspondence of the Club, and prepare all letters to be written in its name, retaining copies of them. He shall serve as Chairman of the Program Committee and Publications Exchange Committee, and perform such other duties of a similar nature as may be assigned by the Club from time to time.

The Recording Secretary shall keep full and accurate records of the membership and proceedings of the Club and Council, notify each member of his election, and report to the Treasurer the name and residence of each member elected, and perform such other duties of a similar nature as may be assigned by the Club from time to time.

### Article VIII—*Editor*

The Editor shall supervise all publications of the Club and appoint Associate Editors subject to the approval of the Council.

### Article IX—*Business Manager*

The Business Manager shall have charge of matters relating to advertisements in the publications of the Club, may be called upon to assist the Treasurer and Editor in business matters, and shall perform such other duties as may be assigned by the Club from time to time.

### Article X—*Bibliographer*

The Bibliographer shall prepare literature citations for publication by the Club, and have charge of the Index Cards of the Club.

### Article XI—*Council*

The Council shall consist of the President, the last two ex-Presidents, the two Vice-Presidents, the Treasurer, the Corresponding and Recording Secretaries, the Editor, the Business Manager, Chairman of the Field Committee, Chairman of the Local Flora Committee, and the Delegate to the New York Academy of Sciences, and twelve elected members, of whom four shall be elected each year for terms of three years. Nine members shall constitute a quorum. Vacancies in unexpired terms shall be filled by the Club by ballot.

The Council shall hold a regular meeting just prior to the Annual Meeting and at other times at the call of the President. It shall prepare annually a Budget for consideration by the Club, shall approve all contracts, shall pass upon all extra-budgetary bills presented for payment, shall pass upon candidates for membership and for all elective offices, and shall have the power to accept resignations and appoint committees to facilitate the conduct of its business.

It shall be the duty of the Council to invest the funds of the Club. No transfer of any stock, bond, note, or other evidence of debt standing in the name of the Club or withdrawals from savings banks accounts shall be made except by the Treasurer, having the written order of the Council for that purpose, and all such orders shall be countersigned by the President and one of the Secretaries.

### Article XII—*Members*

The membership of the Club shall consist of active (including sustaining and life) and associate members. Associate members may attend all meetings and field trips of the Club, but shall not be eligible to vote or hold office.

### Article XIII—*Dues*

Each Associate Member shall pay the sum of two dollars ($2.00) annually and shall receive only the notices of the field trips and other announcements of the Club.

Each Active Member shall pay the Treasurer the sum of five dollars ($5.00) annually and shall receive all current publications of the Club except the Index Cards.

Active Members paying fifteen dollars ($15.00) annually shall be designated Sustaining Members.

Payment of one hundred dollars ($100.00) at one time shall entitle a member to become a Life Member without further payment of dues. After payment of annual dues for forty years, an Active Member shall be eligible to election to Life membership and, in special cases, others may likewise be elected to Life membership.

### ARTICLE XIV—*Election of Members*

Applications for election to membership, after approval by the Council, shall be voted upon at the next regular meeting of the Club. All memberships shall begin on the first day of the year in which the member is elected, except that members elected after the first day of October may, if they choose, have their membership begin on the first day of the following year.

### ARTICLE XV—*Resignation of Members*

A member may at any time resign from the Club on giving notice to the Recording or Corresponding Secretary and paying such sums as he may owe to the Club.

### ARTICLE XVI—*Delinquent Members*

Any member who, after due notice, shall for the space of three months neglect to pay his annual dues, shall cease to enjoy the privileges of the Club's membership until they are paid. Any member delinquent for two years shall be dropped from the rolls of the Club unless special arrangements are made with the Treasurer and approved by the Council.

### ARTICLE XVII—*Fiscal Year*

The fiscal year shall commence on the first day of January, and all annual dues shall be payable at that time.

### ARTICLE XVIII—*Annual Meeting*

The first regular meeting in January shall be the Annual Meeting. Fifteen members shall constitute a quorum for the transaction of business.

### Article XIX—*Delegates and Representatives*

Delegates and Representatives on the Councils of the New York Academy of Science and the American Association for the Advancement of Science, and other organizations with which the Club is or shall become affiliated, shall be elected at the same time and in the same manner as the officers of the Club, the number of such delegates and representatives to be elected depending on the quota regulations of such organizations.

### Article XX—*Amendments*

Amendments to this Constitution must be proposed in writing at a regular meeting of the Club, entered on the minutes, and referred to the Council, which shall report thereon at the next regular or special meeting; and at the next regular or special meeting thereafter ensuing (special notice having been given by the Corresponding Secretary) a vote by ballot shall take place on the proposed amendment, and, if the same be approved by three-fourths of the members present, it shall therefore form a part of this Constitution.

## BY-LAWS

### 1—*Time and Mode of Election*

The committee for the nomination of officers shall be appointed by the President with the approval of the Council at an early meeting of the latter in the fall. All officers, council members, delegates, and representatives shall be elected by ballot mailed to all active members a month before the Annual Meeting. Active Members who so desire may write in the name of an additional nominee for each office on the ballot, and this act shall constitute a vote for the said nominee. The Council shall count the ballots received and report the results to the Corresponding Secretary, who shall read the same at the Annual Meeting. All officers shall enter upon the duties of their respective offices immediately after the close of the Annual Meeting.

### 2—*Meetings*

Unless otherwise determined by the Club, the regular meetings shall be held on the first Tuesday and the third Wednesday of each month from October to May, inclusive, at such time and place as the Club may direct. Nine members shall constitute a quorum for the transaction of business. The President may call special meetings upon his own motion.

### 3—*Order of Business*

The following shall be the order of regular business at all meetings of the Club except at the Annual Meeting:

1. Reading of the minutes of the last meeting.
2. Election of new members and announcement of resignations.
3. Reports of committees.
4. Deferred business.
5. New business.
6. Scientific program.

At the Annual Meeting the order of business shall be as follows:

1. Reading of the minutes of the last meeting.
2. Election of new members and announcement of resignations.
3. Reports of officers, delegates, and representatives.
4. Reports of standing committees.
5. Reports of other committees.
6. Deferred business.
7. New business.
8. Report on results of election of officers.

### 4—*Standing Committees*

The Standing Committees shall be as follows:

1. Program Committee.
2. Field Committee.
3. Local Flora Committee.
4. Publications Exchange Committee.

### 5—*Program Committee*

The Program Committee shall arrange for the scientific program of the meetings of the Club during the year.

### 6—*Field Committee*

The Field Committee shall select the dates, places, and leaders of the field trips and publish notices of the same, and may arrange for special indoor meetings for the study of plant material collected.

### 7—*Local Flora Committee*

The Local Flora Committee shall consist of two distinct subcommittees, one for the phanerogams and one for the cryptogams, whose duty it shall be to prepare complete and accurate lists of all the plants, native, naturalized, and adventive, occurring within one hundred miles of New York City, and to have such lists published with as much description and illustration as they shall deem best, and as the funds obtainable for that purpose shall warrant. It may arrange for special indoor meetings for the purpose of critically studying plant material assembled for this purpose.

### 8—*Publications Exchange Committee*

The Publications Exchange Committee shall consider and, subject to approval by the Council, pass upon all requests for exchanges of publications with the Club, keep an accurate record of the exchanges, and render a report of the same to the Club at the Annual Meeting.

### 9—*Donations and Bequests*

A record shall be kept by the Treasurer of the source, nature, and description of each donation and bequest.

### 10—*Amendments to the By-laws*

Amendments to the By-laws shall be prepared in writing and referred to the Council, which shall report on them at a subsequent regular meeting of the Club, and may be adopted by a majority vote of those present.

## BOOK REVIEWS

### An Introduction to Botany*

R. C. Benedict

A new textbook in botany starts out with a difficult task to accomplish—it must make a place for itself in competition with a considerable number of existing volumes, practically all of which are of good quality. In a list of twenty or so botanies which bear an imprint within the past ten years, differentiation is not so much the quality of scholarship and presentation as in the general design of the books, the phases of subject matter emphasized, and the extensiveness and intensiveness of the treatment.

The new Haupt stands almost certainly at or near the extreme of simplicity of treatment and limitation of scope, in keeping with its announced design for use in a one-semestral course in botany, or in one term of a year course in biology. It may be granted that the author has achieved his aim in some respects; the text is generally clear, almost purely descriptive; intensive treatment of any topic is rigorously avoided. At the same time the general facts of plant structure and nutrition, reproduction, classification, and genetics are adequately and accurately covered in their bare essentials. The illustrations are of high quality, with many photographs and drawings by the author.

While undoubtedly there are not a few classes and institutions where such a restricted text will be welcome, the reviewer believes that a college botany text should make more demands upon its readers, and offer guidance to the ambitious student to go beyond the volume in hand. There are no bibliographies in this volume. Also, some use of the heuristic method, so carefully worked out in the Sinnott, might well have been made. The McGraw-Hill Co., has certainly issued the two extremes of thoroughness of treatment, in the Haupt at one end, and the Hill, Overholts, and Popp at the other.

* Haupt, Arthur W. An introduction to botany. McGraw-Hill, 1938. $3.00.

## Cryptogamic Botany*

R. C. Benedict

Under a title reminiscent of the 19th century, "Cryptogamic botany," Gilbert M. Smith has published a comprehensive and detailed study of the morphology and life histories of representative Thallophytes, (excepting the Bacteria) Bryophytes, and Pteridophytes. In its wide range and scholarly quality, the text is an important contribution to the field of botany. While no attempt has been made to be exhaustive for the various subgroups, important types are very adequately dealt with. Each chapter has an excellent and detailed bibliography.

In the discussion of the algae, as might be expected from Dr. Smith's long research in this group, the most original and radical treatment is found. It is proposed that the old catch-all division of Thallophytes be broken into seven phyletic groups or divisions of algae, and two others, to include the fungi, and slime moulds. These nine divisions are as follows: Chlorophyta, grass-green algae; Euglenophyta, euglenoids; Pyrrhophyta, cryptomonads and dinoflagellates; Chrysophyta, the yellow-green algae (diatoms, etc.); Phaeophyta, or brown algae; Cyanophyta, blue-green algae: Rhodophyta, red algae; Myxophallophyta, slime moulds; and Eumycetes, or fungi.

For such a breaking up of the heterogenous "Thallophyta" there is much to be said. It seems probable, however, that the mycologist would find equal basis for dividing the fungi into at least three coordinate divisions, and that questions will be raised as to the possible union of certain algae with some of the fungi, and the bacteria with the Cyanophyta. When it comes to the vascular plants, Smith is more conservative; he adheres to the older division into Pteridophytes and Spermatophytes, in spite of the evidence as to the unreliability of the seed habit as a basis of phyletic division. (Vide Eames, Vascular plants. 1936.)

* Smith, Gilbert M. Cryptogamic botany. Vol. I. $4.00; Vol. II. $3.00. McGraw-Hill, 1938.

## PROCEEDINGS OF THE CLUB

### Meeting of November 16, 1938

The meeting of the Torrey Club held at Columbia University was called to order by the first vice-president, Dr. Ralph Cheney, at 3:35 p.m. with 26 persons present.

The minutes of the meetings of October 19 and November 1 were adopted as read.

The following were elected annual members of the Club: Miss Lucille M. Joyce, 386 Bergen St., Brooklyn, N. Y.; Miss Mary Elizabeth Pierce, Brooklyn Botanic Garden, 1000 Washington Ave., Brooklyn, N. Y.

Miss Edith V. Folger, 21 E. Magnolia Ave., Maywood, N. J., and Miss Bertha Perlmutter, 4829 61st St., Woodside, Long Island, N. Y., were elected associate members.

The resignation of Mrs. Wanda K. Farr, Boyce Thompson Institute, 1086 N. Broadway, Yonkers, N. Y. and Dr. Samuel Kaiser, Biology Department, Brooklyn College, 80 Willoughby St., Brooklyn, N. Y., were accepted with regret.

The transfer of Miss Alexandra Kalmykov, 473 West 158th Street, New York, N. Y., from associate to annual membership was approved.

Dr. B. O. Dodge, Chairman of the Nominating Committee presented his report to the Club, the nominations being as follows:

(Vote for One)

| *President* | *1st Vice-President* | *2nd Vice-President* |
|---|---|---|
| A. H. Graves | R. H. Cheney | W. S. Thomas |
| P. W. Zimmerman | R. C. Benedict | J. J. Copeland |
| Sam F. Trelease | G. T. Hastings | Cornelia L. Carey |
| *Treasurer* | *Corr. Secretary* | *Rec. Secretary* |
| H. N. Moldenke | J. S. Karling | Miss C. Chandler |
| *Editor* | *Bibliographer* | *Business Manager* |
| R. P. Wodehouse | Mrs. E. H. Fulling | M. Levine |

| | |
|---|---|
| *Delegate to Council of N. Y. Academy of Sciences* | *Representative on Board of Managers, N. Y. Botanical Garden* |
| W. J. Robbins | T. E. Hazen |

(Vote for Four)

*Members of the Council*

| | |
|---|---|
| Mrs. G. P. Anderson | John M. Arthur |
| F. E. Denny | Alfred A. Gunderson |
| H. H. Clum | E. B. Matzke |
| W. J. Robbins | |

(Vote for Two)

*Representatives on the Council of the A. A. A. S.*

| | |
|---|---|
| John H. Barnhart | William Crocker |

The scientific part of the program consisted of reports by Mr. D. A. McLarty and Mr. Arthur B. Hillegas of the Botany Department of Columbia University.

Mr. McLarty reported on "The Identity and Relationship of Certain Species of *Pseudolpidium*."

"In 1892 Fischer reinstated Cornu's genus *Olpidiopsis* to its original status and established the genus *Pseudolpidium* to include small, Olpidiopsis-like, chytridiaceous parasites of various water molds which exhibit no adjacent cell in relation to their resting spores. Fischer described the zoosporangia of *P. saprolegniae* as being thin-walled and spherical or oval in shape in contrast to long-ellipsoidal or cylindrical zoosporangia as in the case of *P. fusiforme*. In each case he described a heavy-walled, spiny resting spore similar to the zoosporangium with which it was associated.

"In swollen filaments of *Achlya* obtained in November, 1937, zoosporangia of *P. fusiforme* were observed and a study of the life cycle and cytology of the species was begun. However, it was soon noted that dependent upon the conditions of growth it was possible to obtain in one culture all the types of sporangia mentioned above. The spiny sporangia proved to be thin-walled and germinated directly. Thick-walled, spherical, spiny sporangia similar to those described by Butler for certain species of *Pseudolpidium* were observed from time to time. To determine the relationships which exist between these structures culture experiments were begun.

"Using a micropipette a few zoospores were collected from a germinating fusiform sporangium and sown in sterile charcoal water in a petri dish containing a young culture of pure *Achlya*. Within twenty-four hours several fusiform sporangia appeared in the *Achlya* filaments. Each zoospore gave rise to a sporangium without fusions to produce a plasmodium.

"From this culture single sporangia were isolated and monosporangium cultures of the fungus were established. The primary infection of the pure *Achyla* culture resulted again in the production of a few solitary fusiform sporangia. However in the course of four or five days secondary infection took place and large swellings were formed in the filaments which contained many spherical to cylindrical zoosporangia varying in size over a large range. Finally many of the sporangia became spiny but germinated directly. Spherical, thick-walled, spiny resting spores were observed in cultures five days old.

"The various types of sporangia which Fischer described for his species are simply modifications of one form which seem to be dependent upon the amount of nourishment which the developing thallus can derive from the host. The "resting spores" which he described are zoosporangia which become spiny in accordance with the age and condition of the host. The true resting spore is spherical, thick-walled and spiny differing from that of *Olpidiopsis* only in the absence of the adjacent cell."

Mr. Hillegas spoke on the "Cytology of Endochytrium."

"The chytridiaceous form *Endochytrium* is a member of the Rhizidiaceae. The mature thallus consists of a typically flask-shaped, operculate zoosporangium and a well developed branched rhizoidal system. In addition to the evanescent sporangia thick-walled resting spores are formed.

"The sporangium develops as an enlargement of the germ tube. The protoplasm is at first hyaline, vacuolated and with large refractive globules. The refractive globules and vacuoles disappear giving rise to a uniformly granular protoplasm. These granules fuse to form the refractive globules of the zoospores. A wall is formed between the rhizoid and the sporangium at the granular stage. Nuclei are not found in the rhizoid and evidence indicates that the cytoplasm is withdrawn from the rhizoid into the sporangium preceding the formation of the wall.

"The cytology of *Endochytrium* has been traced from the zoospore through the formation of the zoosporangium and the resting spore. The nucleus from the zoospore migrates into the germ tube and at that point where migration stops the center of organization of the thallus is established. The resting nuclei possess a large ring-shaped nucleolus. The spindle is intranuclear with central bodies appearing at the poles. A large nuclear cap is associated with the zoospore nucleus. Cleavage of the sporangium is by progressive furrowing to form the uninucleate zoospores.

"Germination of the resting spore is reported here for the first time. On germinating it gives rise to a sporangium. The resting spore is a prosporangium with one or more nuclei.

"Michrochemical tests applied to the refractive substance of the zoospores, sporangia and resting cells indicate that this is a fat."

The meeting adjourned at 5:00 P.M. After the meeting tea was served in the mycology Laboratory.

CLYDE CHANDLER
Recording Secretary

## MEETING OF DECEMBER 6, 1938

The meeting of the Torrey Botanical Club held at the American Museum of Natural History on December 6 was called to order by the President, Dr. Alfred Gunderson at 8:15 P.M. Forty-two persons were present.

Dr. William S. Thomas briefly described the memorial service held on Long Mountain for the late Raymond H. Torrey.

All business of the Club was omitted so that more time might be devoted to the program of the evening which consisted of an illustrated talk by Dr. Thomas on the "Edibility of Mushrooms." After discussing the historical aspect of mushrooms and organic constituents the speaker pointed out that there is really very little nutrient value in mushrooms since 88% of them is water. Some vitamins are present. There are about 210 calories in a pound of mushrooms. As various colored slides were shown Dr. Thomas told how edible species can be distinguished from poisonous types. If mushrooms turn blue when cut, bite the tongue, or have a repulsive odor, they are to be avoided for table use.

The meeting adjourned at 9:45 P.M.

CLYDE CHANDLER
Recording Secretary

MEETING OF DECEMBER 21, 1938

The meeting of December 21 held at the New York Botanical Garden was called to order by the Corresponding Secretary, Dr. J. S. Karling. Twenty-three persons were present.

The minutes of the meetings of November 16 and December 6 were approved as read.

The following were elected annual members of the Club: Dr. Robert B. Gordon, State Teachers College, West Chester, Penn., and Mr. Leon Hervey, 2121 Grand Concourse, Bronx, N. Y. The transfer of Miss Louelle B. Conkling from associate to annual membership was approved.

The following were elected associate members of the Club: Mrs. Edith Bennett, 45 Pondfield Road West, Bronxville, N. Y., and Miss Blanche C. Mayhew, 144 S. 2nd Avenue, Mt. Vernon, N. Y.

The resignations of Mr. Louis S. Jaffe, 97 Chester Avenue, Brooklyn, N. Y.; Mr. Ludwig H. Grunebaum, 11 Brayton Road, Scarsdale, N. Y.; Mr. Oran B. Stanley, Colgate University, Hamilton, N. Y.; and Dr. Flora A. Haas, Arkansas State Teachers College, Conway, Ark. were accepted with regrets.

The resignation of the following associate member was also accepted with regret: Mrs. Robert C. Hill, Palisades, Rockland Co., N. Y.

The death of Dr. Charles P. Dring was reported.

Dr. H. K. Svenson was elected as an alternate for Dr. William Crocker who is a delegate to the American Association for the Advancement of Science but who is unable to attend the Richmond meetings.

The scientific program consisted of a lecture illustrated by lantern slides and motion pictures on "Recent Results of Growth Substance Research" by Dr. P. W. Zimmerman of the Boyce Thompson Institute for Plant Research, Inc.

"By means of lantern slides the work on growth substances was briefly reviewed and then recent findings were presented, under three headings as follows: 1. Extraction and identification of applied growth substances. 2. Effect of growth substances on storage organs. 3. Activation of chemicals with ultra-violet light.

"Three of the most important growth substances ($\alpha$-naphthaleneacetic acid, indoleacetic acid, and indolebutyric acid) were applied to plants in various ways and extracted, tested, and identified at later dates. After gladiolus corms had been treated they grew shoots and roots. The new organs were extracted 24 days after treatment and found to contain the substance. In general the extracts were tested for physiological activity and identified by the colorimetric test and X-ray diffraction patterns.

"Bulbs, corms, tubers and storage roots were induced to grow an abnormally large number of roots from treatment with several growth substances. Phenylacetic acid was shown to break the dormancy of *Helianthus tubersosus* tubers, while naphthaleneacetic acid induced an abnormally large number of roots.

The *trans* form of cinnamic acid is not physiologically active but became active after treatment with ultra-violet light. Light changes *trans* to *cis* cinnamic acid which is the active form.

Plants treated with the *trans* cinnamic acid and then placed in the dark did not respond, but when placed in light made a pronounced physiological response. This indicates that the chemical is activated after it is applied to the plant.

"The lecture closed with time-lapse motion pictures showing plants responding to growth substances. The most striking was, perhaps, the Kalanchoe plant showing treatment of a part of the stem with growth substance which induced roots to grow from the treated region."

The meeting adjourned at 5 P.M.

CLYDE CHANDLER
Recording Secretary

THE ANNUAL MEETING—JANUARY 3, 1939

The annual dinner of The Torrey Botanical Club was held at the Men's Faculty Club of Columbia University on January 3 at 6 P.M. The business meeting was called to order at 7:10 P.M. by President Gunderson with 58 persons present.

The minutes of the meeting of December 21 were adopted as read.

Mrs. Mary Holtzoff, 557 West 148th St., N. Y. C. and Sr. J. P. Carabia, Vedado, Habana, Cuba, (associate member), were elected to annual membership.

Mr. Adolph Henning, 421 Hillside Place, South Orange, N. J. and Miss Anna Harvey, 71–27, 65th Street, Glendale, Long Island were elected associate members of the Club.

The resignation of Prof. Charles P. Smith, Route 1, Saratoga, Calif. was accepted with regret.

After the annual reports of the officers and committee chairman of the Club an open discussion was held on how the meetings of the Club might be made more interesting to the members.

The result of the election of new officers by ballot, reported by the Corresponding Secretary, Dr. J. S. Karling, was announced. The list of officers appears on the inside front cover of this issue of Torreya.

Dr. Alfred Gunderson as retiring president of the Club very ably revived the idea of the importance of an outdoor university stressing the fact that laboratory work should not be the beginning of a study of botany but should supplement field work.

The meeting adjourned at 8:25 P.M.

CLYDE CHANDLER
Recording Secretary

## MEETING OF JANUARY 18, 1939 AT THE NEW YORK BOTANICAL GARDEN

The meeting of the Torrey Club was called to order at 3:30 P.M. by the Corresponding Secretary, J. S. Karling. Twenty-six persons were present. Since neither the President nor the Vice-Presidents were present Dr. Karling was elected Chairman of the meeting.

The minutes of the meeting of January 3 were read and after certain deletions were adopted by the Club.

Miss Gertrude Moodey, 603 Watchung Ave., Plainfield, N. J. and Dr. William Brown, Botanical Laboratory, Johns Hopkins University, Homewood, Baltimore, Md., were elected to annual membership.

Dr. Ray J. Davis, Department of Botany, University of

Idaho, Southern Branch, Pocatello, Idaho, was elected an associate member.

The following resignations were reported: Annual: Mr. G. Russell Fessenden, 5130 Connecticut Ave., Washington, D. C.; Mr. Henry O. Severence, University of Missouri, Columbia, Mo., and Mr. Abraham Rabinowitz, 610 West 163rd St., New York, N. Y. Associate: Miss Mabel Foellner, Ferndale, Penn. and Miss Francis Johnston, 10 Mitchell Pl., New York, N. Y.

Dr. Harold N. Moldenke read an excerpt from a letter received from Alexander W. Burkhardt which follows:

"For the information of the Torrey Botanical Club Members you might report that there is now $313.25 on deposit for the Raymond H. Torrey Memorial Fund at the Bank for Savings, 280 4th Ave., New York City. Of this sum your members have contributed $118.50. The balance $194.25 with the exception of a few small contributions has all been donated by members of the Green Mountain Club. Checks are still coming in, only yesterday I received six dollars. Several G. M. C. members have pledged money which I should receive during the next few weeks."

It was voted that the meeting of February 15 be held at the Brooklyn Botanic Garden.

The President announced the committees for the coming year. They are given on the inside back cover of this issue of Torreya.

The scientific part of the program consisted of reports on: (1) the study of the development and differentiation of the mega- and microsporangia of *Regnellidium diphyllum* by Dr. M. A. Chrysler of Rutgers University and (2) The Study of the Male and Female Gametophytes of *Regnellidium diphyllum* by Mr. N. L. Higinbotham.

The speaker's abstracts follow:

"The work here reported continues the study of material of *Regnellidium* which was put into the writer's hands after the death of Dr. D. S. Johnson. Stages in the development and differentiation of the mega- and microsporangia were traced, and the shape of the apical cell has been determined. The formation and behavior of the tapetum was described, especially its rôle in building the remarkable epispore of the megaspore wall. The spores of the three genera of Marsilleaceae were compared."

"*Regnellidium*, an aquatic fern found only in Brazil, is a monotypic genus of the Marsilleaceae. A study of the two gametophytes has shown them to be essentially like those of the other two genera of this family, *Marsilea* and *Pilularia*. However, a unique feature in the male gametophyte of *Regnellidium* is the formation of a second prothallial cell in the same manner as the first, i.e., by an unequal division of the large central cell. The male gametophyte at maturity consists of two prothallial cells, and two antheridia, each antheridium having three wall cells and sixteen sperms.

"The female gametophyte differs from those of *Marsilea* and *Pilularia* in that the archegonium wall at the time of fertilization is composed of two layers of cells rather than one.

"The gametophytes attain maturity in about 16–22 hours."

Clyde Chandler
Recording Secretary

## NEWS NOTES

Dr. Will S. Monroe, at whose home at Couching Lion Mountain, Vermont, members of the Torrey Club have often been entertained died on January 29 at the hospital at Burlington in his seventy-sixth year. Professor Monroe was widely known as a writer and lecturer. He was for some years professor of psychology at Massachusetts State Normal School and later at the New Jersey State Normal School at Montclair. He gave courses of lectures at Columbia and at the University of Vermont. In 1918 he went to France as a member of President Wilson's peace inquiry commission. In 1925 he retired from teaching, but the following year gave lectures at the University of Sofia in Bulgaria. He built the Monroe Skyline, a section of The Long Trail of the Green Mountain Club, extending from Winooski Gorge to Middleburg Gap, a distance of forty-eight miles.

Dr. Ivan C. Jagger, plant pathologist of the U. S. Department of Agriculture, died in San Diego, California, on February 17. Dr. Jagger had worked on developing disease resistant fruits and vegetables in the Imperial Valley of California. He was born in Palmyra, N. Y. and graduated from Cornell University in 1911. Before he began his service with the Department of Agriculture he was an assistant professor at the University of Rochester.

J. Francis Macbride, associate curator of the herbarium of the Field Museum, Chicago, has returned from several months' work in herbaria of Geneva and Florence to the Paris Jardin des Plantes where he makes his headquarters. He has been in Europe for ten years making photographs of type specimens of plants for the Museum. The 1,500 negatives he recently sent the museum bring the total in the collection to about 36,000. Prints from these are made at cost for botanists and institutions all over the world.

A MONUMENT to a flower. In Toulouse, France a monument has been erected to the chrysanthemum and to Captain Bernet who was the first to develop it in France. Born in 1776, Bernet served in the Napoleonic wars, but after retiring from the army, became an expert horticulturist.

AT THE International Flower Show in the Grand Central Palace, New York, in March the New York Botanical Garden arranged a display of some 150 varieties of Begonias from their large collection. The Journal of the Garden for March contains a description of each species and variety exhibited.

IN A news note in Torreya for January–February, 1938, there was a comment on the second annual report of the Botanical Garden of Huntington College, Indiana. The third report just received lists nearly six hundred species of flowering plants, ferns and trees, mostly natives of Indiana, growing in the garden. An interesting feature of both reports is the series of observations on the growth of plants that have been removed to habitats quite unlike their natural ones. Among them are Sweet Flag, *Acorus calamus*, Water Hemlock, *Cicuta maculata*, Marsh Marigold, *Caltha palustris*, and Water Willow, *Decodon verticillaris*, that are growing well in dry uplands three years after transplanting from the swamp.

LICHENS of the New York area. In this number of Torreya there is printed an article on certain lichens of the New York area. Mr. Nearing has in preparation a series of articles that will cover all the lichens commonly found in the region, with illustrations of the type accompanying this article. If published these will occupy a considerable part of Torreya for at least the next ten numbers. Before publishing the whole series the editor and Mr. Nearing would like to know if readers of Torreya will find such a series valuable.

# THE TORREY BOTANICAL CLUB

Contributors of accepted articles and reviews who wish six gratuitous copies of the number of TORREYA in which their paper appears, will kindly notify the editor, when returning proof.

Reprints should be ordered when galley proof is returned to the editor. George Banta Pub. Co., Menasha, Wisc. have furnished the following rates:

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# OTHER PUBLICATIONS

OF THE

# TORREY BOTANICAL CLUB

## (1) BULLETIN

A journal devoted to general botany, established in 1870 and published monthly, except during July, August, and September. Vol. 65, published in 1938, contained 692 pages of text and 35 full page plates. Price $6.00 per annum. For Europe, $6.25.

In addition to papers giving the results of research, each issue contains the INDEX TO AMERICAN BOTANICAL LITERATURE—a very comprehensive bibliography of current publications in American botany. Many workers find this an extremely valuable feature of the BULLETIN.

Of former volumes, 24–65 can be supplied separately at $6.00 each; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Single copies (75 cents) will be furnished only when not breaking complete volumes.

## (2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–18 are now completed. Volume 17, containing Proceedings of the Semi-Centennial Anniversary of the Club, 490 pages, was issued in 1918, price $5.00.

Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

Volume 19, no. 1, 92 pages, 1937, price $1.50. Volume 19, no. 2, 178 pages, 1938, price $2.00.

(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

HAROLD N. MOLDENKE,
New York Botanical Garden,
Bronx Park,
New York. N.Y.

Volume 39 May-June, 1939 Number 3

# TORREYA

A Bi-Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

GEORGE T. HASTINGS

John Torrey, 1796-1873

CONTENTS



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# THE TORREY BOTANICAL CLUB



## MEMBERSHIP

All persons interested in botany are invited to join the Club. There are four classes of membership: *Sustaining*, at $15.00 a year; *Life*, at $100; *Annual*, at $5.00 a year and *Associate*, at $2.00 a year. The privileges of members, except *Associate*, are: (a) To attend all meetings of the Club and to take part in its business, and (b) to receive all its publications. Associate Members have the privilege of attending meetings and field trips and of receiving the Bulletin of the New York Academy of Sciences.


TORREYA is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, thirty cents. To subscribers elsewhere, twenty-five cents extra, or the equivalent thereof. Postal or express money orders and drafts or personal checks on banks are accepted in payment. Subscriptions are received only for full volumes, beginning with the January issue.

Claims for missing numbers should be made within 60 days following their date of mailing. Missing numbers will be supplied free only when they have been lost in the mails.

Reprints will be furnished at cost prices. All subscriptions and requests for back numbers should be addressed to the Treasurer, Harold N. Moldenke, New York Botanical Garden.

Matter for publication, and books and papers for review, should be addressed to GEORGE T. HASTINGS
2587 Sedgwick Ave.,
New York, New York

TORREYA

Vol. 39 May–June, 1939 No. 3

## Guide to the Lichens of the New York Area—Part 2

G. G. Nearing

Group 4. Lichens more or less stalked, but the stalks and branches (or lobes) having the structure of the Papery Lichens (Groups 5 to 12), showing an upper and an under side different in texture and usually in color.

Some members of this group could easily be placed in Group 5, but in the main, their appearance is intermediate between the Stalked and the Papery Lichens, and they pass between the preceding and following groups in a sort of sequence. The lines of separation, however, between Group 4 and Groups 5 and 6, are arbitrary, not natural. It is simply more convenient to treat them as three groups than as one.

*Evernia prunastri.* Flabby Lichen

Also called *E. thamnodes* or *Letharia thamnodes.*

Evernias are found plentifully in the Catskills and Shawangunks, but seldom on the lower ridges. They vary considerably in form. *E. prunastri* looks like a wilted Ramalina, gray-green or straw-color, and more or less hanging from twigs and branches of trees, or plastered against their bark. It may grow to 10 cm. or more in length, and the wider parts of the branches spread to 5 mm. or more. The upper or outer surface is ridged, and roughened with warty soredia, and with small coral-like outgrowths which often give it a slightly fuzzy appearance, suggesting *E. furfuracea.* The under side is not always apparent, but by looking carefully, parts of the flattened stalk will be seen to have patches of pale, silky under-surface, with ribs and net-like veins, but not roughened.

Fruits, almost never seen, would be brown, cupped disks along the branches, and up to 7 mm. across. Spores, undivided, 5 to 7 by 3 to 4 microns.

*Evernia prunastri* was once used by the Egyptians in making bread. There is some question whether the plant in the New

York highlands is the same as either *E. prunastri* or *E. thamnodes* of Europe, but Muhlenberg applied the present name, which therefore has the sanction of long use. It is not likely to be confused with any lichen except Ramalina, from which it contrasts in the lax, cottony structure inside, that of Ramalina being firm and dense, and drying somewhat like noodles. *E. furfuracea* and *E. Cladonia* are more rigid, and have none of the yellowish tint usually seen in *E. prunastri*. The pointed tips distinguish it from nearly all members of Group 4, and all of Group 5.

*Evernia furfuracea*. SPROUT LICHEN.

Some botanists include this species in Parmelia (Group 5) and forms of it appear to belong there, for it varies greatly. On high mountains its whitish or silver-gray tufts, blackening at the base, reach a length of 15 cm. or more, while main stalks often spread 1 cm. wide. The under side is almost pure white near the tips, but browned or blackening in older parts, and marked with a net-like pattern of raised veins which blacken first. The outstanding character of *E. furfuracea* is a multitude of tiny "sprouts" usually less than 1 mm. long, standing out along the margins like broken teeth of a saw, while either scattered or densely massed over the upper surface of the stalks may be granules or tiny coral-like growths, giving a characteristic fuzzy appearance. The stalks fasten themselves at various points to the bark or wood, as Papery Lichens do, but the branches usually stand out nearly horizontally, 2 to 5 cm. or more from the foothold.

Fruits, very rare, are brown disks along the margins, up to 15 mm. across. Spores undivided, colorless, 5 to 8 by 3 to 5 microns.

Typical *E. furfuracea* can be distinguished from typical *E. prunastri* and *E. Cladonia* by a glance at the illustrations. Some smoother forms might be mistaken at first sight for the much more common *Parmelia physodes* and its close relative *P. vittata*, but the tips of these Shield Lichens are slightly swollen and often brown beneath, while those of the Evernia are white beneath, and paper-thin. The color and texture of *E. furfuracea*, especially in forms with dense, coral-like surface growth, suggest *Cetraria aleurites* (*Parmeliopsis aleurites*) (Group 5), which however keeps its small tips lying close against the bark or wood, and so should not cause confusion.

*Evernia Cladonia.* ANTLER LICHEN.

Also called *Parmelia Cladonia* or *Evernia ceratodes* var. *Cladonia.* This Tuckerman considered a variety of *E. furfuracea*, but its typical forms look very different, resembling at first glance the Reindeer Mosses. It grows gracefully and profusely on branches and twigs of trees high in the Catskills, intermingled with *Parmelia physodes.* The growth, somewhat like a deer's antler, spreads and rises 3 to 4 cm. from the holdfast. On the main stalks, which are about 1 mm. in thickness, smooth and at times nearly round, a careful search will always show portions flattened and grooved with characteristic pale or blackening under-surface as in *E. furfuracea*, but rarely will any teeth, granules or coral-like growths be seen. Tips may be sharp pointed or more or less flattened. The general color is gray, but there may be a greenish tinge. All these characters vary enough so that occasional forms might be called either *E. Cladonia* or *E. furfuracea.* Fruits and spores, indistinguishable from those of *E. furfuracea*, are equally rare.

*Evernia Cladonia* can hardly be confused with any other lichen. The upward-pointing, smooth and often rounded branches distinguish it from *E. prunastri*, the presence of differently colored under-surface from Ramalina. From *Cladonia furcata* and *C. rangiferina*, which it resembles slightly, but which grow on the ground, it can always be distinguished by the fact that it grows only on trees and wood.

*Physcia leucomela.* BLACK-AND-WHITE LICHEN.

Also called *Physcia leucomelaena* or *Anaptychia leucomela.* It is unlikely that this southern species will be found in the New York area, yet it has been collected as far north as Albany, and may be again. Its dense, tangled tufts, as much as 10 cm. across, may be looked for on tree-bark, where, except for color, they suggest Usnea. The whitish or gray stalks, however, with straggling black hairs along their edges, distinguish it at once. There is a definite white under side to the flattened stalks, with a suspicion of down on it, and the edges curl downward. There is a tendency, rare in lichens, for the hairs to stand nearly opposite along the stalks, though in some specimens this is hardly noticeable. Stalks and branches are of fairly uniform width, up to 2 mm., and the blunt tips are commonly bare of hairs.

Fruits, exceedingly rare in the north, on tips of branches, gray, with a whitish bloom, or nearly white, as much as 6 mm. across, with a ragged rim. The spores have a blackish tint characteristic of Physcia, and are plainly divided into two cells. Size 35 to 55 by 16 to 25 microns.

Most Physcias are stalkless Papery Lichens (Group 8), all easily separated from similar forms by the blackish, two-celled spores. They differ from *Parmelia* and *Cetraria* in the color of their fruits, which is never chestnut brown, but usually slate-gray or blackish, with a gray or white bloom, and dull rather than shining. In cases such as *Physcia leucomela*, where fruits are not expected, the shape and color of the lichen must determine it, and in this case they are sufficient.

*Physcia ciliaris.* FRINGED LICHEN.

Also called *Anaptychia ciliaris*. Much like P. leucomela, but found only north of the New York area. It differs in growing on rocks or soil rather than tree-bark, in its usually darker color, and in a tendency of the hairs to remain pale instead of blackening. As it is hardly ever found south of Canada, there is no need of describing it in detail.

*Physcia comosa.* BELL LICHEN.

Also called *Anaphtychia comosa*. Another species rarely seen, but to be looked for on tree-bark. It is pale greenish gray. Though its stalks will seldom exceed 2 cm. in length, they broaden to as much as 2 mm. at the forks, and the hairs which border them are usually short and inconspicuous. The stalks, branches and tips look somewhat swollen, as do many Physcias (BLISTER LICHENS). The most distinctive character is the bell-shaped fruit, unique among local lichens. The stalk behind the fruit has a globular swelling, while the papery rim distends like the mouth of a bell.

Only a few lichens have hairs along the margins of stalks or lobes. Beside the Physcia species just described, the chief of these are: *Physcia hispida* (Group 8), *Cetraria ciliaris* (Group

4), *Parmelia perforata* and its near relatives (Group 6), all larger, broad-lobed lichens except *P. hispida* (*P. ascendens*), which does resemble *P. comosa* at first sight, but has tips swollen into large, whitish blisters, bursting outward, while the fruits grow on the upper surface of the lobes, not on the tips, and are not bell-shaped.

The hairs referred to must not be confused with the rather similar growths which spring from the under surface of many lichens, but which are root-like holdfasts. The hairs which in those few species fringe the edges of stalks and lobes, do not appear to be used for anchoring the lichen.

*Cetraria islandica*. Iceland Moss.

This is probably the most important of all lichens, long used in northern countries both for fodder and for human food. Though in the north it covers acres of otherwise barren ground, only a few scattered colonies are known in the New York area, on the Long Island coast, at the highest points of the Shawangunks, and occasionally elsewhere, mostly at high altitudes. Growing on the ground, *Cetraria islandica* (pronounced icelandica) forms tangled masses, usually about 5 cm. high, but sometimes twice as large, of shining brown, strap-shaped stalks and branches, commonly about 2 mm. but sometimes 1 cm. wide. These curl, especially in drying, so that the upper surface becomes a trough, the margins smooth or bordered with rather uniform spines 0.1 mm. or so in length. While the upper surface is not conspicuously different from the under, it is usually darker brown, sometimes almost black, and more shining. The under surface may show occasional wrinkles and channels, also tiny pits or round patches of gray soredia less than 0.3 mm. across.

Fruits rarely found so far south, are borne on enlarged tips, dark brown, oval or becoming irregular with age, up to 1 cm. and more across, the rims toothed. Spores simple, colorless, 5 to 11 by 3 to 6 microns.

So distinct is *Cetraria islandica* that no other ground lichen could be mistaken for it, except perhaps *C. hiascens*, for no other local upright species that grows on soil is shiny brown. This color, with the spiny margins, should serve for complete identification.

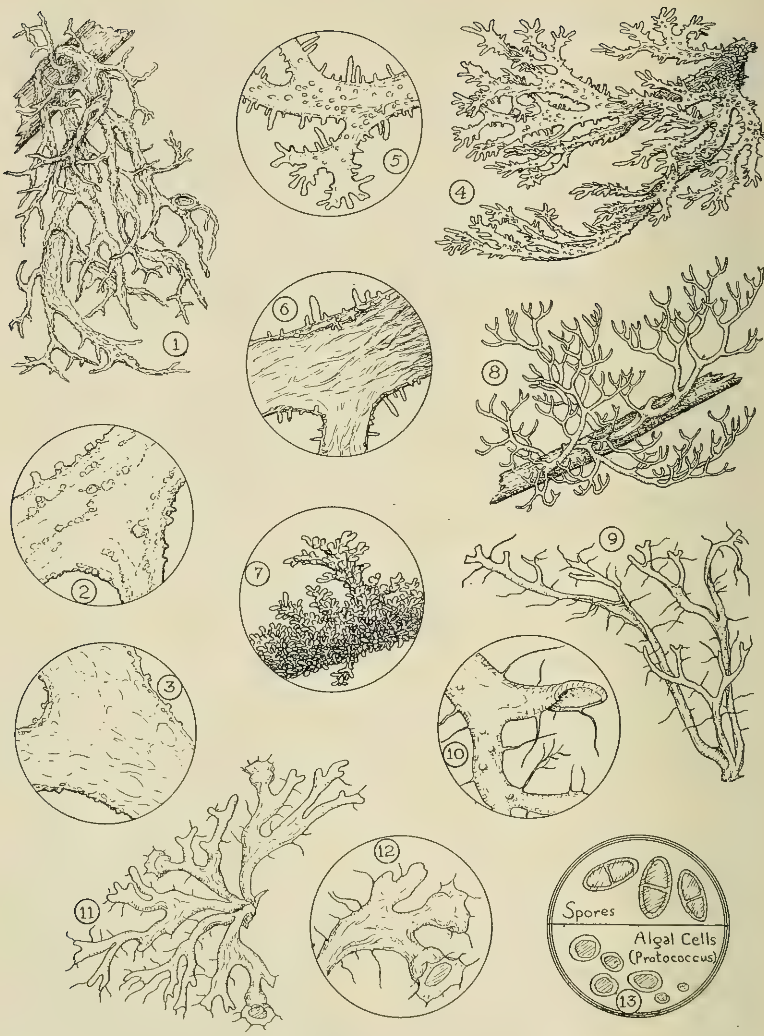


PLATE 3

Fig. 1. *Evernia prunastri*, greenish or yellowish gray.
Fig. 2. *E. prunastri*, upper surface showing warty soredia.
Fig. 3. *E. prunastri*, under surface showing delicate veining
Fig. 4. *E. furfuracea*, white, older parts blackening.
Fig. 5. *E. furfuracea*, tips showing sprouts and granules.
Fig. 6. *E. furfuracea*, under surface, showing darkened veins.
Fig. 7. *E. furfuracea*, older portion with coral-like growths.
Fig. 8. *E. Cladonia*, pale gray.
Fig. 9. *Physcia leucomela*, whitish with black hairs.
Fig. 10. *P. leucomela*, detail and section showing downward curled margin.
Fig. 11. *P. comosa*, pale gray with short hairs.
Fig. 12. *P. comosa*, showing bell-shaped fruits.
Fig. 13. *P. comosa*, spores 2-celled and blackish.

*Cetraria hiascens.* Cleft Lichen.

Mentioned doubtfully, as it is not likely to be found within the area, but may grow under the same conditions as *C. islandica.* Its hue is paler brown or straw-color, and the manner of branching less complicated, but the distinguishing feature is seen in the tips, which, unlike the blunt branches of *C. islandica,* split into many fine, pointed divisions, giving an appearance more like the Reindeer Mosses (Group 2), but easily distinguished because the stalks are flat, and not hollow. As the under surface, though structurally different from the upper, does not appear so, it could be confused with *Ramalina calicaris* (Group 3), except for the fact that it grows on the ground, the Ramalina on trees.

The species of Cetraria (Shield Lichen) which follow are often not actually stalked, but rise from their holdfasts by folds and wrinkles of their papery lobes, and are therefore closely akin to the Papery Lichens. Still other species of Cetraria which do not rise much above the foothold, will be found under Papery Lichens in Group 5, with Parmelia (also Shield Lichen). Though it is not always easy to differentiate these two kinds of Shield Lichen, *Cetraria* tends to raise its margins at least from the foothold, while Parmelia tends to lie more flat against it. The fruits of Cetraria spring from the edge of the lobe, while those of Parmelia lie on the upper surface, usually toward the center. Cetraria fruits have usually toothed or warty rims, while the rims in Parmelia are nearly always smooth. Both Cetraria and Parmelia have small, undivided, colorless spores, which distinguish them from most other Papery Lichens, Sticta, Peltigera, Nephroma, Solorina (Group 7), Physcia (Group 8), Teloschistes, Caloplaca (Group 9), Collema (Group 11).

*Cetraria juniperina.* Cedar Lichen.

Also called *C. viridis.* A frequent lichen in the pine barrens, and seen around upland bogs and ridges, growing on twigs and bark of White Cedar, or on other trees and wood. It forms a tuft of considerably divided papery lobes, wrinkled, pitted, veined, and the margins waved and crinkled. It will spread 5 cm. or more across, and rise 1 or 2 cm. from the foothold. The color may be olive green when wet, or yellow to greenish gray when dry, sometimes edged with bright yellow dust (soredia). The under side is yellow or at least distinctly yellowish, silky and veined. The margins are often thickened and studded with raised blackish granules, which may also spread over the upper surface.

Fruits form on the margins, but so complicated is the structure that they may appear to cap irregular tubes thrust up from the center. The cupped or flat disk, up to 5 mm. across, may be smooth or wrinkled, chestnut brown, shining, and the rim broken, or toothed. Spores undivided, colorless, 4 to 8 by 4 to 5 microns.

*Cetraria juniperina* is conspicuous by its yellow under surface and yellow soredia, which distinguish it from other Papery Lichens in the New York area. The shade is never orange-yellow like *Teloschistes parietinus* or other members of Group 9, but rather a bright sulphur or bright greenish lemon yellow. No other local Papery Lichen which lifts itself from the foothold has a yellow under surface. It can be confused only with *C. pinastri* (Group 5), a closely related species, often considered a flat variety of it, found in the mountains and commonly on rocks. *C. pinastri* rarely or never fruits. *Sticta crocata* (Group 7) has dusty yellow sorediate margins, but a brown under surface.

*Cetraria ciliaris*. Tendril Lichen.

Also called *Nephromopsis ciliaris*. Grows somewhat larger than *C. juniperina*, and is found with it on the bark or twigs of trees in pine barren swamps or upland bogs, or on fence-rails farther north. Tufts are sometimes 10 cm. across, but rise only 1 or 2 cm. from the foothold. The many crowded divisions, about 1 cm. across, spread outward, splitting into lobes with the margins much crinkled and again divided into smaller lobes, some not more than 1 mm. across. Along this complex margin, occasional black hairs will be seen, often not noticeable without a search. Numerous black granules are also usually set along the edge. The upper surface, greenish gray or sometimes brownish, is shallowly pitted in a net-like arrangement, or drawn into wrinkles, while a somewhat similar pattern on the whitish under surface is varied by root-like holdfasts, at first whitish. Older parts may brown and blacken.

Fruits, usually oval and up to 1 cm. across, appear along


PLATE 4

Fig. 1. *Cetraria islandica*, brown (olive green when wet).
Fig. 2. *C. islandica*, fruiting tip. Fruits chestnut brown.
Fig. 3. *C. hiascens*, a finely divided tip.
Fig. 4. *C. juniperina*. Upper surface greenish. Under surface yellow.
Fig. 5. *C. ciliaris*, greenish gray with marginal hairs.
Fig. 6. *C. lacunosa*, spores.
Fig. 7. *C. lacunosa*, showing net-like pattern of veins with pits between.
Fig. 8. *C. stenophylla*. A fragment showing narrow stalks.
Fig. 9. *C. glauca*, showing some margins dusted with soredia, others forming coral-like growths.
Fig. 10. *C. saepincola*, chocolate brown (dark olive when wet).
Fig. 11. *C. saepincola*, fruiting tip. Fruits chocolate brown.

the margin in such a way that some think they belong on the under surface turned upward, as in Nephroma (Group 7), a distinction which, even if true, seems hardly to justify the new genus Nephromopsis. Rims are toothed or warty. Spores undivided, colorless, 5 to 7 by 4 to 5 microns.

From the similar *C. lacunosa*, *C. glauca* and *C. stenophylla*, *C. ciliaris* can be distinguished by the marginal hairs. It has also a thinner substance, and more finely divided lobes. But these four species must be compared carefully to avoid confusion, as there are intermediate forms. *C. lacunosa* has the pitted surface more pronounced, and its fruits often show a conspicuous hole in the center. *C. stenophylla* has the lobes long and narrow. The under surface of *C. glauca* quickly turns shining brown and then black, its margins usually breaking into powdery white soredia or coral-like growths. The hair-margined *Parmelia perforata* and its relatives have much broader lobes which do not commonly divide smaller than 5 mm. across, and do not regularly rise high above the foothold. Other lichens with marginal hairs can be eliminated by a glance at the illustrations.

*Cetraria lacunosa*. LETTUCE LICHEN.

Commonly seen with *C. juniperina* and *C. ciliaris*, or rather more abundant than either on the highlands and in pine barren swamps, where its larger tufts on bark and twigs look like miniature lettuce. It may grow more than 10 cm. across, rising 2 or 3 cm. from the foothold. Lobes are often as broad as high, but with the margins usually more or less divided and crinkled. The net-like pattern of wrinkles with pits between is more pronounced than in any other species of this group. The substance is rather thick and stiff, like thick paper. The margins and often large areas of the surface are usually dotted with conspicuous black granules. The color varies from greenish gray to rather dark green or brownish (greener when wet, as in most lichens), while the under surface is characteristically white, but sometimes turning brown or jet black on the older parts. There are few or no visible holdfasts.

Brown fruits up to 1 cm. across, of round, oval or irregular shape, grow frequently close to the margins, but these clearly spring from the upper, not the under surface, and are sometimes seen on short stalks 2 or 3 mm. from the margin. Large fruits often have a hole in the center. The rim is usually rather smooth and thin. Spores undivided, colorless, 5 to 8 by 4 to 5 microns.

*Cetraria lacunosa* usually rises higher from the holdfast than its close relatives (discussed under *C. ciliaris*), but resembles them so closely that several points should be checked over. Hairs on the margin would make it *C. ciliaris* if narrow-lobed, or if broad-lobed, *Parmelia perforata*, a yellow under surface *C. juniperina*, white soredia on the margins *C. glauca* or a Parmelia, stalks and lobes all narrower than 5 mm. *C. stenophylla*. Other common lichens with conspicuous net-like pattern of wrinkling are *Parmelia saxatilis* and *P. sulcata* (Group 6) *Sticta pulmonaria* and *S. sylvatica* (Group 7), both larger and much less upright.

*Cetraria stenophylla*. Slender Shield Lichen.

Also called *C. lacunosa* var. *stenophylla*. Though differing from *C. lacunosa* in nothing except the narrow lobes, typical specimens are so distinct in appearance that they would be taken for a wholly different lichen. No one has attempted to say just how narrow *C. lacunosa* must be before it is *C. stenophylla*, so let us say arbitrarily that no stalk, branch or lobe of *C. stenophylla* should be anywhere wider than 5 mm.

Forms which appear to be *C. stenophylla* sometimes show characters belonging to *C. glauca*, such as white dusty (sorediate) margins, or coral-like growth. For these Tuckerman named also a var. *stenophylla* for *C. glauca*, but his solution is not satisfactory. The truth is, lichens do not always divide sharply into their different forms, but have intermediates in astonishing variety. Certain names therefore must be applied arbitrarily and with slightly indefinite limits, if we are to name these highly variable plants at all.

*Cetraria glauca*. Pale Shield Lichen.

Less common than related species, but to be looked for in similar places, on living trees or dead wood. The character for which it is named, a bluish gray (glaucous) color, appears also in *C. lacunosa*, which it resembles in many ways. Tufts may be 10 cm. or more across, but do not commonly rise more than about 2 cm. from the foothold. Lobes may be 2 or 3 cm. broad and often not much divided, with margins frequently breaking into dusty white soredia or extended into coral-like growths. A little of the under surface may be whitish near the tips, but it is more likely to be shining brown there, jet black farther down.

Fruits much like *C. lacunosa*, but somewhat larger, and without the hole in the center, occur very rarely. In their absence, *Cetraria glauca* can be mistaken for *Parmelia perlata* (Group 6), which also fruits rarely, but is of a darker color, larger size, with broader, simpler lobes, which though often margined with soredia, do not develop coral-like growths. *P. perlata* is commonly found on rocks, *C. glauca* on trees. If any marginal hairs are present, a lichen of this nature is almost surely *P. perforata*, which grows on trees. (For distinctions within this group, see *C. ciliaris*.)

*Cetraria saepincola*. CHOCOLATE SHIELD LICHEN.

This small species, rarely spreading more than 3 or 4 cm., or rising more than 5 mm. from the twigs and tree-bark on which it grows, has a characteristic chocolate brown color, sometimes shading to olive green or blackish, especially when wet, shared by few local lichens. It inhabits the Shawangunks and mountain crests to the north. When well developed, it forms loose, irregular, wrinkled tufts, like *C. juniperina* in miniature, but is often reduced to a few fruits clustered on a twig, almost no stalks or lobes visible. Even in larger forms, the lobes are rather simple, smooth and not intertangled. The under surface is paler brown.

Fruits, up to 4 mm. across, usually plentiful, are chocolate brown like the rest of the lichen, and seat tightly against the upper margins, with a slightly toothed rim. Spores undivided, colorless, 6 to 9 by 3 to 6 microns.

*C. fahlunensis*, (Group 5), with similar color, but longer lobes and few fruits, grows only on rocks. The only other brown papery lichen of comparable size on local trees, is the rather common *Parmelia olivacea* (Group 5) and its varieties or subspecies, usually olive-brown or brassy, lying flat against the bark, and seldom fruiting. It can be distinguished by its mostly black under surface. The brown lichens in Group 7, Sticta, Peltigera, Nephroma, and in Group 12, Umbilicaria and Dermatocarpon, are mostly much larger and wholly different lichens, none of them with the chocolate shade.

Groups 1 to 4 include all the principal Stalked Lichens which can be expected in the New York area, with the exception of a very few small and rare ones offering special difficulties. The last species of Cetraria are not exactly stalked, and there are included in the Papery Lichens (Groups 5 to 12) a few species perhaps comparable in form, as already noted. In Group 11 are some highly variable forms difficult to classify, and kept together because their algal parts, mostly Nostoc, give them a characteristic water-soaked or gelatinous appearance in shades of black, dark green, dark brown and blue-gray, very different from the greenish gray or yellow tints of most of the larger lichens.

RIDGEWOOD, N. J.

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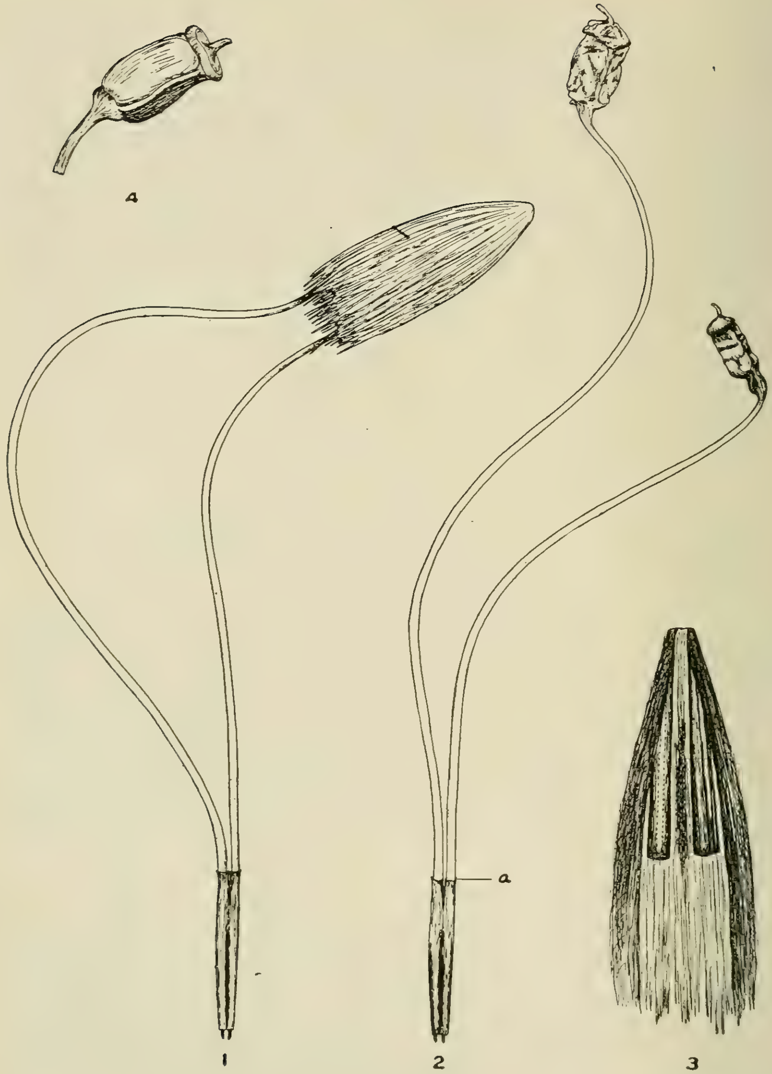
## An apparent double-sporophyte in Polytrichum commune L.

HENRY N. ANDREWS, JR.

Although the occurrence of abnormalities, such as "double-sporophytes," in the mosses is not common, judging from the accounts of the relatively few students who have concerned themselves with them, one would expect that more careful field examination of large numbers of individuals would bring to light more numerous cases. The relatively inconspicuous nature of the moss habit is probably the chief reason for the few cases on record.

Gyŏrffy (1934) and Schimper (1861) have described and illustrated double-sporophytes in several genera of mosses including *Orthotrichum*, *Homalothecium*, *Anomodon*, *Bryum*, *Brachythecium*, *Mnium*, and *Buxbaumia*. In all of these cases the two thecae have a common seta—division of the latter taking place well above its point of union with the gametophyte. The specimens described by these authors appear to have been collected when mature and after the calytra had been lost—at least there is no mention of the latter in their accounts. As will be shown below the calyptra may be of considerable significance in determining the true ontogenetic morphology of the teratological form in question.

The two most plausible explanations of this phenomenon are




*Polytrichum commune* L.

Fig. 1. Two sporophytes enclosed within an apparently single calyptra. (5×)
Fig. 2. The sporophytes after removal of the calyptra; *a*, point at which the archegonia were torn by the elongating sporophytes. (5×)
Fig. 3. The calyptra split longitudinally, showing the two calyptra-proper contained within the outer hairy covering. (7×)
Fig. 4. A normal mature theca. (5×)

as follows: doubling may arise either from the fertilization of two eggs contained within one archegonium: or two archegonia (or young sporophytes) may partially fuse during their early development. The second explanation is, as Schimper has pointed out, more likely and such is readily proved to be the case in the specimen described below.

*Polytrichum commune* L.

The specimen was collected by the author on the high open moorland in eastern Belgium about 10 kilometers north of Malmedy (in the province of Malmedy), Belgium, in July, 1938. It is now in the Herbarium of the Missouri Botanical Garden, St. Louis. (#1140623)

The two thecae were enclosed in what appeared to be a single calyptra and are shown in figure 1. One seta is somewhat shorter than the other and its theca is correspondingly diminutive (fig. 2). The sporophytes were not mature at the time of collection which accounts for the rather shrunken and wrinkled appearance of the young thecae after drying. Figure 4, a normal mature theca, has been included for comparison.

Examination of the setae has shown that the apparent fusion is quite superficial and actually involves only the basal portions of the old archegonia, the fringa at *a* (fig. 2) representing the point at which the neck was torn from the remainder of one archegonium.

The most interesting feature of the specimen, however, is to be found in the calyptra. Although slightly larger, it is externally quite similar in size and form to those enclosing normal thecae. Dissection of the calyptra, however, revealed the true nature of its origin beyond a doubt, for instead of a single calyptra-proper contained within the hairy covering, *two* are present (fig. 3). In this figure the hairy cover has been split open to the apex in order to show the distinctly unfused nature of the two calyptra.

The explanation of this phenomenon is then clear, and the apparent doubling undoubtedly took place as follows: two adjacent archegonia became superficially fused in the region of their venters; as the setae elongated and began to carry aloft their respective archegonial necks or calyptra the latter remained sufficiently close together to be enclosed by a common hairy covering. The growth of one sporophyte proceeded at a more rapid rate than that of the other resulting in their unequal size (shown in figure 2). Unequal growth of the setae starting at a very early stage caused them to become slightly separated and probably accounts for the fact that they have not taken part in the twinning.

It is to be hoped that more teratological specimens such as the particularly interesting cases figured by Schimper (1861) may be discovered at earlier stages in development in order that the true nature of those in which the setae are nearly or completely fused may be known.

The writer is indebted to Professor Armand Renier, Chief of the Mine Service of Belgium, and to certain other Belgian scientists, whose kind assistance made possible many collecting trips in that country.

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## Notes on taxonomic techniques

Lyman Benson

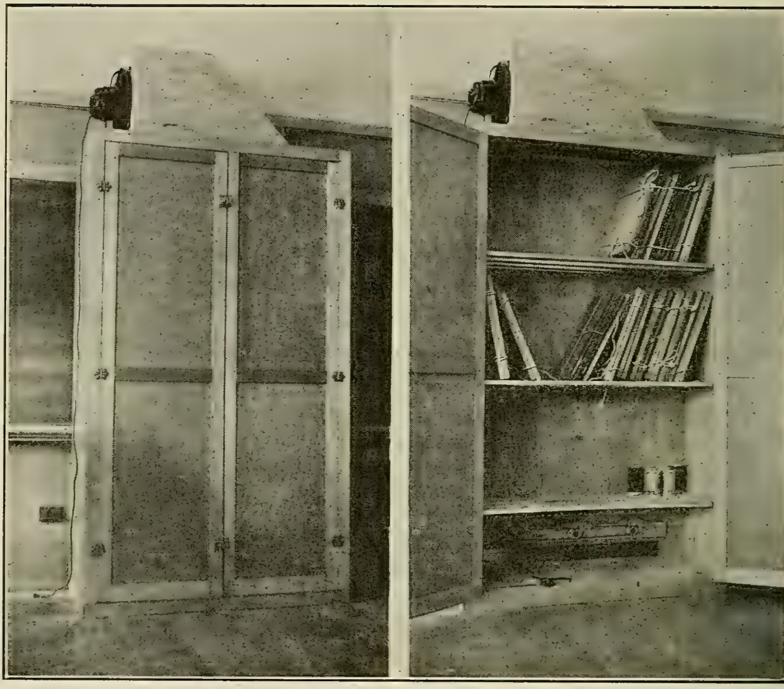
### I. Pressing and Drying Plants

*Salt*. Drying of succulent plants may be hastened and improved and mold may be discouraged by use of salt.

Extreme succulents such as cacti, the snow plant (*Sarcodes sanguinea* Torr.), *Pholisma*, or even some *Crassulaceae* may best be split with a knife (and a fork for cacti) and perhaps scraped or hollowed like a dug-out canoe and then *heavily* salted and placed in the open air for a time. After a few minutes or an hour a puddle of brine accumulates in the hollow. This should be drained off and then the plant may stay in the open air until visible water is about gone and the specimen has just started to curl. For many cacti this requires about 24 hours. After this preliminary drying, the specimen should be pressed in the usual manner. The crust of salt may be washed away later by sparing use of water, and redrying the specimen by pressing requires only a short time. Cactus flowers may be split and salted also. The use of salt not only speeds up drying of succulents, but also it makes possible almost perfect preservation of color. *Sarcodes sanguinea*, for example, retains its characteristic red, and cactus flowers retain their coloration.

Salt is useful also for drying even slightly succulent specimens. Sprinkling it over the uncut plant surface hastens drying in even such water-conserving halophytes as *Salicornia*, *Atriplex*, *Allenrolfia*, and *Frankenia*, or in corms or bulbs or thickened roots or stem bases. A few scalpel slashes on thick stems or roots help the drying process.

*Pressing and travelling*. Despite the disrepute of "collecting by the roadside," no one with true botanical blood in his veins can drive an automobile through miles of plants without stopping to get them. However, unless some means are available for drying the specimens the result is a sorry mess of brown or moldy plant corpses. In dry regions, a press arranged for the front bumper of the car overcomes the difficulty of dehydrating plants, provided the cardboards are turned so the air flows through the corrugations. It also amuses some travellers and amazes the rest. In the Western States about 50 each of cardboards and blotters will dry large collections, provided field work consists of intensive collecting in each of several localities for two or three day periods with considerable travelling in between stops. However, in the region of high humidity east of the Great Plains the method doesn't work.



Drying cabinet used for plant presses at Bakersfield Junior College, closed and open.

The 12 inch fan pulls air from the cabinet, the intake is at the bottom. Corrugations of the cardboards which alternate with blotters in the presses (now empty) are kept parallel to the air current.

*Heat or air circulation.* Despite the convenience and the satisfactory results obtained by drying plants above steam radiators, steam heat is rarely obtainable in Arizona or California and perhaps not often available elsewhere in the collecting season. While the writer taught at Bakersfield Junior College, California, the collections of about 30 students were dried each week from February until June, and one wooden cabinet 7 feet high by 4 feet wide by 21 inches deep was sufficient for curing the specimens. A fan was used to pull air through the cabinet, and the air change provided good specimens in 2 to 4 days. At the University of Arizona, good results have been obtained by directing the air current from a fan against the side of a press in an open room. The outstanding feature of drying by air change is color preservation, which makes the collections more attractive to students. Since drying by air currents is slower than drying by heat, liberal use of salt on plants with any tendency toward thickness or succulence is necessary to increase the drying speed and to eliminate molds.

Whether use of fans is practical in the East, Southeast, or Middle West is another question. Humidity is low at Bakersfield and in Tucson after the end of February, and maximum temperatures range from 70 to 90 and above in March and April, and from 80 to 100 or over in May. The combination of dry air and high temperature is ideal for plant drying, and the fan method is a good one at least for the Western States.

## II. Digging

Digging tools are variable, and each collector swears by his own type. Therefore, as one crank to another, the writer suggests the following: an ordinary box opener with a hammer end and a claw end (a trade name is Box Terrier). It is easy to carry, and it serves well for digging. Since there is a slight angle in the blade and the steel is strong and several millimeters thick, it is excellent, too, for prying rocks apart. The hammer end is useful for smashing rocks.

## III. Softening Dried Flowers

The following formula for a fluid of almost magic powers in softening flowers and other parts of herbarium specimens for study was called to the attention of the writer by Mr. Arthur L. Cohen. Only a drop of fluid and about 1 minute of time are required to restore the flexbility and softness of any ordinary thin dried plant part, and the results are more satisfactory than those obtained by the time-honored method of boiling the flower. Per 100 cc., use 65 cc. of water, 20 of 95 per cent methyl alcohol, and 15 of glycerine.

University of Arizona
Tucson, Arizona

## BOOK REVIEWS

### The World Was My Garden*

G. T. Hastings

This autobiography is also a history of the introduction of useful foreign plants into the United States and of the development of the Section of Foreign Seed and Plant Introduction, later the Division of Plant Exploration and Introduction, of the Department of Agriculture. A brief account of the author's boyhood in Michigan and Kansas, his college days, work as a plant pathologist in Washington and graduate study in Naples and Germany, leads up to his first trip to Java as a protege of Barbour Lathrop. Once in contact with the tropics and a multitude of new economic plants the Plant Explorer developed. The remainder and, much the greater part of the volume—one every lover of plants will read with delight—carries us around the world, east, west, north, south—seeing both strange and familiar plants and meeting plant growers in all lands. Many plants now familiar to everyone were strangers to this country when David Fairchild began his work of sending or bringing new plants home. Dates, avocados, mangos, papayas, new citrus fruits, flowering cherries, vegetables of many kinds, new wheats and barleys, fodder plants; plants for semitropical Florida and California, hardy plants for northern states; merely to list all the plants he was instrumental in introducing or improving would take more space than can be given to this review. He has enriched our agriculture and horticulture as few others have done. Dr. T. D. A. Cockerell in reviewing this book in Science states "his contributions to horticulture and thus to human welfare have been so great that he deserves to rank with those who have done most for the country and the world." The development of gardens in Florida, Georgia, California, North Dakota, Panama and near Washington, D. C. where new plants could be tested and from which they could be distributed is described. He says little of himself, much of those who helped in his work, but reading between the lines it is easy to see that the courteous friendly treatment he

* The World Was My Garden. David Fairchild. Charles Scribner's Sons. 1938. 494 pages, 130 plates. $3.75.

received from officials and growers in all parts of the world was due in no small measure to his enthusiasm and charm. But there are other interests that claim some attention: the first airplane flights of Glenn Curtiss and the Wrights that Fairchild witnessed with his father-in-law, Alexander Graham Bell; experiences in making enlarged photographs of insects (Monsters of our Back Yard) with a camera twenty five feet long; the development of the Journal of Heredity. Over 200 photographs, mostly of plants and their cultivation taken in many parts of the world by the author, add interest and beauty to the book.

## Diatomaceae of Porto Rico*

JOSEPH F. BURKE

This report, issued as a part of the Scientific Survey of Porto Rico and the Virgin Islands, is an important contribution to the literature on North American diatoms. The work of the author was greatly facilitated by the personal possession of a nearly complete library on the diatoms and by the ownership of a collection of about 17,000 diatom slides. Thus equipped as few students have the good fortune to be, and with a broad experience in the critical use of the microscope, it was particularly fortunate that the late Dr. Nathaniel L. Britton invited him to undertake this part of the Survey.

In the Introduction he writes that nearly three hundred collections were made during the years 1926, 1928, and 1929. The cleaning and subsequent treatment of these collections were handled personally by Mr. Hagelstein with equipment used for that purpose only, a detail very important in the regional study of diatoms to avoid contaminations; it shows the thoroughness with which the research was carried on.

A summary is given of previous work, by others, in the area covered by the Survey. The richness of the flora is commented on, with attention called to the interesting flora of the thermal springs near Coamo and Ponce. Species usually considered marine or brackish-water forms were found in apparently fresh water. This feature is discussed. A number of plankton gather-

* The Diatomaceae of Porto Rico and the Virgin Islands. Robert Hagelstein. Scientific Survey of Porto Rico and the Virgin Islands, Volume VIII, Part 3. New York Academy of Sciences. 1939. 138 pp., 7 pl. $2.00.

ings were made and it was found that a planktonic flora of some extent existed.

The taxonomic arrangement is a strictly alphabetical one, by genera and by species. Eighty-four genera are included; species and varieties number over nine hundred. This is the most extensive publication on North American Diatoms since the monographic work of Charles S. Boyer, "Synopsis of North American Diatomaceae," published in 1927. It is an important supplement thereto, adding many new records to the North American flora. In naming new species and varieties the author has been moderate, an attitude which will benefit all who study this difficult group.

A feature of the report is the thoroughness with which the Bibliography is compiled. In this work Mr. Hagelstein had the active co-operation of an outstanding authority, Dr. John Hendley Barnhart, of the New York Botanical Garden. Citations are taken directly from the original papers, thus errors that may have arisen in the printed citations of other authors are avoided. In giving the full names of the authors and the years of birth and death, except in a few instances, the bibliography becomes an important source of reference to diatom students everywhere. Even those not primarily interested in the area dealt with in the report, will find this section of the utmost value.

In recent times there has been a distinct trend toward illustration of diatom reports by photomicrographs. When accurately executed, a drawing leaves little to be desired. A good photomicrograph is preferable to a poor drawing for it retains the general character of the diatom. Depth is lost with increased magnification and resolving power, but usually a plane can be selected that will show the more important characters. Many of the forms figured in this report are very difficult to photograph. The figure of *Pleurosigma portoricense* Hagelstein, beautifully resolved into puncta, should act as a fresh incentive to ardent microscopists who seek to try their skill against the diatoms most difficult to resolve.

Mr. Hagelstein has chosen to illustrate, in addition to the new species and varieties he has named, those forms of other authors which have been inadequately figured or where the figures appear in publications inaccessible to the general student. The process by which the plates are reproduced is full-tone collotype, making it possible to examine with a magnifying glass the finer structure caught by the camera but not at once evident to the unaided eye.

## Edible Wild Plants*

G. T. Hastings

David Fairchild, in concluding his book The World Was My Garden, says "anyone who will sincerely try can learn to enjoy almost any food." While he was journeying around the world sampling the foods of all peoples, Oliver Medsger has been roaming meadows and woods plains and mountains sampling the native plants that have been or can be used for food. And he has found them good and still adds to his enjoyment of outdoor life by the wild foods he finds. The book in which he records his own experiences as well as information he has gathered regarding the food plants used by the Indians, early settlers, hunters and campers is divided into sections,—wild fruits, nuts, seeds and seed pods, salad plants, roots and tubers, beverage and flavoring plants, sugars and gums. In each section plants from all parts of the United States are described as to their characteristics, the parts used and how they are best prepared. The many personal comments on the plants give the book a pleasantly informal and friendly flavor. But the book impresses one by its completeness and accuracy. The author has consulted Sturtevant's Notes on Edible Plants and other works in order to make sure no useful plants are omitted, but the book is entirely Medsger's. Possibly it is an error to speak of the Hog Peanut as a perennial, though it is so described in the standard manuals, as in the region about New York the plant is certainly an annual, growing almost always from the single-seeded, underground fruit described in the book. At the end there is a unique "finding index" in which plants are listed under regional headings,—North Eastern United States, Southern United States, Mississippi to the Rockies, Rockies to the Pacific Coast,—under each of the headings plants are listed as to the parts used for food and for each plant the common and

* Edible Wild Plants. Oliver Perry Medsger. The Macmillan Co. 1939. 323 pages, 16 plates. $3.50.

scientific names, a summary of the characters, the range and season is given. There is also the more conventional index. The book makes good reading, will be valuable for reference, and will undoubtedly influence many who go into the fields and woods to add to their diet some of these plants so commonly neglected.

## The Physiology of Plants*

R. C. Benedict

"Three qualities have been striven for in the writing of this book; the avoidance of finality of statement; frequent reminders of the bearing of plant physiology on commonplace experiences; and a presentation as readable and fluent as is consistent with scientific accuracy."

The reviewer is glad to record his judgment that the aims so set forth have been very adequately achieved in this new plant physiology. Probably briefest of all the current texts on the subject, and least exhaustive in its treatment, this book should serve as a satisfactory introduction for an undergraduate course in plant physiology. Consistent with Professor Seifriz's special interest in cellular problems, this volume stresses those phases of the subject which are of "general physiological" significance. The style is clear and simple, the material interesting and recent. Brief bibliographies for each chapter will enable the reader who wishes to go beyond this text to find more exhaustive discussions. In itself, the Seifriz should furnish excellent supplementary reading for students in general botany and general biology classes.

In one particular of treatment, this reviewer would take definite issue with the Seifriz (as with not a few other texts), viz., in the definition and usage of the word, food. "The foods of plants are the same as the foods of animals. Inorganic substances are not foods. To be sure, if a plant containing chlorophyl is supplied with inorganic material only, it will grow normally; but the salts supplied are not food; this is made by the plant." If the word food means anything, it means building material as well as material which supplies energy. Certainly protoplasm cannot be built without water, both colloidally and

* Seifriz, William. The Physiology of Plants. Wiley 1938. $3.50.

chemically bound, nor without the mineral constituents like magnesium, calcium, and iron which are known to enter into chemical union with essential parts of the protoplasmic organization. Seifriz himself cites such contradictory facts as the use of hydrogen sulphide, sulphur, and iron as energy sources in certain bacteria. And what of the experiments in the nutrition of rats in which the animals were raised on purified proteins, carbohydrates, and fats, plus a nutrient solution which reads like an elaborate water culture for green plants? The restricted usage for the word food seems to be one of those inherited verbalisms which persists although it will scarcely stand a critical analysis.

## General Plant Physiology*

R. C. Benedict

"All living things feed. Matter is taken up from without and altered chemically, and from these chemical changes energy is released for growth and movement."

In a companion review to that of Seifriz's "Plant physiology" it is apposite to start with the quotation above as illustrative in part of the nutritional point of view of Barton Wright's new volume. However, the question of a proper definition of the word "food," so far as plants are concerned is not otherwise specifically advanced; the word food does not occur in the index nor, so far as noted, in the text. The title, "General plant physiology" is significant, not only for this volume but also for modern plant physiology as well. The "general physiological" point of view is evident in the four texts in plant physiology which appeared during 1938, either as entirely new books, like the Seifriz and the Barton Wright, or as the much amplified and modified new editions of Miller and Maximov.

This new English text, like another English plant physiology of the year before (Meirion Thomas, 1937), may be highly rated as a reference work for graduate students, for teachers, and for some advanced undergraduate students in botany. In three parts, "I. The general physiology of the cell," "II. Metabolism," and "III. Growth, reproduction and irritability," it is comprehensive but concentrated to a degree which sets it off

* Barton Wright, E. C. General plant physiology. Blakiston. 1938. $4.50.

from the texts published primarily for use in this country, like the translations of the Russian books by Palladin and Maximov, or those of purely American origin like Seifriz, Raber, and Miller. The Barton Wright is more exhaustive than any of these, except the Miller, which, in its new 1100 page second edition, is in a class by itself. A few minor errors were noted, such as "formanieran," for foraminiferan," Von Mohl as the "coiner" of the word, protoplasm, and Sequoia as reaching 400 feet in height.

# FIELD TRIPS OF THE CLUB

## Trip to the American Museum of Natural History on March 4, 1939

Thirty-two members and friends of the Torrey Botanical Club arrived Saturday morning at ten o'clock for a visit to the laboratories of the American Museum of Natural History.

In the Paleontological laboratory they observed some partial skeletons of prehistoric animals in situ, or partially set up for exhibit. The most recent acquisitions there, were the casts of footprints of a dinosaur which were discovered by Mr. Roland T. Bird along a stream in Texas this last December. These were made by the largest animal (yet discovered) that has ever lived. When comparing it with other large creatures even the sulphur-bottom whale, that has held the record for size up to the time these tracks were discovered, has been put into the "small in comparison" class. From these footprints of the largest of creatures we went to the laboratory where the minute creatures take on visible size. Here the world-famous glass blower, Herman O. Mueller, demonstrated how, as by magic plus a blow torch and a puff of breath, tiny tubes of glass can be fashioned into likenesses of intricately formed animals of the sea. Here too, Dr. Childs showed the group some of the objects that are being prepared in wax for a miniature habitat group, portraying the life of the pearl diver. This group is to form a portion of the Museum exhibit at the World's Fair. From this very modern activity we were again whisked back into the "millions of years ago, before the time of man" by Dr. Barnum Brown's fascinating discussion of the new Museum halls showing dinosaurs of different eras, many of these dinosaur remains being those found by Dr. Brown on his recent expeditions in western U. S.

A hurried trip to the laboratory where the botanical reproductions are made for the Museum habitat groups was made and the trip was concluded with luncheon in the Museum dining room where we are glad to state that items on the menu were not in the millions-of-years-ago class.

Farida A. Wiley

## "Sugar Bush" Outing to Mohonk Lake

### March 10–12, 1939

This trip was planned to give an opportunity to see a little known but economically important plant industry—the making of maple syrup and sugar. On the practical side, we saw something of the general procedure involved in obtaining and processing maple sap. Fundamentally, this is the same regardless of the equipment used. However, the leader's main objective was to try to give the members an opportunity to sense for themselves the uncanny fascination of doing it when old-fashioned methods are used.

Those arriving Friday evening were able to enjoy skating on the lake with flood lights and music. The balance of the group (total of 27) arrived Saturday morning in time to join in the coasting and tobogganing—the whole mountain being covered with a hard crust.

After dinner it started to snow gently just as we set out. The route led through Glen Anna where the snow silently sifting through the branches of the great hemlocks left an unforgettable impression. On arrival at the "sugar bush," which term might be translated as orchard when applied to a grove of sugar maple trees, we found two of the school boys in full charge.

This particular bush covers about an acre on a steep slope with a northwest exposure. About 30 trees (over 12 inches in diameter) had been tapped. The "tapping" is done with a brace and bit and consists of boring a hole about one-half inch in diameter into the tree an inch and a half. The hole is usually about four feet from the ground.

Into this hole is lightly driven a "spile." This may consist of a neatly formed piece of sheet metal with various patented features or a piece of green sumach which has been transformed by a few minutes of jack-knife work and a red hot wire to remove the pith. In either case a wire hook is usually provided on which to hang a pail, which is usually a tinned or galvanized one with about 12 quart capacity. In olden times keelers (wooden buckets) were used.

The process of converting maple sap to syrup is merely a matter of boiling away water until the right proportion of solids and sugar are left in solution. Maple sugar is made by carrying the process further.

In the boiling is the greatest divergence between oldtime and modern methods. The commercial evaporator is a complicated system of shallow flat pans and pipes set on a brick fire box. It turns out clear syrup after a short time of boiling with a minimum of labor. However, here at the Mohonk bush, a great round bottomed iron kettle holding 48 gallons was suspended by heavy chains from a tripod of solid oak poles.

The final boiling to syrup is accomplished in a small kettle, the point of removal being judged with either a thermometer or by its consistency as it drops from a spoon. The weight of a gallon of syrup is fixed by law—at not less than 11 pounds. In an average season a tree 12 inches in diameter may yield 30 gallons of sap per year through one hole. The sweetness of sap varies during the season (the first run is considered the highest quality) and from year to year, but many experiments have shown that it takes between 30 and 50 gallons of sap to make a standard weight gallon of syrup or 7 pounds of sugar.

From the sugar bush we walked across snow covered fields to the old log cabin whose history dates back to Revolutionary War times. Here in the great open fire place the leader prepared supper for us complete with fried potatoes flipped in the pan, Mohonk farm steaks broiled over charcoal and oldfashioned boiled coffee. The flickering candles cast strange shadows on the old log walls.

After supper we gathered round the crackling fire and sang old time songs to the notes of a guitar. The jingle of sleigh bells announced the arrivals of the straw filled sleighs which were to take us back to the House.

Sunday morning was spent in exploring the seven inch snowfall—some on skiis and toboggans, others merely tramping through it to enjoy its beauty.

Daniel Smiley, Jr.

## Trip of April 29 to Grassy Sprain Ridge, Yonkers

Sixteen members of the club met at the arboretum of the Boyce Thompson Institute at Grassy Sprain Ridge.

A short time was spent examining the trees and shrubs growing in the nursery. Then the party went into the woods along the crest of the ridge to study the wild flowers. Some 25 species of early spring flowers were found. In a marshy brook the golden saxifrage, *Chrysosplenium americanum*, was flowering, the reddish disk and bright orange stamens above the green sepals giving a pleasing bit of color when closely observed. A patch of trailing arbutus was found among the rocks, covered with dainty blossoms that the members of the group bent over to get the delightful perfume. The plants had probably been set out in recent years, but in a location where arbutus grew naturally in earlier days. It looked as if it had always been there.

The woods have been kept in their original state with the native flowers and ferns undisturbed. Only in open places was there signs of the setting out of some local plants that had disappeared from the region, and of others, such as the holly, *Ilex opaca*, that never had grown there.

Many ferns were noted—the three Osmundas, Christmas, marginal-shield, marsh, sensitive, lady, and New York, all with fronds only partly uncurled. The rattlesnake fern, *Botrychium virginianum*, was found to be rather common in places on the hillside, the sterile fronds in varying stages of development, none of the fertile as yet expanded. Besides the flowers and trees some members of the group enjoyed observing birds that had recently arrived from the south.

George T. Hastings

## PROCEEDINGS OF THE CLUB

### Meeting of February 7, 1939 at the American Museum of Natural History

The meeting of the Torrey Club was called to order at 8:15 P.M. by the President, Dr. Arthur H. Graves. Forty-four persons were present.

The president announced that the Club would have Dr. W. E. Kearns as speaker at the meeting held at the American Museum of Natural History on March 7, 1939. He also announced that the first field trip of the year will be held on March 4 under the guidance of Miss Wiley. All people interested in this trip will meet at 10 A.M. in room 207 of the School Service Building of the American Museum of Natural History.

No further business was transacted.

The scientific part of the program consisted of an illustrated lecture on the Vegetational Zones of British Guiana by Dr. A. C. Smith of The New York Botanical Garden. An abstract by the speaker follows:

"As a member of the American Museum-Terry-Holden Expedition, the speaker had the opportunity to collect plants in British Guiana in 1937 and the first part of 1938; subsequently he collected under the auspices of the New York Botanical Garden and collaborating institutions. The region visited was the country drained by the upper Essequibo and Rupununi Rivers, some weeks being spent in the Akarai and Kanuku Mountains; except for small collections of the Schomburgks, the area had been essentially uncollected.

"Of the four principal vegetational zones of British Guiana, the rain forest is by far the most extensive, covering about 90 per cent of the country. This forest is not floristically homogeneous, but shows several types, each with one or more obviously dominant trees. The interior forest appears to be a preclimax of the Amazonian rather than the typical Guianan forest, as shown by the presence of certain species and the conspicuous absence of others.

"The extensive Rupununi savannas make up another vegetational zone. This outlying section of the Brazilian Rio Branco savannas is far from monotonous showing many various types of vegetation depending upon soil and other factors. Perhaps the most remarkable region of British Guiana is the sandstone area culminating in Mount Roraima, a unique region of great endemism."

After considerable discussion the meeting adjourned.

Clyde Chandler
Reocrding Secretary

### Meeting February 15 at the Brooklyn Botanic Garden

The meeting was called to order at 3:30 p.m. by the President, Dr. Arthur H. Graves. Twenty-six persons were present.

The minutes of the meetings of January 18th and February 7th were adopted as read.

Mr. Glen D. Chamberlain, 22 Academy Street, Presque Isle, Me. and Mr. Julius Cohn, 1987 Davidson Avenue, Bronx, N. Y. were elected to annual membership in the club.

Mr. Andrew D. Kalmykow, 473 West 158th Street, New York City and Miss Dorothy Jewett, 441 Baldwin Road, Maplewood, N. J., were elected Associates.

The following resignations from Annual Membership were reported: Dr. George L. Zundel, Penn State College, State College, Pa., Miss Dorothy Jewett, 441 Baldwin Road, Maplewood, N. J.; Mrs. Mary Olmstead Sparrow, 1818 Clay Avenue, New York, N. Y.; and Mr. Joseph Hermann Fleisher, 1904 Robinson Avenue, Conway, Ark.

It was with regret that the secretary announced the death of the following annual members of the Club:

Mr. Ira C. Otis, 4320 First Ave., N.E., Seattle, Washington, died on November 3, 1938.

Prof. John H. Schaffner, Ohio State University, Columbus, Ohio, died on January 27, 1939.

Dr. E. B. Southwick, an honorary life member, 206 West 83rd Street, New York City, died December 18, 1938.

It was voted that the President appoint a committee of two persons to prepare an account of Dr. Southwick's life to be published in Torreya.

The Club welcomed most heartily two of its new members, Mrs. Mark Cohn and Miss Lucile M. Joyce who were present at the meeting.

The scientific program consisted of a report by Dr. Elizabeth Marcy on "Some Factors Influencing Smut Infection in the Sorghums."

The meeting adjourned at 4:45 P.M. after which tea was served by the Brooklyn Botanic Garden.

Clyde Chandler
Recording Secretary

## Meeting of March 7, at American Museum of Natural History

The meeting was called to order by the President, Dr. Arthur H. Graves at 8:15 P.M. Eighty-seven persons were present.

No business was transacted.

Mr. W. E. Kearns, Assistant Park Naturalist, spoke on his experiences in Yellowstone National Park. Mr. Kearns has photographed the Park at the various seasons and especially attractive were the natural color slides showing the plant and animal life of the Park during midwinter.

Clyde Chandler
Recording Secretary

## Meeting of March 15, at Columbia University

The meeting of the Torrey Club was called to order at 4:30 P.M. by the Vice-President, Mr. George T. Hastings. Twenty-eight persons were present.

The minutes of the meeting of February 15 and March 7 were adopted as read.

Miss Charlotte M. Jacobs, Dept. of Biological Sciences, Hunter College, 2 Park Ave., New York City and Dr. Henry J. Oosting, Dept. of Botany, Duke University, Durham, N. C., were elected annual members of the Club.

Mrs. Robert B. Zatz, 1384 Union Street, Brooklyn, New York and Mr. Eugene Gross, 775 High Street, Newark, N. J., were elected associate members of the Club.

The transfer of Mr. George F. Dillman, 346 East 87th Street, New York, N. Y., and Dr. John S. Ware, 396 Van Duzer Street, Stapleton, Staten Island, N. Y., from annual membership to associate membership was approved.

The following resignations from annual membership were reported: Dr. E. S. Schultz, Bureau of Plant Industry, U. S. D. A., Washington, D. C.; Mr. Frank H. Rossiter, 365 Reserve

Street, Boonton, N. J.; Mr. Charles E. Mohr, 815 Greenwich Street, Reading, Pa. and Miss Libra Palmeri, 313–17th Street, Brooklyn, N. Y.

The resignation of Mr. Frank Mayer, 165 East 88th Street, New York, N. Y., an associate member, was reported.

Miss Rosalie Rosenberg, 32 East 64th Street, an annual member for 40 years, was elected to Life Membership.

Miss Lela V. Barton was elected a member of the Council to fill the vacancy left by Dr. Carey in the 1937–1939 group.

Dr. W. S. Thomas and Mr. James Murphy were elected members of the Council to fill the vacancies in the 1938–1940 group.

A plan proposed by the Appalachian Mountain Club for a memorial to Raymond H. Torrey was presented to the Club by Dr. J. S. Karling.

"There are two hundred acres on Anthony's Nose, facing the river, which constitute a dangerous quarry site. Approximately $12,000 is needed to purchase this land. The Hudson River Conservation Society has raised $7,000 towards it. It has been suggested that a most beautiful and appropriate memorial to Mr. Raymond H. Torrey could be made if the members of the New York and New Jersey out-door clubs could contribute the remaining $5,000 necessary to complete the purchase. With this money a tract of about 100 acres could be set aside in memory of Mr. Torrey. The entire 200 acres will be given to the State to be used for park purposes only. Your gift will serve a double purpose: saving beautiful and historic Anthony's Nose from destruction, and creating a memorial to Mr. Torrey in the region he loved so well."

No action was taken by the Club.

The scientific part of the program consisted of a report by Miss Vivian Trombetta on her research investigations on "Cytonuclear Relationship in Plant Cells."

The speaker's abstract follows:

"From the time of Strasburger, Sachs and Hertwig, botanists and zoologists have tried to connect problems of growth of living cells with the nucleocytoplasmic ratio—i.e. the relationship of nucleus to active cytoplasm. In mature plant cells where a large vacuole is found, it is practically impossible to determine the volume of the cytoplasm with any degree of accuracy, pushed as it is against the wall in a thin film of unequal thickness. Consequently, instead of attempting to find the relationship between the volume of the nucleus and cytoplasm, an attempt was made to find the relationship between the volume of the nucleus and that of the *entire* cell—the *cytonuclear* relationship in plant cells.

The method of approach has been a simple one. Camera lucida drawings of cells and nuclei were made, the drawings measured and volumes determined. Stem and root tip meristems of a number of representative families of the higher plants were used, leaves of the aquatic plant *Elodea*, and stem hairs of tomato plants. In ordinary meristem tissue, nuclear volume bears a definite relationship to cell volume, large cells having larger nuclei than small cells, but as cell size increases, nuclear size does not increase as fast. The *relative* rates of change, however, are constant, so that when plotted logarithmically, a straight line results. The fact that the slope of the line is about .67 indicates that the nucleus is growing only about two-thirds as rapidly as the cell, and as a result, the volume of the nucleus is keeping pace with the surface of the cell (the surface of a sphere growing as the square of its linear dimensions and the volume as their cube, as a result of which the surface of a spherical cell will increase two-thirds as fast as its volume). The relationship holds for experimentally enlarged nuclei—in polyploid cells of the root tip induced by colchicine treatment.

Further studies were undertaken to discover whether any change occurs in the cytonuclear ratio during the growth phases of elongation and differentiation. The relationship apparently is maintained throughout development in the onion root tip for cells of different sizes at the same stage of development, but final cell size may be as much as one hundred times, and nuclear size three times greater than meristematic size. Stem tip material offers three distinct developmental types—one, similar to the developing onion root tip; a second, one in which nuclear size remains the same in the meristem, but increases when meristematic activity stops; and a third, one in which the relationship of cell to nucleus found in the meristem, is maintained throughout development. The method of approach in this study—the method of heterogonic growth proposed by Huxley—is rather significant here.

Clyde Chandler
Recording Secretary

Dr. Witmer Stone, director emeritus of the Philadelphia Academy of Natural Sciences died on May 24 in Philadelphia after a long illness. He was seventy years old. He was former president of the Ornithologists Union and also of the American Society of Mammalogists. He wrote *Plants of Southern New Jersey*, chiefly a flora of the Pine Barrens, in 1912.

Dr. Elmer D. Merrill has been appointed one of the presidents of the section of Taxonomy and nomenclature, and president of the subsection of nomenclature, of the seventh International Botanical Congress to be held in Stockholm in 1940. Dr. Merrill was honored by being awarded the Linnaean Society medal for 1939 at the annual meeting of the Linnaean Society in London on May 24. He is the third American and the first American botanist to receive this medal during the fifty years that it has been awarded.

At the same meeting of the Linnaean Society Professor Alfred Rehder, of the Arnold Arboretum, was elected a foreign member of the society.

A new and practical course of nature study, for boys from twelve to fifteen years of age, is being conducted this summer by Mr. George F. Dillman, a well known teacher of nature study, and a member of the Club for many years. Mr. Dillman's course is called a "Summer of Trail Adventures," and consists of camping trips along different sections of the Appalachian Trail in Connecticut, Massachusetts, Vermont and New Hampshire, with selected farm homes as base camps. For further information write to Mr. Dillman at 346 East 87th Street, New York, N.Y.

Our treasurer, Dr. Harold N. Moldenke, is interested in securing records of new introductions to the American flora and of their spread to new territory. He requests members of the Club to send him information concerning new plants recently seen growing wild in this region. Herbarium specimens of such plants will be very welcome.

Memorial to Raymond H. Torrey. Those desiring to contribute to the memorial described in the minutes of the meeting of March 15, printed on page 89 of this issue of Torreya, should send their contributions at once to Dr. Moldenke, Treasurer of the Club, stating that they are for the Torrey Memorial on Anthony's Nose.

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Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

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(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

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Bronx Park,<br>
New York, N.Y.

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# TORREYA

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EDITED FOR

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BY

GEORGE T. HASTINGS

John Torrey, 1796-1873

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# THE TORREY BOTANICAL CLUB



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2587 Sedgwick Ave.,
New York, New York

# TORREYA

Vol. 39 July–August, 1939 No. 4

## Guide to the Lichens of the New York Area—Part 3

G. G. Nearing

### Papery Lichens (Groups 5 to 12)

Among the Papery Lichens, differences in form are somewhat less obvious than among the Stalked Lichens. The aim of this guide is to make possible the identification of a great many species with no other aid than a hand-lens, but in order to give a clearer idea of relationships, and to make determinations more certain, microscopic characters are mentioned also and given increasing prominence as the forms become simpler, the obvious distinctive characters fewer.

Papery Lichens are flattened to make an upper surface, and an under surface different from it in structure and usually in appearance. This under surface is sufficiently free from the foothold so that it can be inspected and described. Stalked Lichens (Groups 1 to 4) differ from papery Lichens in having some sort of stalk, or in being lifted largely well clear of the foothold. After an intermediate class of Flake Lichens (Group 13), the Crust Lichens (Groups 14 etc.) differ from Papery Lichens in having no free under surface, but adhering tightly to the foothold or even growing within it.

### Key to the Papery Lichen Groups

(This key will not be found entirely satisfactory, especially if no compound microscope is available, and chief reliance should be placed rather on a careful reading of the general description of each group, on the illustrations, and on the references to similar species at the end of each specific description.)

Algal cells not in chains
  Lichens bright yellow or orange, with yellow or orange fruits — Group 9
  Lichens greenish gray, whitish, pale yellow, brown or olive
    Fruits chestnut-brown or greenish (yellowish gray in *Cetraria placorodia* and *Parmelia ambigua*). Spores undivided, colorless

Small lichens with parts usually narrower than 5 mm. Group 5
Larger lichens, parts mostly broader than 5 mm. Group 6
Fruits gray, whitish or blackish. Spores 2-celled, blackish or brownish Group 8
Fruits black, with minute brain-like convolutions. Lichen an unbranched leaf Group 12
Fruits hidden within the tissues, showing as dark dots on the upper surface Group 12
(See also *Peltigera aphthosa* and Sticta in Group 7)
Algal cells in chains
Lichens greenish gray, rosy gray or brown, not gelatinous
Fruits chestnut-brown on special lobes projecting from the tips Group 7
Fruits scattered on the upper surface, light red or reddish brown
Lichen parts usually broader than 5 mm. Spores divided into 2 or more cells Group 7
Lichen parts narrower than 5 mm. Spores not divided Group 10
Lichens dark green, dark brown, olive, or lead gray, gelatinous-looking when wet Group 11

Group 5. The Smaller Shield Lichens. Mats of paper-like structure growing close to the bark, stone, or other foothold, or the tips and margins rising somewhat from it. Divided into radiating trunks, more or less branching, and lobed. Trunks and lobes usually narrower than 5 mm. Fruits typically chestnut-brown, sometimes pale brown, greenish or gray, especially when wet. Spores undivided, colorless.

*Cetraria fahlunensis.* SWEDISH SHIELD LICHEN.

In the mountains of northern New England, and rarely as far south as the New Jersey highlands, on exposed, rocky summits, this tiny Shield Lichen grows flattened against the usually vertical face of rock containing quartz, in tufts commonly 3 or 4 cm. across. The radiating trunks branch profusely, and grow over each other to form an interwoven mat sometimes 2 mm. or more deep. Trunks and branches maintain a rather uniform width of about 1 mm., with the tips a little wider or narrower. Margins and tips are lifted a little, forming a shallow trough. In some specimens, tiny, blackish granules border the older parts. In the form seen in the Shawangunk and Kittatinny Mountains, sometimes called var. *Frostii*, the margins are dusted with whitish soredia. The upper surface is smooth, shining brown or dark olive at the tips, blackish on the older parts or all bleached rather grayish. Under surface slightly paler, with a few dark, root-like holdfasts.

Fruits, seldom or never seen in the New York area, are unexpectedly large, up to 1 cm. in diameter, and seated rather tightly against the older trunks. Color dark brown. Rim smooth or beaded. Spores undivided, colorless, 5 to 11 by 3 to 7 microns.

*Cetraria fahlunensis* looks at first glance almost exactly like *Parmelia stygia*, a northern lichen which hardly reaches the New York area, and which has the trunks and branches slightly convex instead of trough-shaped, the under surface being pitch-black instead of brown. *C. saepincola* (Group 4), though of nearly the same color, rises much higher from the foothold, grows on trees and wood instead of rocks, and has plentiful, much smaller fruits. Shining tips distinguish all these Shield Lichens from the dull-surfaced *Physcia aquila* (Group 8) and *Pannaria microphylla* (Group 10), both of which are brownish in color. Perhaps *Parmelia omphalodes*, a strictly northern, small, brown variety of *P. saxatilis*, should also be mentioned here. It has wider and thinner parts than *C. fahlunensis*, the upper surface somewhat pitted, and the under densely clothed with root-like holdfasts. It is rarely or never found in the New York area, nor is *P. sorediata*, a form of *P. stygia* with round, white soredia.

*Cetraria pinastri*. PINE LICHEN.

Also called *Cetraria juniperina* var. *pinastri*. A form similar to *C. juniperina* (Group 4) in color, yellowish to olive green on the upper surface, yellow on the under, with the margins usually breaking into greenish yellow dust (soredia). Some consider these soredia the determining character of *C. pinastri*, but neither this view nor any other can explain satisfactorily the intermediate forms. This lichen is typically small and straggling, with lobes but little divided, and less than 5 mm. wide. The margins usually rise above the foothold to a height of less than 5 mm. It is seen commonly on rocks in the highlands of New England, New York and New Jersey, but also grows on trees. It does not fruit, though intermediate forms may. The important characters are the yellow under surface and yellow soredia.

Except for the close relationship with *C. juniperina* from which perhaps it need be separated only in order to make recognition easier, *Cetraria pinastri* is not likely to be confused with other lichens. *C. Oakesiana*, resembling it somewhat, has pale green, not yellow soredia, and a brown under surface. *C. aurescens* is white beneath, and without soredia. *Parmelia ambigua*, *P. centrifuga*, *P. incurva*, and the larger *P. conspersa* and *P. caperata* (Group 6), with *Candelaria concolor* and other species of Group 9, though all yellow or yellowish on the upper surface, are never yellow on the under.

*Cetraria Oakesiana*. OAKES SHIELD LICHEN.

Throughout the highlands and pine barrens, this species will be met in many localities, but not too plentifully, on trees and rocks. Once learned, it is easy to recognize, yet at first each point of the description must be checked carefully. Its trough-like branches, usually about 5 mm. wide, spread irregularly side by side, not forming symmetrical rosettes, but rarely over-lapping. They usually rest on the foothold, but their margins curl away from it 2 or 3 mm., and are waved and crinkled, though not much lobed, often foaming into a *pale green* dust of soredia, fading later to whitish. The upper surface is smooth, or only slightly wrinkled, pale grayish green, the under surface light brown, with a few brownish holdfasts sometimes visible.

Except in the high mountains, and then rarely, it does not fruit. Fruits dark brown, up to 6 mm. across. Spores undivided, colorless, 5 to 10 by 4 to 6 microns.

The pale green soredia distinguish it from other Papery Lichens, but when these have faded or are wanting, the general habit, curling margins, and light brown under surface must be noted. It will be found in association with *Cetraria ciliaris* and *C. lacunosa* (Group 4), which rise high above the foothold, and with many species of Parmelia, none of which are trough-shaped. *Physcia speciosa* and *P. sorediata* (Group 8) often have colored soredia, but pale blue, not green.

*Cetraria aurescens.* YELLOWING SHIELD LICHEN.

A small, rather rare lichen described from New England and New Jersey, growing on coniferous trees and old rails, and to be looked for in the pine barrens. It looks something like a pale, flat form of *C. juniperina,* with a wrinkled and warty upper surface pale yellowish green or yellowish gray, the under surface whitish, with many whitish root-like holdfasts. Only the crinkled margins and tips rise from the foothold. Its many branches and lobes 2 or 3 mm. wide, rarely spread more than 4 or 5 cm. in an irregular pattern.

Fruits are frequent, large in proportion, up to 7 mm. across, and often mounted above the margins on spurs as much as 5 mm. high. The disk is chestnut-brown, the rim toothed. Spores undivided, colorless, 3 to 6 by 3 to 5 microns.

From *C. juniperina, C. pinastri* and *C. Oakesiana, Cetraria aurescens* can be distinguished by the white under surface and the absence of dusty soredia, from *C. placorodia* and *Parmelia ambigua* by the crinkled and lifted margins. The spores also are smaller than those of any local Shield Lichen except the very different *Parmelia colpodes* with swollen tips.

*Cetraria Fendleri.* FENDLER SHIELD LICHEN.

A rare lichen to be looked for on pine bark in the pine barrens, where it often spreads only 1 or 2 cm., or is reduced to a few mere wisps around crowded fruits. The typical color is brownish olive, dull, not shining, with a white under surface. The tips and margins are usually slightly raised and finely cut, with small lobes ending in many delicate points which might sometimes be considered marginal hairs.

Fruits are many and often crowded, chestnut-brown, shining, smaller than 4 mm. in diameter, and with rims distinctly toothed or notched, or even minutely lobed. Spores undivided, colorless, 4 to 11 by 4 to 5 microns.

Owing to its small size and dark coloring, *Cetraria Fendleri* will easily escape observation. At a glance it looks somewhat like the common *Physcia endochrysea* (Group 8) which is small and olive-gray, but which, when scratched with the fingernail, reveals an internal blood-orange color. The finely divided and pointed lobes of *C. Fendleri* distinguish it from all other brown Papery Lichens. With it on the pine bark will be found the flakes of *Psora anthracophila* and *P. ostreata* (Group 13) and various species of Cladonia (Group 1), some of which take a brown color. As these are very common, a little observation will separate them from *C. Fendleri*, which is rare, and of quite different structure.

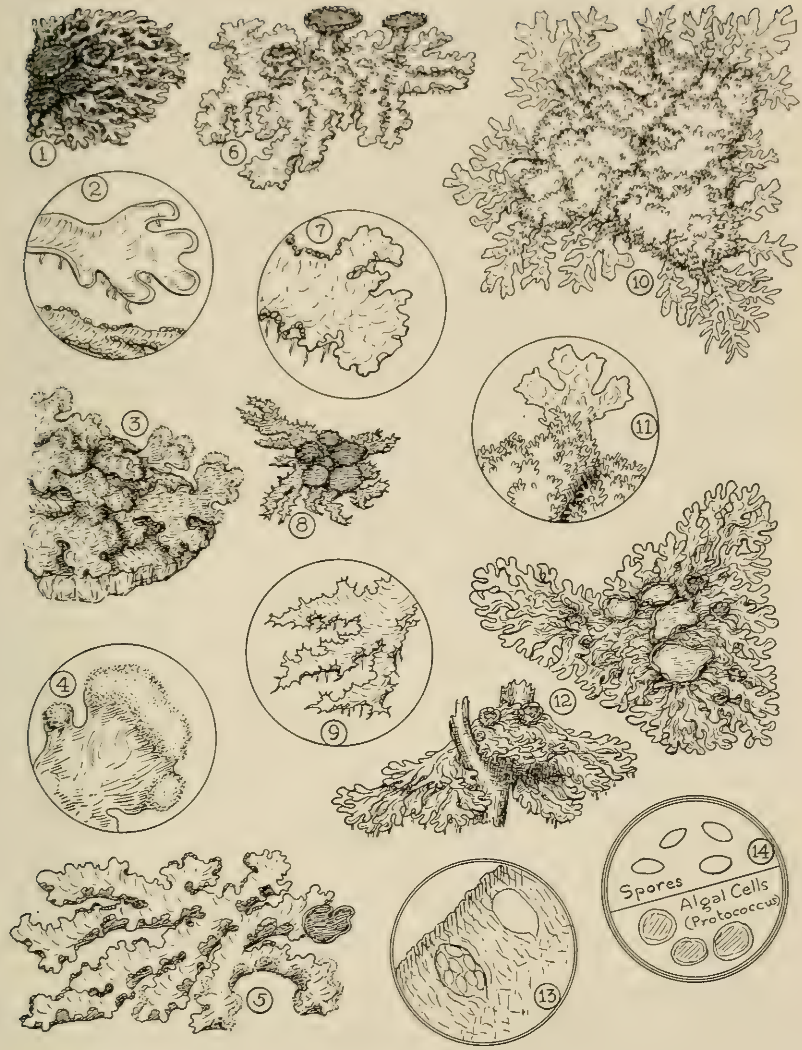
*Cetraria aleurites*. Grizzly Shield Lichen.

Also called *Parmeliopsis aleurites*. A common species found especially on pine bark, rails and dead wood, in swamps, pine barrens and hills everywhere. It forms a grayish white rosette flat against the foothold, with branches and lobes radiating to a total spread of 5 cm. or more, but is often fragmentary. Branches may be 2 or 3 mm. wide, but the usually short tips, less than 1 mm. wide, are sometimes divided into feathery lobes less than 0.1 mm. wide. Scattered over the dry-looking upper surface are minute white or yellow-gray granules, becoming very numerous toward the center and extending into prongs or coral-like growths. Eventually the center becomes a mass of these growths, heaped into a cracked and humped crust, which may occupy almost the whole lichen, making it necessary to look sharply for the few scraps of papery lobes around its edge. The under surface is white to pale brown, and somewhat wrinkled, with a few small, brownish holdfasts.

Fruits on the typical form are hardly to be found, at least in the New York area. There are however forms intermediate between this species and *C. placorodia*, having the coral-like growths few and scattered instead of massed in a central crust. These forms are sometimes called var. *diffusa*, and they often bear fruits much like those of *C. placorodia*, with similar spores.

Though variable, *Cetraria aleurites* will be recognized with ease by its white or silver-gray color, and the yellow-gray granular center. Other common Papery Lichens have similar massed granules and coral-like growths, notably *Parmelia rudecta* (Group 6), a lichen with typically much broader parts, rather regularly speckled with small, flat, white soredia. *Parmelia frondifera*, an uncommon form of *P. saxatilis*, has the growths flattened into small lobes, and is distinguished by its black under surface. *Physcia stellaris* and *P. granulifera* (Group 8) often have central granules, but the frequent gray or blackish fruits contain blackish, 2-celled spores.

*Cetraria aleurites*, *C. placorodia* and *Parmelia ambigua* have




GROUP 5—PLATE 5

Fig. 1. *Cetraria fahlunensis*, dark olive brown.
Fig. 2. *C. fahlunensis*, tip and older branch.
Fig. 3. *C. pinastri*, olive-green, yellow beneath.
Fig. 4. *C. pinastri*, tip with yellow soredia.
Fig. 5. *C. Oakesiana*, yellowish green, brown beneath.
Fig. 6. *C. aurescens*, pale yellow-green.
Fig. 7. *C. aurescens*, tip.
Fig. 8. *C. Fendleri*, olive-brown.
Fig. 9. *C. Fendleri*, tip.
Fig. 10. *C. aleurites*, whitish, centrally yellow-gray.
Fig. 11. *C. aleurites*, tip.
Fig. 12. *C. placorodia*, pale gray.
Fig. 13. *C. placorodia*, section of spore layer.
Fig. 14. *C. placorodia*, spores.

recently been placed together in the genus Parmeliopsis, but it seems simpler to follow the older tradition, omitting this new genus.

*Cetraria placorodia.* PLATE LICHEN.

Also called *Cetraria aleurites* var. *placorodia* or *Parmeliopsis placorodia.* Resembles *C. aleurites* in color and size, but does not develop the central growths and does usually fruit. It is fairly common in the pine barrens, where it may either grow flat on the bark or wood, or may reach out its fan-like tips as much as 1 cm. from the foothold, especially when found on twigs. Branches of nearly uniform width, about 1 mm., radiate side by side, not usually overlapping. The upper surface tends to be more gray or even greenish than the nearly white *C. aleurites.*

Fruits, up to 7 mm. diameter or larger, stand near the center of the lichen, raised 1 mm. or so, the disk round or becoming irregular with age, yellowish gray, later green or brown. The rim may be nearly smooth or broken with radiating ridges or toothed. Spores undivided, colorless 4 to 9 by 3 to 6 microns.

*Cetraria placorodia* resembles somewhat the larger *Parmelia tiliacea,* which is rather common in swamps, but has a black under surface and constantly chestnut-brown fruits. The yellow-gray fruits of *C. placorodia* distinguish it from most other Shield Lichens except *Parmelia ambigua,* the upper surface of which is distinctly yellowish, the under-surface black. *Lecanora muralis* (Group 13) has fruits of this color, but grows only on rocks. Confusion is likely with *Physcia stellaris* and *P. tribacia* (Group 8), both of comparable size and growing in similar places, but with fruits black or gray dusted with white, and lacking any trace of yellow tint; spores 2-celled and blackish.

*Parmelia ambigua.* SULPHUR-DUST LICHEN.

Also called *Parmeliopsis ambigua.* Like *Cetraria placorodia* this little lichen frequents the pine barrens, but only in the form of its variety *Halei,* the species itself being found in the mountains to the north, outside the New York area. The variety spreads in oval rosettes 3 or 4 cm. across, usually on pine or white cedar bark, either clinging flat or rising somewhat from the foothold. Sometimes it wanders irregularly among other lichens in fans up to 1 cm. wide, divided gracefully into regularly forking branches less than 1 mm. wide. The upper surface is straw-color or yellowish green, and sulphur-colored dust (soredia) often edges the branches or forms large rounded masses on the older parts. The under surface is dark brown to black.

Fruits not frequent, up to 5 mm. in diameter, sometimes much larger, plate-shaped or wavy, yellowish gray and waxy looking, the rim thin and irregular, dusted with yellow soredia. Spores 8 to 13 by 2 to 4 microns, but scarce.

Since there are few small lichens with yellow soredia, *Parmelia ambigua* is easily identified. Its form closely resembles *Cetraria placorodia*, but the yellow tint marks it at a glance, and distinguishes it from all species of Physcia. The black under surface separates it from *Cetraria pinastri* and *Parmelia centrifuga*, while the masses of yellow soredia mark it from all similar lichens except *Cetrari pinastri*, which is yellow beneath, and *Parmelia incurva*, white beneath and found on rocks only. The yellow and orange lichens in Group 9 are distinguished by having orange or bright yellow fruits.

*Parmelia centrifuga.* Ring Lichen.

An alpine species of the north seen occasionally on quartz and sandstone as far south as the summits of the Shawangunks. Its trunks and branches, usually about 1 mm. wide, and varying but little except to widen somewhat at the tip, radiate from a center which with age becomes crust-like, and often falls away, leaving the lichen an irregular ring rather than a rosette as much as 10 cm. across. The branches, except at the flattened tips, are convexly rounded and covered with minute, warty wrinkles. The tips are straw-colored or yellowish gray, but the older parts usually darken as though dusted with soot. New growths often cover the old in shingle fashion, and in doing so, may swerve sharply to one side from the otherwise uniform lines of radiation, making a peculiar and characteristic pattern. The under surface is whitish with a few dark, root-like holdfasts.

Fruits, as much as 8 mm. in diameter, but usually smaller, are chestnut-brown, closely seated on the older parts, and with a thin, pale rim. They are not likely to be seen in the New York area. Spores undivided, colorless, 7 to 12 by 5 to 6 microns.

In size and color, *Parmelia centrifuga* resembles *P. ambigua*, but differs in the whitish under surface, and in being found on rocks, not tree-bark. The yellow soredia also are wanting, but will be found on the similar *P. incurva*. *P. conspersa*, commonest of Shield Lichens, though extremely variable, is broader in its parts, and the under surface, dark brown to black, will always distinguish it. The ring-like habit is not confined to *P. centrifuga*, nor constant in it, but is strongly suggestive when present.

*Parmelia incurva*. Fist Lichen.

Found in association with *P. centrifuga*, and so like it in general appearance as to require no separate description. The chief character determining it is the presence of globular masses of yellowish soredia as much as 2 mm. or more in diameter, and rather like those of *P. ambigua*. The ring-like habit is not usually noticeable. Close inspection will also show that the branches tend to twist about irregularly rather than radiate from a central point, while the tips usually curl, some taking the form of a clenched fist. It will hardly be mistaken for any lichen except *P. centrifuga* or *P. conspersa*. (See comparisons under *P. centrifuga*.)

*Parmelia physodes*. Puffed Shield Lichen.

A frequent species on trees and occasionally rocks in the highlands and the pine barrens, becoming very plentiful in the Catskills. It either forms rosettes a few cm. across, or grows irregularly, often intermingled with other lichens. It may rest almost flat against the foothold, or with tips lifted, or, especially when on twigs, may stand out 1 or 2 cm., like the species of Group 4. The habit of branching is highly irregular, trunks and branches usually 1 mm. or less in width, but the tips often much broadened, thickened and puffed. The upper surface is smooth, greenish gray, the under surface black, but shining pale brown and wrinkled under the tips, which usually curl back to show the color conspicuously. Other tips may break open in a form suggesting vaguely a flower of the pea family, the inner surface of which is covered with pale blue dust (soredia), later turning white.

Fruits are very rare, unless *P. vittata* is included in *P. physodes*, as it sometimes is. But the lichen is easily determined without them.

Though variable, *Parmelia physodes* has well marked distinguishing characters. The puffing of the tips, and to a certain extent, of other parts, separates it from all other species of Parmelia except *P. vittata*, *P. colpodes* and *P. pertusa*. Typical *P. vittata* forks into long branches of uniform width, with tips which do not broaden. *P. colpodes* has broad tips black and roughened beneath instead of brown and shining. Near the tips of *P. pertusa* are conspicuous small holes puncturing the lichen. The Physcias, which often show swollen parts, usually form more symmetrical rosettes of smaller size. *P. stellaris* and *P. hispida*, the ones most likely to cause confusion, are white beneath and fruit abundantly. The brown tips curled upward distinguish *Parmelia physodes* from all other similar lichens except *P. vittata*, while those tips which have pale blue soredia mark it from all but *Physcia speciosa*, which is not puffed, and is white beneath, with conspicuous white holdfasts.

*Parmelia vittata*. FORKED SHIELD LICHEN.

Also called *P. physodes* var. *vittata*. Similar to *P. physodes* in most characters, but differing in some which are plainly evident. The trunks and lobes are long and rather straight, of uniform width, about 1 mm., while the tips, though puffed are not broadened, and never somediate. Branches fork at a wide angle. The black under surface is deeply wrinkled. *P. vittata* may be looked for on trees in the higher mountains, but is nowhere plentiful.

Fruits frequently large, occasionally 25 mm. in diameter, brownish or greenish, wavy, with thin rim somewhat notched or broken. They are lifted as much as 5 mm. high, like mushrooms, and the under surface of the fruit, like that of the lichen, is often black, wrinkled and pitted. Spores undivided, colorless, 4 to 6 by 4 to 5 microns.

Though forms intermediate between *P. physodes* and *P. vittata* do occur, the typical lichens differ so evidently that they may usefully be considered separate species. Since the tips of *P. vittata* do not break into blue soredia, other characters should be noted, especially the long, straight branches with parallel edges, and the habit of forking wide like the letter Y. No other local lichen with puffed tips has this habit. (For comparisons see *P. physodes*.)

*Parmelia pertusa.* PUNCTURED LICHEN.

This rather rare species will be seen at times wherever *P. physodes* is plentiful, either on mountains or in the pine barrens, and can be recognized after a glance through the lens, for though similar to that species in size and habit, it shows here and there, usually in the middle of a branch or tip, a round or oval hole less than 0.5 mm. in diameter. An observant person will at once notice that these holes appear to be made by insects, but as the punctured parts grow older, the edges of the holes lose the appearance of having been gnawed, and look as if formed in the growth of the lichen. Examination of the under surface will show that patches of the black, spongy material have been eaten off or tunnelled through, exposing the white pith.

While insects are probably responsible for this determining character, there are other points on which *P. pertusa* differs from *P. physodes.* The soredia, instead of being borne on flower-like tips, usually start as whitened lumps well back from the tip and develop commonly into mushroom shape, with *white* soredia on the top.

Fruits are unknown in this region, but when found in the tropics, the spores measure 45 to 60 by 22 to 28 microns, about 7 times longer than those of *P. physodes.* It is best therefore to consider *P. pertusa* a distinct species. It will not be confused with any other lichen, because no other is regularly punctured in this fashion. (For detailed description and comparisons, see *P. physodes.*)

*Parmelia colpodes.* BLACK-PAW LICHEN.

Also called *Anzia colpodes.* Found on tree bark rather frequently in the pine barrens, occasionally on mountains. Though at first sight this fourth of the Shield Lichens with puffed tips, looks like a darkened *P. physodes*, closer inspection will show it to be entirely different—so different that some put it in a special genus Anzia. It forms straggling rosettes 3 or 4 cm. across on tree-bark, preferring oaks. The narrow main trunks divide into broader branches and still broader tips, but few parts are broader than 2 or 3 mm., while many are 1 mm. in thickness. The olive-green or blackish main trunks (turning white in old herbarium specimens) are often arched, and roughened with warts and wrinkles. Tips take a paw-like shape with upper surface moderately dark green, bordered with a whitish line where it meets the under surface. This under surface is black, roughened by tiny papillae standing close together, and visible as a nap under a strong glass, but with weaker magnification, showing only as a dull finish, in contrast to the shining under-tips of *P. physodes.*

Fruits are usually rather abundant, scattered along the older trunks and branches, bowl-shaped, chestnut-brown or darker, with a thick, smooth, pale rim. They are of all sizes up to 8 mm. diameter, and when large are often of irregular shape. The spores, undivided, colorless, very small, 3 to 6 by 1 to 2 microns, are numerous in the spore sack, instead of numbering only 8, as in most Shield Lichens, and are usually shaped like a curved sausage.

Under the microscope, *P. colpodes* is easily differentiated as the only local Shield Lichen with more than 8 spores in the spore-sack, and the only one with curved spores. With a hand lens alone however, it can be determined definitely, because no other local lichen of this type has the black nap under the tips, which is perhaps 0.1 mm. deep, and not at all like the much longer blackish holdfasts of such lichens as *Physcia endochrysea.* The presence of fruits and the absence oforediate tips distinguish it at once from *P. physodes* and *P. pertusa.* From *Physcia stellaris* and *Cetraria placorodia*, its darker color and black under surface easily separate it.

*Parmelia olivacea.* OLIVE-BROWN SHIELD LICHEN.

Rather frequent everywhere on trees where other Shield Lichens grow, *P. olivacea* often escapes notice because its color does not differ greatly from that of the bark. It spreads irregularly, flattening against the foothold, and the tips of the lobes often widen to 5 mm. or even more, but very thin, in contrast to the puffed lichens just described. About 1 cm. or so behind the tips, it often becomes a thin shapeless crust with confused wrinkles instead of radiating branches. Near the tips, the color is yellowish-brown to chestnut, or olive when wet, often shining like bronze metal, while older parts may blacken, or show dots of whitish soredia, or white where the brown surface has been scratched off. The under surface is dark brown or black.

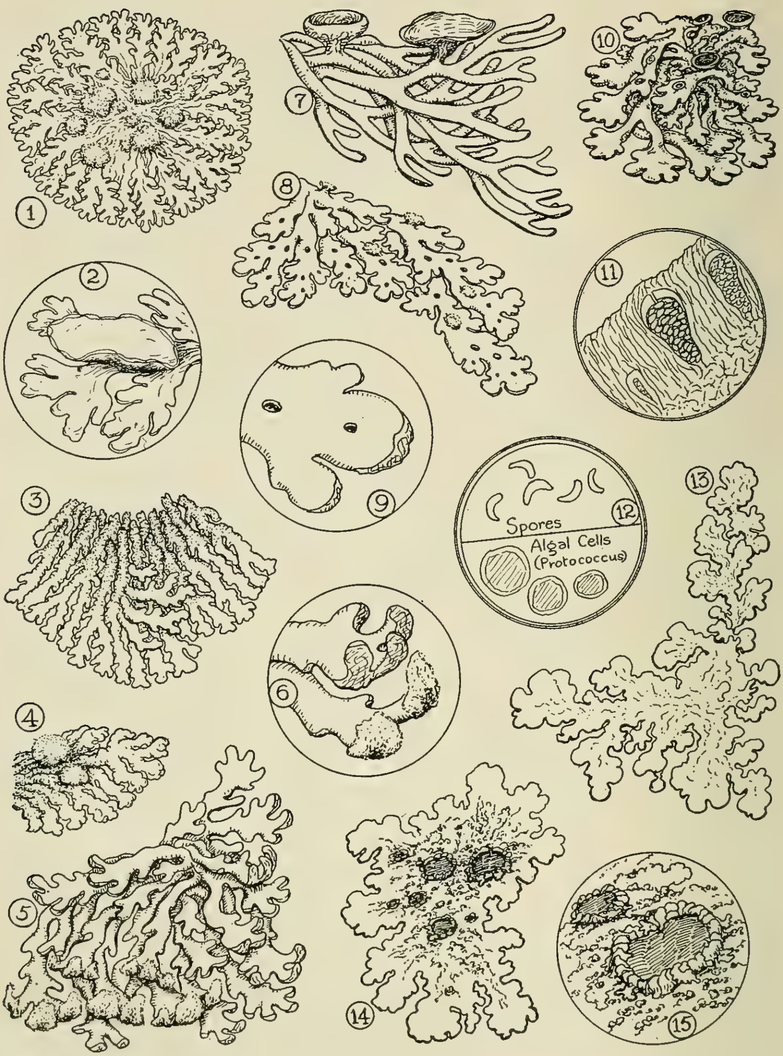



PLATE 6

Fig. 1. *Parmelia ambigua*, straw-color.
Fig. 2. *P. ambigua*, tip with fruit.
Fig. 3. *P. centrifuga*, pale yellowish.
Fig. 4. *P. incurva*, pale yellowish.
Fig. 5. *P. physodes*, greenish gray.
Fig. 6. *P. physodes*, tips with brown under surface and pale blue soredia.
Fig. 7. *P. vittata*, greenish gray.
Fig. 8. *P. pertusa*, greenish gray.
Fig. 9. *P. pertusa*, tip showing punctures.
Fig. 10. *P. colpodes*, dark greenish.
Fig. 11. *P. colpodes*, section of spore layer.
Fig. 12. *P. colpodes*, spores.
Fig. 13. *P. olivacea*, bronze-brown.
Fig. 14. *P. aspidota*, bronze-brown.
Fig. 15. *P. aspidota*, fruits.

Fruits when present are usually small, but occasionally reach 7 mm. diameter, chestnut-brown or blackish, with a wavy or warty rim. They will seldom be seen except on high mountains. Spores undivided, colorless, 7 to 16 by 5 to 10 microns.

The rich brown shades differentiate *P. olivacea* from most other Shield Lichens that grow on tree-bark, while the smooth, flat margins contrast with the toothed and raised edges of *Cetraria Fendleri*. From the papery species of Collema (Group 11), which often grow on trees, its shining and hard-looking surface separates it easily, for their surfaces are dull when dry, gelatinous when wet. The gelatinous lichens are found usually near the base of the tree, while *Parmelia olivacea* more often occurs 1 to 3 meters high on the trunk. *Dermatocarpon arboreum* (Group 12) is thick, dull, and when wet, bright green. *Physcia aquila*, though brownish, has conspicuously long, narrow branches and tips, overlapping shingle-fashion.

Several varieties and subspecies of doubtful value have been separated from *Parmelia olivacea*, and may be noted if desired. *P. aspidota*, the most common and best justified, has the surface much roughened with small warts and larger blisters, while the fruit-rims are often fantastically contorted and lobed. *P. conspurcata*, somewhat larger, with much broader lobes, has many white soredia, and whitish coral-like growths. *P. prolixa*, found on rocks instead of trees, has narrower parts, approaching the northern *P. stygia*.

(Group 6 will contain all of the larger Parmelias.)

RIDGEWOOD, N. J.

## The classification of Dicotyledons

Alfred Gundersen

Among botanical systems of the past century those of Bentham and Hooker and of Engler and Prantl stand out as having received world wide recognition. It is well known that Bessey adopted several points from the Bentham and Hooker system in preference to the Engler system. In 1925 Rendle (4) presented the Engler system with slight modifications, but in part adopted Bentham and Hooker arrangements. The follow-year Hutchinson (3) in many respects followed the Bentham and Hooker system. The works by Rendle and by Hutchinson may perhaps be considered as modernized forms of the two standard systems; they were briefly compared in Torreya xxvi: 70–75 (1926), where Hutchinson's diagram of dicotyledons is reproduced.

In 1897 Engler published (1) an early diagrammatic representation of dicotyledons. In this Parietales and Rhoeadales (Papaverales) are connected, a connection of special significance. More recent diagrams are those of Hallier, Wettstein, Bessey, Clements, and Hutchinson. It may be that in certain features one system is better, in other features another system is superior.

An arrangement more or less intermediate between the Rendle system and the Hutchinson system is here attempted. Arguments against keeping the herbaceous plants as a separate group are strong. In the following outline and diagram the dicotyledons are grouped around eight genera: *Magnolia*, *Ulmus*, *Cistus*, *Dianthus*, *Geranium*, *Myrtus*, *Ligustrum* and *Rubia*. The arrangement, using the words of Rendle, "does not claim to be strictly phylogenetic."

Magnolia Group (Magnoliflorae)—Perianth parts separate, stamens often many, carpels usually separate or single.

| | |
|---|---|
| Magnoliales | Rosales |
| Ranales | Leitneriales |

The subsequent groups have generally united carpels.

Ulmus Group (Ulmiflorae)—Usually without petals, often only one seed per ovary, often catkin-bearers.

| | |
|---|---|
| Urticales | Fagales |

Wind-pollination is ill adapted to the diversity of tropical vegetation. Birches, oaks and hickories grow chiefly in northern and temperate climates where plants of the same species are not far apart and thus present comparatively large surfaces to wind-borne pollen. A single ovule per flower is often associated with wind-pollination, but the fused carpels suggest that the ancestral plants had several ovules. Anatomical characters of this group have recently been summarized by Tippo (3).

CISTUS GROUP (CISTIFLORAE)—Sepals usually separate, placentation usually parietal (that is, separate placentae), stamens and ovules usually many. Parietal placentation precedes axile placentation (2).

| | | |
|---|---|---|
| Cactales (incl. Aizoaceae) | Papaverales | Salicales |
| | Sarraceniales | Passiflorales |
| Cistales | | (incl. Cucurbitaceae) |
| | Aristolochiales | |

This group and the following are connected through *Frankenia-Dianthus*, an affinity recognized by DeCandolle and by Bentham and Hooker. They are also connected through Cactaceae-Aizoaceae-Portulacaceae, a relationship recognized by Schumann and also by Engler, though not expressed in the Engler system.

DIANTHUS GROUP (DIANTHIFLORAE)—Placentation central or basal, embryo often curved.

| | | |
|---|---|---|
| Caryophyllales | Polygonales | Primulales |
| Chenopodiales | Piperales ? | |

The following four groups have in nearly all cases axile placentation, that is, placentae united in the center of the ovary. In or near the Geranium Group must come the Ericales.

GERANIUM GROUP (GERANIFLORAE)—Sepals usually united, stamens usually many or in two whorls.

| | | |
|---|---|---|
| Theales | Rutales | Sapindales |
| Ericales | Geraniales | Celastrales |
| Malvales | | |

For the remaining groups the Engler sequence is approximately followed.

Myrtus Group (Myrtiflorae)—Ovary usually inferior, calyx lobes often very small.

Myrtales Araliales (Umbellales)

Ligustrum Group (Ligustriflorae)—Sympetalous, ovary superior.

Ebenales Solanales
Loganiales (Contortae) Borraginales

Rubia Group (Rubiflorae)—Sympetalous, inflorescence usually dense, ovary inferior.

Rubiales Asterales

*Casuarina*, *Balanops*, *Myrica*, Proteales, Santalales, *Euphorbiaceae* and others have not been included in the above outline. As living plants have not descended from each other, any diagram of them can be only a top view, so to speak, of the tree of evolution. It may aid in understanding affinities, but for practical purposes a linear sequence of plant families is required.

Brooklyn Botanic Garden

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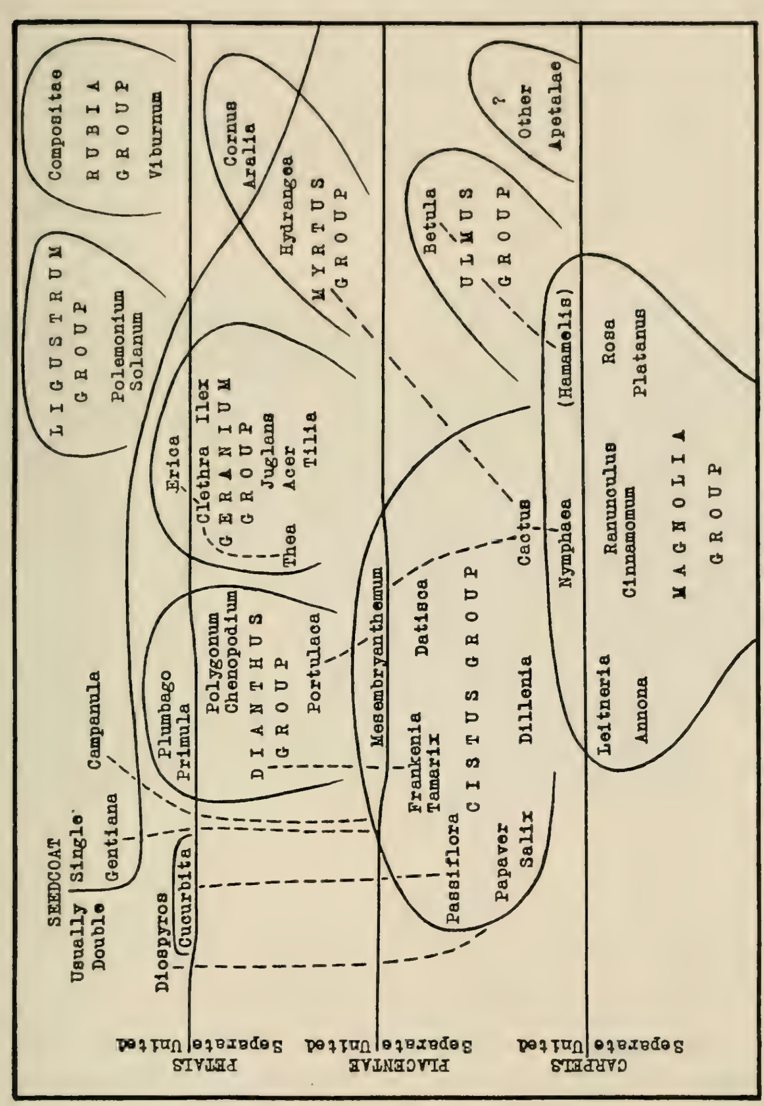

GROUPS OF DICOTYLEDONS (Gundersen 1939)

## A wild double strawberry from Colorado

Edna L. Johnson

Three years ago plants of a wild strawberry, *Fragaria ovalis* (Lehm.) Rydb., bearing double blossoms were observed by Mrs. Earl Davis of Denver, growing in Deer Canyon near Littleton, Colorado. A casual search in the immediate vicinity indicated that all the strawberry plants bore normal single blossoms with the exception of those in this small area.

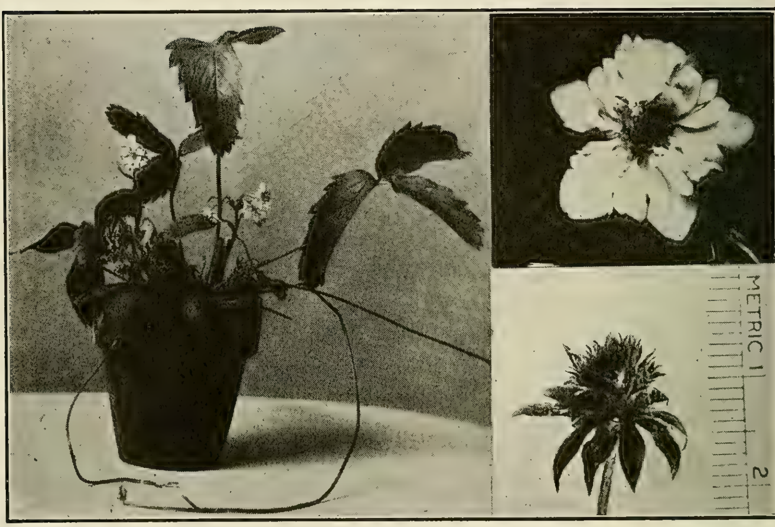


Fig. 1. Wild strawberry plant bearing double flowers. Appearance of garden-grown plants the third spring after transplanting from Deer Canyon; upper right, enlarged flower showing numerous petals developed at the expense of the stamens; lower right, head of sterile leafy bracts which forms in place of a normal, fleshy fruit. A number of these dry "fruits" are evident in the lower left part of the plant.

A few plants were transferred to Mrs. Davis' garden and one was sent to the University greenhouse. Those transplanted to the garden have spread and have borne blossoms for a month or more every spring. The figure represents a plant which was transferred to a pot for photographing.

The plants in the green house bore flowers almost continuously for a couple of years. The petals were greatly increased in number; a few narrow ones had yellow tips indicating that they were transition forms between petals and stamens. True stamens were absent in all flowers.

Normal fleshy fruits have never been produced by either group of transplanted specimens. After the petals had dropped, a subglobose head of green leafy bracts developed but no fleshy receptacle was observed. Since the bract-like structures bore no seeds, it has been impossible to determine whether or not the double-flowered wild strawberry is a true mutation. All plants developing from runners, however, have continued to bear double blossoms.

University of Colorado
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# BOOK REVIEWS

## Fassett's The Leguminous Plants of Wisconsin*

H. N. Moldenke

Here is a fine book by a careful and thorough worker. A great many more similar works are sadly needed before we will have any clear and accurate conception of the flora of North America, and it is to be hoped that Dr. Fassett will contribute at least some of these. While the present contribution deals officially only with the leguminous plants of Wisconsin, a great amount of information about the 97 distinct recognized species and varieties of this state, is included which is of great interest to workers in other regions, including our own. Outline maps are included showing the known distribution of each species in Wisconsin, while other maps show the known distribution throughout North America, including, of course, the Torrey Botanical Club range. The material preserved in the herbaria of 24 institutions forms the basis of these maps and it is a distinct relief to see here a worker who does not content himself with examination of the material in only one or two herbaria. The 24 plates and 59 text figures are excellent in every respect, and are exceedingly well chosen to illustrate the salient points of difference between genera and species so often missed in more pretentious descriptions or illustrations. No less than five separate keys to the treated genera and species are included: one based on vegetative characters, one based on flowers, one based on fruit, one based on seeds, and one based on epidermal outgrowths. The value of such a system of multiple keys will be apparent at once to everyone who has attempted to identify plants either in the field or from material sent in by amateur collectors, when the plants are either not in flower or fruit or the material sent is very fragmentary.

It is also a distinct relief to the reviewer to note that Dr. Fassett apparently still holds to the old concept of varieties and forms as distinct from the species proper and does not adopt the

* The Leguminous Plants of Wisconsin. The Taxonomy, Ecology, and Distribution of the *Leguminosae* Growing in the State without Cultivation, by Norman C. Fassett, with drawings by Richard I. Evans and a study of epidermal outgrowths by Catherine Mose. University of Wisconsin Press. i–xiii. 1–157. 24 plates. 59 figs. 1939. $3.

trinomial system of nomenclature so general among zoologists and becoming, alas, more and more prevalent among botanists, wherein the species is considered to be sum of all its varieties and forms and the specific name is repeated or a "var. *typica*" is added to every species in which varieties or forms have been segregated,—a decided step back toward the polynomial nomenclature from which Linnaeus' binomial system attempted to save us. Thus, Dr. Fassett has a map for *Amorpha canescens* and also one for *A. canescens* f. *glabrata*, and one for *Tephrosia virginiana* and one for *T. virginiana* var. *holosericea*.

A statement on page 36 is worthy of emphasis. The author notes there that he is unable to present maps for the various species of *Trifolium*, *Melilotus*, and *Medicago* because these genera, being in large part roadside weeds escaping from cultivation, have been less systematically collected and are therefore more poorly represented in herbaria than are native members of the family. This illustrates well one of the unfortunate results which obtain when collectors insist on collecting only the scarce or native plants and do not condescend to collect introductions and weeds. Because of this practice and the equally general practice of herbaria to refuse to retain specimens of common plants or weeds which are sent in, we actually know far less about the introduction, spread, and distribution of weeds and common plants than we do of the scarce or rare native ones. To keep the picture balanced collectors should collect *all* the plants of a region in which they are working and herbaria should retain *all* plants, whether rare or common, native or introduced, wild or cultivated, which are sent in.

Several changes in nomenclature brought out in this work will be of interest to students in the Torrey Botanical Club area. The plant which we have been so generally calling *Desmodium grandiflorum* or *Meibomia grandiflora* should be known as *D. acuminatum* (Michx.) DC. The plant we have been calling *Lathyrus maritimus* should be *L. japonicus* var. *pellitus* Fernald and var. *glaber* (Seringe) Fernald. The plant we have been calling *Apios tuberosa* or *A. apios* is actually *A. americana* Med., while our hog-peanut, known hitherto as *Amphicarpa monoica* or *Falcata comosa*, should, under the present International Rules of Nomenclature, be known as *A. bracteata* (L.) Fernald.

Interesting varieties and forms of plants common in our area are described in this work and members of the Club in our area ought to be on the watch for them. Among these are *Gleditsia triacanthos* f. *inermis*, *Lupinus perennis* var. *occidentalis*, *Tephrosia virginiana* var. *holosericea*, *Desmodium nudiflorum* f. *foliolatum* and f. *personatum*, *Amphicarpa bracteata* var. *comosa*, and pale-flowered and white forms of *Trifolium pratense*.

## Muenscher's Poisonous Plants of the United States*

G. T. Hastings

Plants that we have regarded as friendly, or at least as harmless, are revealed in this book by Professor Muenscher of Cornell University as treacherous enemies that may injure us or our domestic animals. The first section of the book deals with the nature of plant poisons, classifying them as skin irritants, as the cause of photosensitization in animals that eat them, cyanogenetic plants, seleniferous plants, or of half a dozen other types. By far the greater part of the book is taken up with descriptions of several hundred plants known to be poisonous—"all the vascular plants of the United States known to cause poisoning when eaten, by contact, or by mechanical injury to man or animals are included." The arrangement is botanical, by orders and genera. For each plant the botanical characters, range, poisonous principle, symptoms of poisoning and treatment is given. About a hundred plants are listed as causing dermatitis, but only a dozen of these affect many people. Others such as ailanthus, Queen Ann's lace or wild carrot, buttercups, Alsike clover, and sheep sorrel, are troublesome to only a few people or under unusual conditions. Possibly if it were generally known that Cypripediums cause dermatitis very frequently, it would help in conserving these beautiful flowers. The prevention of poisoning by the species of Rhus and the treatment to be followed after poisoning are given in detail.

Many of the plants described poison animals that eat them, but are rarely eaten if other food is available, and the great majority are seldom or never eaten by man. It is surprising to find sorghum, lily of the valley, iris, marsh marigold, Dutch-

* Poisonous Plants of the United States. Walter Conrad Muenscher. xvii+266 pages. 75 plates. The Macmillan Co. 1939. $3.50.

man's-breeches, wild mustard and other common plants included in the book, but one need not fear these as long as he does not eat the plant or the particular part containing the poisonous principle.

This book may be considered as a companion volume to Medsger's *Edible Wild Plants*, also published by Macmillan. Some plants,—bracken, cowslip, ground cherry, mandrake, to name a few—are listed in both books. In some cases the plant is edible if cooked and poisonous if eaten uncooked; in others unripe fruits are poisonous, ripe ones wholesome. This is the only up-to-date book on the subject of poisonous plants, is as complete as it is possible to make it, written so as to be intelligible to everyone, and attractive with its many illustrations. Several hundred references to the literature, mostly articles in journals and government and state publications are given.

## FIELD TRIPS OF THE CLUB

### Trip of May 7, 1939, to Croton Lake

Thirteen members and guests were present on this trip to the vicinity of Croton Lake, N. Y. This was the first time the Club has ever scheduled a trip to this precise locality and it was made possible this year through the kindness of the Gerding family, Mr. W. H. Oliver, and Miss Viola Richtberg, to whom the Club tenders its most sincere thanks. The day was spent in exploring the shores of a little artificial lake about half a mile from Croton Lake and in climbing over the cliffs and through the woods and swamps bordering it. In the waters of the lake quantities of *Utricularia macrorhiza*, *Callitriche palustris*, and *Isnardia palustris* were seen, and on the margins, *Scirpus lineatus*, *Ludwigia alternifolia* (last year's stems), and great quantities of *Lythrum salicaria* (last year's stems and small new basal shoots). In the swamps stands of *Symplocarpus foetidus*, *Veratrum viride*, *Caltha palustris*, *Viburnum cassinoides*, and the characteristic tussock sedge (*Carex stricta*) proved of interest, and, along little woodland streams, *Chrysosplenium americanum*, *Cardamine bulbosa*, and *Viola pallens*. In the woodlands some specimens of *Dicentra cucullaria*, *Hepatica americana*, and *Erythronium americanum* were still found in bloom, and hundreds of examples of *Anemonella thalictroides*, *Anemone quinquefolia*, *Panax trifolia*, *Oakesiella sessilifolia*, *Geranium maculatum*, *Benzoin aestivale*, *Arisaema triphyllum*, *Chimaphila maculata*, *Aralia nudicaulis*, *Trillium erectum*, *Viola conspersa*, and *V. triloba*. One plant of the color variant, *Trillium erectum* var. *flavum*, was observed. Among the rocks on the cliffs were found large stands of *Asarum canadense*, *Micranthes* (*Saxifraga*) *virginiensis*, *Arabis laevigata*, *Polypodium virginianum*, *Mitchella repens*, *Caulophyllum thalictroides*, and *Maianthemum canadense*, and scattered columbine (*Aquilegia canadensis*). Common everywhere, and conspicuous because of being in full anthesis, were two sedges, *Carex pennsylvanica* and *C. platyphylla*, the wood-rush (*Luzula campestris* var. *multiflora*), and the sweet-fern (*Comptonia peregrina*). Two buttercups were found, *Ranunculus abortivus* and *R. hispidus*. Last year's fruiting-stalks of *Lespedeza hirta*, two species of pinweed (*Lechea villosa* and *L. minor*), *Verbena hastata*, *Oenothera biennis*, and *Gerardia purpurea* gave practice in the identification of plants at seasons other than their blooming season. The matted panic-grass (*Panicum meridionale*) was found in recently filled-in soil. Discovery of *Viola rotundifolia*, *Mitella diphylla*, *Pinus virginiana*, *Camptosorus rhizophyllus*, *Cardamine pennsylvanica*, and two species of wintergreen (*Pyrola elliptica* and *P. americana*) formed one of the highlights of the trip. Both species of hornbeam (*Ostrya virginiana* and *Carpinus caroliniana* var. *virginiana*) were abundant, as well as *Amelanchier canadensis*, *Azalea nudiflora*, *Diervilla lonicera*, *Rubus allegheniensis*, *R. occidentalis*, and *R. procumbens*, and numerous forms of mosses and lichens identified by Mr. G. G. Nearing. A few plants of *Fissipes acaulis* and a tremendously large tree of *Sassafras albidum* var. *molle* were observed. Among fungi were noted *Phyllosticta kalmicola*, *Bulgaria melastoma*, *Daedalea quercina*, and four polypores—*Coriolus pubescens*, *Hapalopilus gilvus*, *Piptoporus suberosus*, and *Pycnoporus cinnabarinus*.

H. N. Moldenke

## Trip of May 12 to 14 to Mohonk Lake, N. Y.

The mid-spring outing to the Shawangunks was held May 12 to 14. It had been scheduled two weeks later than in the past several years in order to give a different aspect of spring flowers and birds. Due to the unusually late spring, many early blossoms had been held back with the consequence that both early and mid-spring flowers were in bloom at the same time. The weather during the trip was delightful for walking. On Sunday morning there was a white frost.

On Saturday about 4½ miles were covered, the route leading off to the south down a heavily wooded slope into the dogwood country. It was cool enough so that a fire felt good at lunch time. Sandwiches from our box lunches were toasted. In the afternoon we walked through open country along the upper edge of the valley fields. Near an old Huguenot house foundation an outdoor Dutch oven was observed. Kleinekill Lake was visited.

The Sunday morning objective was Rhododendron Swamp. Here is found cool water and acid soil. In the brook leading out of the swamp a small oval stone was noticed. From its shape and general smoothness, (with a roughened area at one end), we guessed that it had once been an Indian pestle. It was easy to imagine just how it might once have been held in an Algonquin squaw's coppery fingers. At the north end of the swamp two kinds of salamander eggs were noted. In stagnant pools there were several masses belonging to Spotted Salamanders. It is said to be exceptionally late to find the eggs of this species. Near an old rotted plank there was a cluster of eggs covered with leaves which may be something rare. A few have been collected for identification.

As an example of early and late blossoms, Arbutus still had flowers, while not far away Pink Azalea was almost out. Both the Yellow and Pink Lady's Slippers were in bloom, the former is relatively rare except in a restricted area. Both Red and Painted Trilliums were noted. Many violets were seen, including one clump of *Viola rostrata.* Showy Orchis and *Polygala paucifolia* were in prime condition. Crinkleroot and False Gentian were seen in bloom in Rhododendron Swamp, but Clintonia and Goldthread were not yet in flower. Hobble-bush was fully out. The Dogwood (florida) was at its best and made a particularly fine display because of the great size of the bracts or "petals." Near some of the abandoned farms were a few apple trees, gone wild. In the natural setting their beauty was particularly impressive.

A total of 40 different species of birds were identified; the following are probably most worthy of note: Turkey Vulture, Ruffed Grouse (drumming), Mourning Dove in dense woods, drilling of the Pileated Woodpecker, Winter Wren in song, Hermit and Wood thrushes singing at the same time, Blackburnian Warbler abundant and singing, Myrtle Warbler (migration late), Magnolia Warbler, Louisiana Waterthrush singing, Ovenbird flight song, White-throated Sparrows and Juncos.

DANIEL SMILEY, JR.

## TRIP OF MAY 19 TO 21 TO BRANCHVILLE, NEW JERSEY

On this fifteenth nature conference at the Pines, eighty-two members and friends of the club, including members of the Newark Museum Nature Club, had a delightful weekend. The evening programs included illustrated talks by Dr. Kummel on Flowers of Florida and by Dr. Curran on Insects We Eat, and the showing of colored moving pictures of the Pine Barrens by Dr. Small and of California by Mr. Hastings.

Bird trips were led by Mr. Russel Evans before breakfast each morning, on Saturday and Sunday mornings and Saturday afternoon. The birds seen totaled 93 species, two being new record for these nature outings, bringing the total number of species seen during the fifteen years to 103. One of the birds seen for the first time was the short-billed marsh wren, two birds swung on the grasses and sang so that the whole group had splendid opportunity to see and hear them. The other new record was of the bald eagle. Two were seen circling over head and one perched on a dead tree in the swamp at the end of Culver Lake with red-wing black birds worrying it.

Insects were studied, under the leadership of Dr. C. H. Curran, in the woods, fields and the lake and brook. Besides observing a great variety in various stages of development, some members of the party tried photographing them.

Geology trips were led by Dr. Henry Kummel. This was the tenth year he has led these trips, for which he has always made careful plans so as to see as much of the geological history of Northern New Jersey as possible. The last of the geological trips was to High Point where the main features of the region could be observed, from the mountains of Pennsylvania beyond the Delaware River on the west to the mountain ridges of the Jersey Highlands on the east.

Botanical trips were about the grounds and in the woods near the inn, led by Dr. Graves; and to a swamp area south of Newton where a small lake was seen, the margins yellow with golden club, *Orontium aquaticum*, and water buttercup, *Ranunculus delphinifolius*. In the woods beautiful plants of the showy orchid, *Orchis spectalilis* were seen. Sunday morning a trip was made to the Stokes State Forest. Near the forest on a rather barren bank were many plants of lupine, *Lupinus perennis*, and above at the top of the bank two scrub oaks, *Quercus ilicifolia* and *Q. prinoides*. The crest of the mountains in the Forest bears a pitch pine-chestnut oak association in which many pink lady's slippers, *Cypripedium acaule*, and birds-foot violet, *Viola pedata*, were found. On the slopes lower down the hemlocks and red oaks were the dominant trees with quantities of the fringed polygala, *Polygala paucifolia*, growing along the road side. Still lower was swampy ground with red maples and elms.

In hillside fields to the west of the forest were great masses of two members of the figwort family, the wood betony, *Pedicularis canadensis*, some plants with deep red flowers and red tinged leaves, others with pale yellow flowers and bright green leaves, and standing above them the brilliant painted cup or Indian paint brush, *Castilleja coccinia*, with scarlet tipped bracts below the greenish flowers.

In the same field three Vacciniums, *pennsylvanicum*, *vacillans*, and *corymbosum* and two Gaylussacias, *baccata* and *frondosa*, were in bloom.

At the Sunday dinner Professor Oliver P. Medsger told of the first Branchville Nature Outing which he organized in May, 1925. In the lobby of the inn a list of the plants collected on that first field trip was posted, the list was prepared by Dr. Gleason and Professor Medsger. Profesor Medsger spoke of the interest in plants shown by Mr. Stephen R. Smith who joined the Torrey Club in 1925 and arranged for the accommodations of the Club on these nature outings. Since the death of Mr. Smith in 1937, Mrs. Smith has continued the arrangements for the comfort of those attending the conference. As in other years those attending found nothing left undone that might contribute to the success of the occasion. The thanks of the Club are extended to Mrs. Smith and to Mr. Wallace Husk, business manager of the Pines.

George T. Hastings

## A Correction

When the writer (Torreya **39**: 6. 1939) recently listed *Alyssum gemonense* Linn. from Oneida Co., N. Y., he overlooked the earlier name, *A. petraeum* Arduini. The nomenclatorial citation should have read: *Alyssum petraeum* Arduini, Animadvers. botan. spec. alt. p. 30. pl. 14, 1764. (*A. gemonense* L. Mantissa plant. p. 92. 1767. *A. medium* Host. Fl. Austr. **2**: 244. 1831).

Robert T. Clausen

## NEWS NOTES

The Annual Report of the Brooklyn Botanic Garden for 1938, just published, calls attention to the fact that the private funds budget of the Garden was more than 56% of the total operating budget, the City of New York contributing about 44%. The attendance at the Garden in 1938 was more than 1,628,000. Eighteen pages of the Report are devoted to the results of scientific research done at the Garden in 1938. This included studies in disease resistance in plants, on the Iris and its diseases, on classification of various groups of flowering plants, on variation in ferns, and studies of economic plants.

Dr. James G. Horsfall, chief in research in plant pathology at the State Experiment Station at Geneva, N.Y., since 1929, has been appointed head of the department of plant pathology and botany at the Connecticut Agricultural Experiment Station at New Haven.

In Science for May 5, 1939, there is a short description of the development of seedless watermelons, cucumbers and peppers by the application of various plant hormones to the cut ends of styles of the flowers. The substances used were indolebutylic and napthalene acetic acids. The work was done by Dr. Cheong-yin Wong at Michigan State College.

Back Sets and Numbers of Club Publications. The treasurer now has a complete inventory of all stock on hand. Information regarding back numbers of the *Bulletin*, Torreya, the *Memoirs*, and *Index Cards* can be secured from the treasurer. He also has a few reprints of the article entitled "Raymond H. Torrey" from the Bulletin. These reprints are bound in paper and include a portrait of Mr. Torrey. They can be secured for 25 cents a copy. Address Dr. Harold N. Moldenke, New York Botanical Garden, Bronx Park, New York.

Dr. Harold St. John, professor of botany at the University of Hawaii, has been appointed Bishop Museum visiting professor of botany at Yale University for 1939–40.

THE UNIVERSITY OF MINNESOTA Botanical Expedition, with Dr. Ernst C. Abbe in charge, is studying the plants and plant distribution on the east coast of Hudson Bay at Richmond Gulf.

DR. GEORGE ELWOOD NICHOLS, professor of botany and director of the Botanical Gardens at Yale University, died on June 20 at the age of fifty-seven years.

DR. T. G. YUNCKER, professor of botany at DePauw University, is spending a year in the South Pacific making collections and studying the flora of southeastern Polynesia on a Yale-Bishop Museum fellowship.

CAPT. F. KINGDOM WARD, English plant explorer, was the guest of honor at the celebration of Botanical Day at the "Gardens on Parade" of the New York World's Fair on July 17. As a feature of the day members of the New York and the Brooklyn Botanical Gardens established a "clinic" in the rotunda of the exhibit and answered questions of visitors concerning plant and garden problems.

THE JOHN BURROUGHS ASSOCIATION desires to get in touch with all organizations in the United States and elsewhere that have been organized in honor of John Burroughs.

The purpose: To learn whether such groups would be interested in a yearly publication containing reports from these various units, as well as articles about John Burroughs.

Please communicate with Dr. Clyde Fisher, President, at the American Museum of Natural History, 77th Street and Central Park West, New York City.

# THE TORREY BOTANICAL CLUB

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The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–18 are now completed. Volume 17, containing Proceedings of the Semi-Centennial Anniversary of the Club, 490 pages, was issued in 1918, price $5.00.

Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

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(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

HAROLD N. MOLDENKE,
New York Botanical Garden,
Bronx Park,
New York, N.Y.

Volume 39 September-October, 1939 Number 5

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A Bi-Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

GEORGE T. HASTINGS

John Torrey, 1796-1873

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GEORGE T. HASTINGS, 2587 Sedgwick Ave., New York, New York

# TORREYA

Vol. 39 September-October, 1939 No. 5

## Contributions to the Flora of New Jersey

Robert T. Clausen

Recent collecting in various parts of New Jersey has led to the preparation of the present report. Names of herbaria are abbreviated as (BH) Bailey Hortorium of Cornell University, (Claus) private herbarium of R. T. Clausen, (Corn) herbarium of the Department of Botany of Cornell University, (Edw) private herbarium of J. L. Edwards, (NY) herbarium of the New York Botanical Garden, and (Ph) herbarium of the Academy of Natural Sciences of Philadelphia. Collectors most frequently mentioned are indicated as *C,* R. T. Clausen; *E,* J. L. Edwards; and *M,* K. K. Mackenzie.

Isoetes Engelmanni. A Br. Pfeiffer (1922) studied material from only three counties in New Jersey: Bergen, Camden, and Sussex. Small (1935) considered the species to be general in the vicinity of New York (including New Jersey), but specimens are not available to substantiate this belief. Actually the species is unknown from the pine-barrens and coastal region. Indeed, except for the specimens previously cited from Camden County, it seems to be absent from the coastal plain in New Jersey. Plants from Bennett, Cape May Co., are probably *I. melanopoda* Gay and Durieu.

Bergen Co.: Oradell, *M 742* (NY). Camden Co.: reported by Pfeiffer (1922). Middlesex Co.: Iselin, *E & C 1721* (Claus). Morris Co.: Denville, *E* (Claus, Edw); Pine Brook, *E* (Claus, Edw); Splitrock Pond *E* (Claus, Corn, Edw). Passaic Co.: Oak Ridge, *M 3187* (NY); Pequannock, *M 3803* (NY); Charlotteburg, *E. G. Britton* (NY); Greenwood Lake, *W. C. Muenscher* and *O. F. Curtis, Jr. 5379, 5380, and 5381* (Corn). Somerset Co.: Rock Mill, *E. T. Wherry* (Ph). Sussex Co.: Montague, *E & C 163* (Claus, Edw); Lake Hopatcong and Wawayanda Lake, *fide* J. L. Edwards. Union Co.: *fide* J. L Edwards. Warren Co.: above Phillipsburg, *M 5170* (NY).

Pellaea glabella Mett. ex Kuhn. When Butters (1917) published on the status of *Pellaea glabella* he did not mention any records from New Jersey. Lewis (1924) reported it from the Highlands of the Delaware below Phillipsburg and other writers have referred to isolated collections in the northwestern part of the state, but no attempt has been made to summarize available data. Small (1935) stated that the species occurs throughout our range (including New Jersey), except the coastal plain, but the writer has seen specimens from only two counties in northwestern New Jersey. There the species is locally distributed wherever there are exposures of limestone. It sometimes occurs in association with *P. atropurpurea,* but at such localities usually grows in more exposed places on the cliffs than does its close relative.

Sussex Co.: limestone ledge along Walkill River near Owens, *E & C 62* (Claus, Corn, Edw), also *A. N. Leeds 571* (Ph); south of Springdale, *E & C 63* (Claus, Edw); south of Branchville, *A. N. L. 292* (Ph); northwest of Brighton, *A. N. L. 566* (Ph); east of Huntsburg, *A. N. L. 567* (Ph); south of Huntsburg, *A. N. L. 568* (Ph); northwest of Lafayette, *A. N. L. 570* (Ph); also six other stations, *fide* J. L. Edwards. Warren Co.: Johnsonburg, *E & C 1201* (Claus, Edw); also *A. N. L. 569* (Ph); Mud Pond, Stillwater, *M* (NY); also three other stations, *fide* J. L. Edwards.

Pinus resinosa Ait. Sussex Co.: summit of Breakneck Mt., 1400 ft., April 4, 1936, *E & C 2096* (BH, Corn). This seems to be the first record of the occurrence of the Red Pine in New Jersey.

**Pinus rigida** ssp. **serotina** (Michx.) n. comb. (*Pinus serotina* Michx., Flor. Bor. Am. **2**: 205. 1803. *Pinus rigida* var. *serotina* Loud., Arb. et Frut. Brit. **4**: 2242. 1838.) Long (1909) first recorded this pine from New Jersey, from the margin of a swamp about two miles northwest of Swedesboro, Gloucester County. His specimens had pale leaves, 15–20 cm. long, with the sheaths longer than in *P. rigida*, and with the spines of the cone-scales very minute and mostly deciduous.

The writer became interested in the taxonomic problem of the relationships of the Pitch and Pond Pines as the result of collecting specimens at West Cape May which were intermediate between the two supposed species. This led to a review of herbarium specimens of New Jersey material available under the two names, also a survey of series of specimens from Massachusetts and intermediate states to Florida. Length of leaves and leaf-sheaths, nature of the prickles on the cone-scales, and geographical range have been the three most important characters for separating these two populations. Of these, range should be at once excluded as no basis for specific segregation. The nature of the prickles on the cone-scales is tremendously variable. In *P. rigida* the prickles are usually stated to be stout, while in *P. serotina* they are said to be small, slender, and deciduous, or obsolete. Actually, this criterion is impossible to apply. The writer has seen short-leaved specimens of *P. rigida* from Massachusetts and New York in which the prickles were very slender and mostly deciduous. He has also seen long-leaved specimens of *P. serotina* from coastal North Carolina in which the prickles were stout. In view of such a condition, this character, though perhaps indicating a tendency, is exceedingly difficult to use in making determinations of individual specimens.

Length of leaves remains as the best basis for identifying trees as *P. rigida* or *P. serotina,* but this character exhibits a geographical gradient, as shown in the following table.

| | *No. of collections tions measured* | *Extremes in length* | *Average length* |
|---|---|---|---|
| Massachusetts[1] | 7 | 5–12 cm. | 7.9 cm. |
| Central New York | 7 | 6–14 | 9.1 |
| Southern New York | 6 | 7–12 | 8.9 |
| Northern New Jersey | 4 | 5–11.5 | 9.3 |
| Southern New Jersey | 13 | 7–23 | 13.5 |
| Maryland | 3 | 8.5–14 | 11.8 |
| North Carolina | 6 | 8–17.5 | 13.9 |
| South Carolina | 3 | 10.5–18 | 15.4 |
| Georgia | 2 | 13–21 | 16.8 |
| Florida | 4 | 15.5–20 | 17.6 |

[1] Professor G. T. Hastings has recently sent to the writer leaf-clusters from trees at Cape Ann, Massachusetts, of which the extremes in length are 4.7 cm. and 14.2 cm. These exceed in both directions the measurements made in the above study.

The average for southern New Jersey is perhaps higher than it ought to be because more specimens from Cape May County were measured than from elsewhere. Since from southern New Jersey southward there are trees with the leaves 15 cm. or more long and since this length previously has been used as the dividing line, it might be considered as the arbitrary median between the two populations which the writer prefers to consider as subspecies.

Length of sheaths[2] has been ignored because its variation seems directly proportional to the variation in the leaves. Sheaths subtending long leaves are proportionally longer than those subtending short leaves. As a taxonomic character in this group, sheath-length is really a repetition of leaf-length.

Specimens typical of ssp. *serotina* have been seen from three counties in southern New Jersey. Cape May Co.: Cold Spring, *Bayard Long 5744* (Ph). Cumberland Co.: Ocean View, *Henry Fox* (Ph), this collection is on the border-line. Gloucester Co.: Swedesboro, *Bayard Long* (NY), also *B. H. Smith* & *C. D. Lippincott* (Ph).

Although specimens from low elevations from southern New Jersey to North Carolina collectively are intermediates, yet in any region there are likely to be trees which are more one way than the other. New Jersey collections which are in the middle, true intermediates, are cited from two counties. Cape May Co.: West Cape May, *W. C. Wilson, J. Tanner,* and *C 2349* (BH, Corn); Cape May Court House, *Witmer Stone 11742* (Ph); Nummytown, *S. S. Van Pelt* & *Witmer Stone* (Ph); Cold Spring, *O. H. Brown* (Ph); Dennisville, *W. Stone 7473* (Ph); Cape May Point, *C. A. Williamson* (Ph). Cumberland Co.: Dividing Creek, *F. W. Pennell 14870* (Ph).

Potamogeton angustifolius Berch. & Presl. Morris Co.: rooted on muddy bottom on west side of Budd Lake, *E, C, et al 1737* (Corn).

Taylor (1915) reported this only from Sussex and Warren Counties. The writer has seen no other New Jersey collections.

Potamogeton capillaceus Poiret. Middlesex Co.: shallow backwater of Lawrence River about one mile southwest of Milltown, *E & C 1731*. Morris Co.: on sandy bottom at southern end

[2] In this discussion, only sheaths still intact are considered. The breaking away of the sheath in old leaf-clusters causes this character to vary tremendously, with the result that the oldest leaves may have the shortest sheaths. Statements made apply to leaf-clusters of the same age.

of Green Pond. *A. P. Clausen & C 1728*, also *1729*. Passaic Co.: pool at base of Wolf Den Mt., Upper Mocopin, *E*.

From northern New Jersey, Fernald (1932) reported this species only from ponds near Milton and from Moosehead (?) Pond, Morris County.

Potamogeton panormitanus var. major G. Fischer. Ocean Co.: brackish backwater, Mantoloking, *E & C 1402*.

Fernald (1932) reported this species from New Jersey only from Closter.

***Sagittaria graminea*** ssp. ***Edwardsiana*** (Clausen) n. comb. (*Sagittaria Edwardsiana* Clausen, in Rhodora **39**: 30. 1937.) Two years of additional experience and further study of the genus *Sagittaria* have caused the writer to alter his opinion concerning the specific validity of *S. Edwardsiana*. The arrow-head of the New Jersey pine-barrens still seems distinctive, but the significance of its distinctness now appears less great to him than when he originally published the species. Examination of series of seeds of *S. graminea* indicates that these vary more than at first supposed and that those of *S. Edwardsiana* come within this range of variation. The foliage characters remain fairly satisfactory, although occasional intermediates with the typical *S. graminea* do occur. The habit, too, continues to appear significant and indicates that this population of the New Jersey pine-barrens can not lightly be disregarded as a deep-water form of *S. graminea*. Observation of abundant *S. graminea* in the lakes of northern New York, where one can see all stages, from plants on shore completely emersed to those under several feet of water, revealed no plants like those described by the writer. Plants in some of the outlets, under conditions very similar to those in southern New Jersey, never matched them in the succulent phyllodia, the absence of a rosette of flattened basal leaves, or the trailing habit. New York plants always stood up in the water, as does the var. *cycloptera* of Smith (1895), described from the southeastern states. Attempts to match *S. Edwardsiana* with that variety have been unsuccessful. Instead, the New Jersey population seems unique in the three characters mentioned above. Although its differences perhaps were originally the result of environmental influences, the writer ventures the opinion that it today represents a distinct genetical race which takes the place of typical *S. graminea* in the region of the pine-barrens. Because of its geographical and ecological homogeneity, it now seems best to consider this population as a subspecies. Collections from along the Delaware River and from southern New Jersey outside the pine-barrens represent the typical race. Only a few specimens from these places are intermediate in character.

Collections additional to those cited with the original description of *S. Edwardsiana* are now listed. Atlantic Co.: Pleasant Mills, near mouth of Hammonton Creek, *Bayard Long 4658* (Ph). Burlington Co.: Wading River, *W. H. Leggett* (NY); swift flowing water, Batsto River n. n. w. of Quaker Bridge, *Bayard Long 7736* (Ph), also *7743* (Ph); *S. W. Conrad* (Ph). Gloucester Co.: Willow Grove near Newfield, *C. A. Gross* (Ph).

Intermediate specimens have been seen from two counties in New Jersey and from one in Pennsylvania. Burlington Co.: Delanco, *Bayard Long* (Ph) and *H. B. Meredith* (Ph). Camden Co.: Camden, *T. F. Seal* (Ph). Bucks Co.: Mud Island, Andalusia, *C. S. Williamson* (Ph).

Anacharis canadensis (Michx.) Planchon. Although Taylor (1915) reported that he had seen no specimens of this species from our range, the writer has collected it or examined material from Middlesex, Morris, Passaic, and Warren Counties, also doubtful material from elsewhere.

Panicum spretum Schult. Passaic Co.: Clifton, field east of River Drive at Delawanna, *W. Marold* and *C 1221* (BH, Corn). The northernmost previous collection of this species in New Jersey was from Shark River Station, Monmouth Co., *M* (NY).

Carex incomperta Bickn. Although cited from only Burlington, Morris, Passaic, and Union Counties by Taylor (1915) the writer has now seen or collected specimens in Camden, Cape May, Gloucester, Hunterdon, Mercer, Monmouth, Ocean, Salem, and Warren Counties.

Carex brunnescens (Pers.) Poir. Morris Co.: Budd Lake, *W. D. Miller 509* & *510* (NY). Passaic Co.: moist woods in Allwood Swamp, Clifton, *G. S.* & *S. Yerbury* and *C 1782* (Claus). Taylor (1915) reported this only from Sussex County.

ERIOCAULON PARKERI B. L. Robinson. This is now known from tidal shores of back-waters and rivers at several places along the coast from Monmouth County to Atlantic County.

TRILLIUM UNDULATUM Willd. Warren Co.: low woods south of Sand Pond, *J. W. Large & C 1250* (Corn). This was reported by Taylor (1915) from Hudson, Passaic, and Sussex Counties.

RANUNCULUS PUSILLUS Poir. Passaic Co.: marsh west of Bloomfield Avenue at Allwood, Clifton, *G. S. Yerbury* and *C 1546* (Corn). Taylor (1915) reported this as rare and local in Morris and Essex Counties, increasing southward. There seem to be no previous collections from Passaic County.

RUBUS LACINIATUS Willd. Camden Co.: Camden, vacant lot, Kaighers Point, *N. B. Meredith* (NY). Hudson Co.: Secaucus, Snake Hill, *E, C et al 1909* (BH).

Taylor (1915) regarded this as a rare, hardly persisting escape. At Snake Hill, the species seemed well established and thriving.

VICIA VILLOSA Roth. Camden Co.: Camden, *G. W. Bassett* (NY). Cape May Co.: Cold Spring, *M 6981* (NY). Monmouth Co.: Farmingdale, *Norman Taylor 2186* (NY). Passaic Co.: in field at Allwood, Clifton, *G. S. & S. Yerbury & C 1916* (Corn). Taylor (1915) reported this as a waif.

LUDWIGIA SPHAEROCARPA Ell. (var. TYPICA). Sussex Co.: Hopkins Corners, 3½ miles n. n. e. of Lafayette, *C & E 3531* (BH, Corn); shallow water, Decker Pond, *M 7274* (NY).

Taylor (1915) reported this as rare in Bergen and Morris Counties, increasing southward. At Hopkins Corners, the species grew in water one foot deep, at the northern end of a pond-like marsh in a limestone depression, in association with *Scirpus Torreyi* Olney, *Rynchospora macrostachya* Torr., and *Mariscus mariscoides* (Muhl.) Kuntze.

MYRIOPHYLLUM HUMILE (Raf.) Morong. Essex Co.: in a pond about one mile west of Millburn, *M 290* (NY). Morris Co: southern end of Green Pond, *A. P. Clausen & C 1945* (Corn); Mt. Arlington, *M 874 & 891* (NY).

Like *Potamogeton capillaceus*, this species has been considered as rare and local in northern New Jersey.

Verbena bracteata Lag. & Rodr. Sussex Co.: in cinders along railroad ½ mile south of White Lake, Sparta Township, *C & E 3538* (BH, Corn). Taylor (1915) reported this as a waif. Perry (1933) cited specimens from Weehawken and Camden, from both of which localities the writer also has seen material.

Utricularia minor L. Warren Co.: pool at Johnsonburg, June 16, 1934, *E & C 1289* (Corn). This collection unfortunately is sterile, but closely matches authentic material from elsewhere. The species has not previously been recorded from the state.

Lonicera canadensis Marsh. Sussex Co.: along brook in moist hemlock woods between Wawayanda Lake and Moe, *E & C 1294* (BH, Corn).

Taylor (1915) stated that this had been reported, but was not definitely known, from Warren Co., and was otherwise unknown. Specimens are now available (NY) from Cedar Pond and east of Moe, Passaic County, and from Kampe and Wawayanda Lake, Sussex County. These represent collections of K. K. Mackenzie and W. D. Miller. The writer has seen no specimens from Warren County.

Hieracium florentinum All. Passaic Co.: edge of field at southwest corner of Allwood Swamp, Clifton, *G. S. & S. Yerbury & C 2012* (Corn).

This was reported by Taylor (1915) as locally rare as an occasional weed. In addition to the collection cited, the writer has seen specimens from Bergen, Hudson, and Somerset Counties.

Prenanthes racemosa Michx. Morris Co.: roadside at Two Bridges, *A. P. Clausen & C 992* (Corn). This species has otherwise been reported only from Bergen and Hudson Counties.

Bailey Hortorium,
Cornell University,
Ithaca, N. Y.

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## Notes on a Semi-arid Region in the Aguan River Valley, Republic of Honduras*

T. G. Yuncker

The Republic of Honduras, or Spanish Honduras as it is sometimes called to distinguish it from the crown colony of British Honduras, is situated near the geographical center of Central America. It extends across the continent from the Gulf of Fonseca on the Pacific to the Caribbean Sea where the more extensive coast line extends in a generally east-west direction and offers better harbor facilities.

The country has an area of about 46,000 square miles and, in common with the other Central American countries, exhibits a great variety of physiographic features. Along the Caribbean and, to a limited extent, about the Gulf of Fonseca is a low, sometimes marshy, region which varies from a very narrow strip where the mountains occasionally reach the sea to several miles in width. This coastal plain reaches its greatest width in the so-called Mosquitia Territory at the east and also extends inland along the main river courses, especially the Ulua and the Aguan. Excepting this low coastal plain the country is very rough and mountainous. From the plain the land may rise gradually in a series of foothills and plateau-like plains or the ascent may be rapid and abrupt with few or no foothills. The highest mountains are to be found

* I am indebted to Mr. L. A. Richardson of the Standard Fruit Company at La Ceiba, Honduras, for data relative to rainfall, geology of the valley, etc.

toward the Pacific side although a few peaks in the northern coastal range are reported to rise to a height of about 8,000 feet.

The prevailing trade winds blow from the northeast to southwest. As a consequence the northern Caribbean coastal plain and mountain slopes receive an ample rainfall. Plant life is abundant there and the mountain slopes are covered with a luxuriant rain-forest type of vegetation. In parts of the interior many of the mountains are densely forested much as those near the coast, especially towards their summits and in ravines where numerous species of trees, shrubs, ferns (many of which are tree-like), arums, bromeliads, many woody and herbaceous vines, peperomias, etc., grow very rank. In many parts of the interior the rainfall is less, and open, park-like regions with pine and oak forests are predominant. This type of forest is also to be found on the leeward slopes of the northern coastal range. One can find few regions elsewhere where so great a variation of ecological conditions are to be found as in Honduras, and, as Standley has pointed out, probably few areas of equal size yield as great a variety of species. A large part of the country still remains unexplored, botanically speaking, particularly in the mountainous interior and near the Salvador border where the country is especially rough and the mountains, according to report, are covered with a rich vegetation.

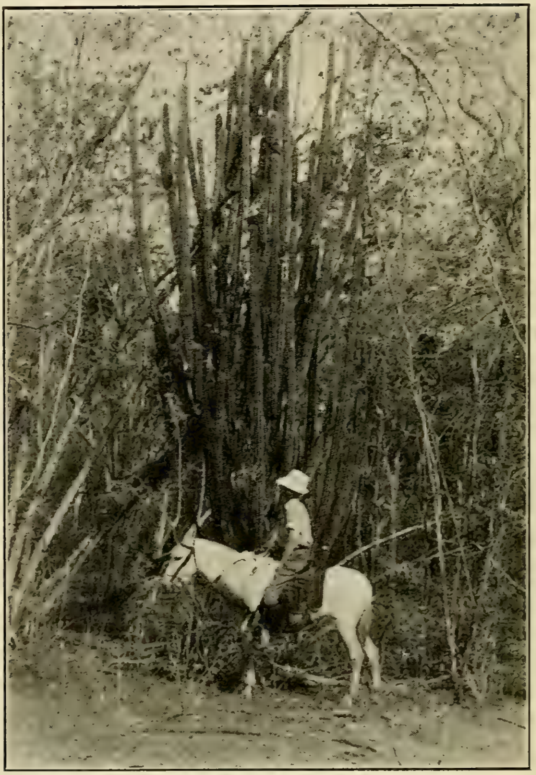
The writer, accompanied by James Koepper and Kenneth Wagner, spent the summer of 1938 from June to the middle of August making plant collections in the department of Atlantida on the slopes of the coastal range in the vicinity of La Ceiba and also along the Aguan River valley in the department of Yoro near the village of Coyoles above Olanchito. The Aguan valley, which lies behind the high coastal range, is especially interesting botanically because of the low rainfall and consequent semi-arid conditions. The period of our visit was during the comparatively dry summer season when only a small percentage of the species were in a flowering or fruiting condition suitable for collecting. Although a number of undescribed species were obtained, undoubtedly a collection made in the spring following the rainy season would reveal many additional and interesting plants.

The Aguan River rises in the mountains in the interior of the department of Yoro and flows in a northeasterly direction to empty into the Caribbean Sea several miles east of Trujillo. Its valley lies between ranges of mountains on the southeast and on the north. The northern range extends in a generally east-west direction near the coast and reaches its highest elevation near the city of La Ceiba where Mts. Bonita and Cangrejal are claimed to be about 8,000 feet in height. The moisture-laden clouds from the Caribbean lose their water on the windward slopes of this northern coastal range and as a result the rainfall of that portion of the Aguan valley region which lies behind these mountains and above the town of Olanchito is much reduced. The precipitation varies considerably at different points in the valley. At Olanchito it is about 50 to 55 inches annually, but farther up the river at Coyoles it is only 35 to 40 inches which is probably the minimum for the valley. Of the total rainfall about 25 percent falls in May and June, 50 percent in October, November and December, and the other 25 percent during January, July, August and September with very little in January and ordinarily none in February, March and April. The rate of evaporation is very high so that, with the exception of that falling during the months of May, June, October, November and December, the rains do but little good. As a result of the low rainfall a part of the valley above Olanchito about 25 miles in length and 2 to 7 miles in width is semi-arid and represents a very unique region in Honduras.

The Aguan River has a good flow of water even in the dry season and in the rainy period overflows its banks and inundates a large amount of bottom land, or vega land as it is called locally. This vega land, which varies considerably in width in different parts of the valley, totals approximately 15,000 acres. It represents recently deposited alluvial soil made up of the sediments of the Aguan River and its tributaries and is quite fertile. The soil is calcareous in nature, indicating that the walls of the mountains adjacent to the headwaters are evidently chiefly limestone and marl.

Rising abruptly from the vega land to a height of about sixty feet is a bench or plateau-like area the soil of which is also calcareous and apparently represents an old alluvial terrace formed by the meandering of this same Aguan River. Near Coyoles the bench is about 495 feet above sea level but slopes gently upward toward the bordering mountains. It has an average width of about 3,000 feet and merges with soils representing typical outwash formed by the erosion of the mountains.

Apparently the valley was originally more or less completely wooded. At the present time all but about 1,500 acres of the vega land is cleared. About 75 percent of the plateau-like bench, how-



A large *Cereus* is common in the semi-arid plateau region.

ever, remains wooded. Here and there on the bench occur cleared, oasis-like areas usually adjacent to old stream beds which are largely planted with grass for pastures as is also a large part of the vega land. During the rainy season corn and beans may also be grown there and, with the aid of irrigation, large banana plantations have been developed.

Mammoth ceiba (*Ceiba pentandra* (L.) Gaertn.) and guanacaste (*Enterolobium cyclocarpum* (Jacq.) Griseb.) trees are still to be found but many have been destroyed to establish plantations or for timber. However, most of the trees, especially on the bench, are small to medium size, forming a low-topped forest.

The river is bordered with a fringe of trees and a dense thicket of shrubs, lianas, etc. Along the river and on the sand and gravel bars one finds a variety of woody and herbaceous species mostly of wide distribution and often of a weedy nature, e.g., *Cenchrus echinatus* L.; *Mimosa pigra* L.; *Polygonum persicarioides* HBK.; *Solanum nudum* HBK.; *Tridax procumbens* L.; *Jussiaea repens* L.; *Crotalaria retusa* L.; *Prophyllum punctatum* (Mill.) Blake; *Commelina elegans* HBK.; *Cyperus rotundus* L.; *Trichachne insularis* (L.) Nees; *Scoparia dulcis* L.; *Borreria laevis* (Lam.) Griseb.; *Polypremum procumbens* L.; *Oxalis Neaei* DC.; *Lobelia splendens* Willd.; *Pistia Stratiotes* L.; *Cissus sicyoides* L.; *Portulaca pilosa* L.; *Portulaca oleracea* L.; *Croton lobatus* L.; *Cassia occidentalis* L.; *Mimosa pudica* L.; *Muntingia Calabura* L.; *Talinum triangulare* (Jacq.) Willd.; *Lippia nodiflora* (L.) Michx.; *Lippia repens* HBK.; *Lantana Camara* L.; *Priva lappulacea* (L.) Pers., etc.

A much more interesting area for the botanist, however, is the bench where the most arid conditions seem to prevail and which is largely forested. In some places the growth is moderately open and one can move about easily but much of it is dense and entangled with numerous lianas which, together with the fact that many of the species are armed, make it necessary to do considerable cutting with a machete in order to penetrate any distance. Herbaceous species appear to be scarce in the forest of this region, at least in the dry season when even the leaves of the woody plants curl and wither and the soil, which is light colored, becomes dry and powdery. Many of the trees have an ash-colored bark which imparts a somewhat ghostly effect to the landscape. An outstanding feature of the vegetation is the occurrence of two species of tree-like cacti often 20 or more feet in height. One is an undescribed species of *Cereus* and the other an undescribed *Opuntia*. Several other cacti species both terrestrial and epiphytic also occur here. Another notable feature of this forest is the extremely large number of parasitic mistletoes (*Phoradendron* and *Struthanthus* species) and epiphytic ferns, arums, bromeliads, orchids, peperomias, and cacti. It is rare to find a tree that is entirely free and many are very heavily loaded with them. *Bromelia sylvestris* Willd. and *Aechmea bracteata* (Sw.) Griseb., two large bromeliads, occur in large numbers throughout the area, mostly as terrestrial forms, and specimens of an unidentified *Agave* are not uncommon. Characteristic tree species include *Erythrina hondurensis* Standl., *Acacia riparia* HBK., and *Pithecolobium dulce* (Roxb.) Benth.,

A tree loaded with various epiphytic and parasitic plants characteristic of the semi-arid woodland region.

all of which are armed and common; *Bursera Simaruba* (L.) Sarg. which is very distinctive because of its smooth, brown, papery bark and height which is greater than many of the other trees in this area; several species of *Coccoloba; Clusia flava* Jacq. a species widely distributed in Central America; *Hasseltia floribunda* HBK.; *Celtis iguanaca* (Jacq.) Sarg.; *Cupania glabra* Sw., etc. Shrubs or sometimes small trees include several species of *Piper; Ardisia paschalis* D. Sm. which is common; *Russelia sarmentosa* Jacq.; the almost leafless *Pedilanthus tithymaloides* Poit. with its curious, slipper-like involucre; *Jatropha urens* L. with stinging hairs which give a very painful sensation when touched; two or three species of *Acalypha; Rauwolfia hirsuta* Jacq.; several species of *Psychotria; Eupatorium albicaule* Sch. Bip.; *Acacia spadicigera* Schl. & Cham. with its bull-horn-like spines inhabited by colonies of vicious and persistent ants; *Croton flavens* L.; *Benthamantha mollis* (HBK.) Alef.; *Iresine nigra* Uline & Bray; *Amyris sylvatica* Jacq.; *Capparis* sp.; *Eugenia* sp., etc. Woody climbers include *Solanum unguis-cati* Standl. with its sharp, recurved spines; *Echites turrigera* Woodson; *Smilax mollis* H. & B.; *Combretum mexicanum* H. & B.; *Paullinia pinnata* L.; *Capparis* sp., etc. *Zamia furfuracea* L. f., a curious stemless cycad with poisonous properties, is also rather common.

As one passes through the arid bench towards the bordering mountains the surface becomes rougher with here and there ravines cut by mountain streams. The soil changes in character to some extent, becoming characteristically mountain out-wash. The rainfall is apparently greater and the character of the vegetation changes perceptibly as the foothills are approached. Parasitic and epiphytic species are less abundant and terrestrial ferns and herbaceous plants are more common. The ravines are richer in species and numbers of plants and the open areas develop a better coverage of grasses. Palms are more abundant and a number of different and somewhat larger species of trees, including pine and oak, are encountered. As one ascends to an altitude of 1,000 feet or more the forests become open and are made up predominatingly of several species of oak and a pine (*Pinus Caribaea* Mor.), with scattering specimens of other species, and the ground between the rocky outcroppings is covered with a rank growth of grass and small herbs.

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## BOOK REVIEWS

### Methods and Materials for Teaching Biological Sciences*

R. C. Benedict

In a book "prepared for teachers of elementary courses in the biological sciences ranging from junior high school to junior college," Professors Miller and Blaydes have produced a text which should be decidedly useful for biology teachers working in the indicated grades. The book is divided into two parts. The first part, "Principles and class room methods," deals in ten chapters totalling 130 pages with such pedagogical topics as "The biological basis of education," "The objectives of teaching in biological sciences," "Methods of presentation," "How to choose a text," etc. Part II, on the "Preparation and uses of class room materials," totals nearly 300 pages, divided into twelve chapters. This part of the book is essentially a manual in the teaching of biology, and should be a real practical help to many teachers. Each of the twenty-three chapters of the book has a well selected bibliography which will enable the interested teacher to go beyond the necessary space limitations of this volume.

As a whole, the Miller and Blaydes' book fills a place in the field of biology teaching for which there has been no text available since the Lloyd and Bigelow, "Teaching of biology in secondary schools," (Longmans, Green & Co., 1904) went out of print. Current texts which deal with biology teaching, such as those by Kinsey, Cole, and Hunter, are concerned almost entirely with educational principles and pedagogical methods, the material dealt with in the first part of the Miller and Blaydes. The three books just referred to are also more restricted in their scope and general content. For example, Kinsey's "Methods in Biology" (Lippincott), while excellent in its general analysis, is definitely focussed on a particular type of high school biology course, an elementary course of natural history type. The Hunter volume (American Book Co.) deals with biological methods only incidental to a consideration of all the high school sciences.

* Miller, D. T., and Blaydes, C. W. Methods and materials for teaching biological sciences. McGraw-Hill, 1938. $3.50.

The college teacher of biological sciences may find the first part of the Miller and Blaydes an interesting introduction to the field of science pedagogy. While much that is currently printed under this general head is of ephemeral value when not absolutely useless it is none the less true that many college teachers could profit through some well selected reading in the field of science education. For too many biology teachers, high school as well as college, the value of any given biology course is judged chiefly by the number of separate facts which the student can be made to memorize and repeat. The idea that piles of facts have no more real value than jumbled piles of bricks is obviously not as widely appreciated as it might be. The real responsibilities of science teaching can be realized only when factual material is used to build definite structures, and particularly, when the student is gradually trained to fashion his own syntheses.

One point becomes noticeable to anyone who compares recent educational literature with older discussions along the same line; vocabularies and phrases change as the years go by; the ideas remain much the same. Two older books, dealing with the presentation of a biological science objectively, and which may be consulted with profit, are Ganong's "The teaching botanist," and Osterhout's "Experiments with plants," both still in print (Macmillan).

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## An Introduction to Botany*

R. C. Benedict

It is appropriate to review Priestley and Scott's "Introduction to botany" in association with a review of "Methods in Biology" because this botany represents a distinctive methodology very carefully and logically worked out. Whether American botany teachers find its methods feasible under American conditions or not, it seems certain that they will find this text valuable both as an aid to their own teaching and as reference reading for their students.

The Priestley and Scott is designed to provide students both with general textual material and with directions for laboratory

* Priestley, J. H., and Scott, Lorna I. An introduction to botany. Longmans, Green & Co., Ltd., London, 1938. $6.00.

work. The latter are incorporated as an integral part of the text development, not as sometimes happens, as disjunct digressive passages. Part of the distinctiveness of this book lies in the fact that most of its generalizations are "developmentally" approached; the expositional style is purely inductive as compared with the more didactic treatment followed by most American texts. The Priestley and Scott presents considerable objective data in the form of measurements, and tables, but much less in the way of pictures than the average American book. The illustrations given are chiefly original, skillfully made drawings, often showing three-dimensional aspects.

One illustration of the quality of the Priestley and Scott is found in the treatment of the common plants upon which the morphological and physiological discussions are based. It must have been the not infrequent experience of all teachers in biological sciences to be confronted with factual questions relating to even the most widely discussed species for which no definitive answer was readily if at all available. The writers of this text have evidently anticipated this difficulty by carrying on a good deal of original research regarding the plants discussed in the text.

## FIELD TRIPS OF THE CLUB

### Trip of May 20 to Watchung, N. J.

Eight persons were present on this trip and over 400 species of plants were identified out of the recorded flora of 1,455 species from the area. Some time was spent observing exotic plants which have persisted after former cultivation or have definitely escaped and become naturalized, including *Lonicera morrowi, L. bella, Vinca minor, Myosotis arvensis, Morus alba, Wisteria sinensis, Malus pumila, Ginkgo biloba, Calycanthus floridus, Catalpa bignonioides, Tilia tomentosa, Spiraea prunifolia* var. *plena, S. billiardii, Chelidonium majus, Galium mollugo, Elaeagnus umbellata, Hydrangea paniculata, Berberis thunbergii, Ligustrum vulgare, L. ovalifolium, L. obtusifolium, Pleuropterus cuspidatus, Cotinus coggygria, Deutzia scabra, Fraxinus excelsior, Salix lucida, Yucca filamentosa, Azalea japonica, Chaenomeles lagenaria,* and *Coreopsis grandiflora* var. *villosa.* In full anthesis were found great stands of *Cardamine pratensis, Campe barbarea, Senecio aureus, Zizia cordata, Eleocharis tenuis,* and the sedges, *Carex stricta, C. digitalis, C. vulpinoidea, C. crinita,* and *C. rosaeoides.* In the woodlands we saw in flower many species, including *Scirpus planifolius, Ranunculus recurvatus, R. hispidus, R. abortivus, Arisaema triphyllum, Viola palmata, V. rostrata, Panax trifolium, Aralia nudicaulis,* two highlights of the trip, *Galeorchis spectabilis* and *Obolaria virginica,* and still a few specimens of *Anemonella thalictroides.* Attention was called to the two types of leaves on *Viola triloba* and on *Nintooa* (*Lonicera*) *japonica.* In the dry fields *Crataegus coccinea, Vaccinium atrococcum, V. vacillans, Galium aparine,* and *Aronia melanocarpa* were found in bloom, and in wetter places, *Ranunculus bulbosus, R. repens* var. *floreplenus, Viola cucullata, V. papilionacea, Cardamine bulbosa, Triosteum aurantiacum,* and *Sisymbrium nasturtium-aquaticum.* Cryptogams identified included *Lycopodium flabelliforme, Coriolus pubescens, C. versicolor, Ceriomyces crassus, Leucobryum glaucum, Onoclea sensibilis, Aspidium marginale, Polystichum acrostichoides, Pteridium latiusculum, Osmunda cinnamomea, O. claytoniana,* and *Osmundopteris virginiana.*

Among the species not yet in flower were *Heuchera americana, Diervilla lonicera, Galium asprellum, Celastrus scandens, Ranunculus acris, Crataegus uniflora,* the very rare *Hieracium murorum,* and *Cynoglossum virginianum* (only recently discovered in the area). Also not in flower, but identified by non-floral characters, were *Prunus americana, Salix purpurea, S. alba, Viola pubescens, Carex pennsylvanica, Rubus hispidus, Carya ovata, Myosotis scorpioides, Menispermum canadense, Floerkea proserpinacoides, Amphicarpa bracteata, Cimicifuga racemosa, and Aureolaria virginica.* Fine displays of *Azalea nudiflora* were observed in full flower, but *A. prinophylla* was not yet in anthesis.

H. N. Moldenke

## Trip of May 21 to Seeley's Notch, N. J.

Twenty-eight persons were present on this trip and over 350 species of plants were identified, most of which were different from those observed on the preceding day's trip only a few miles away. Among the plants found in flower were *Comandra umbellata, Taenidia integerrima, Gaylussacia baccata, Veronica agrestis, Scleranthus annuus, Aralia nudicaulis, Aquilegia canadensis, Micranthes virginiensis, Cardamine bulbosa, Uvularia perfoliata, Oakesiella sessilifolia, Viola fimbriatula, V. pallens, Erigeron pulchellus, Thalesia uniflora, Asarum canadense, Staphylea trifolia,* and the rare *Isotria virticillata.* Attention was called to the two types of plants of *Antennaria plantaginifolia* and the marvelous floral adaptations for securing healthy seed exhibited by the Indian-turnip, flowering-dogwood, yellow fawnlily, moccasin-flower, and the common chickweed. Among the cryptogams identified were *Polyporus caudicinus, Cystopteris fragilis, Woodsia obtusa,* and *Polypodium virginianum.* Special attention was devoted to the identification of plants in their non-flowering stages and among the species thus identified were, in the woodlands on the trap-rock ridges, *Laportea canadensis, Helianthus divaricatus, Menispermum canadense, Viburnum acerifolium, V. rafinesquianum, Nyssa sylvatica, Rhus typhina, Atragene americana, Sericocarpus, asteroides, Solidago bicolor, S. squarrosa, S. caesia, Ionactis linariifolius, Cunila origanoides, Hieracium venosum, Kalmia latifolia, Tilia americana, Quercus montana,* and *Q. maxima.* At the borders of the woodlands and along roadsides were found *Hydro-*

*phyllum virginianum, Solanum dulcamara, Thalictrum dioicum, Nemexia herbacea*, and *Rubus phoenicolasius* (first time found in the area). In and about the ponds and brooks we saw great quantities of *Philotria canadensis, Isnardia palustris, Callitriche palustris, Iris prismatica, I. pseudacorus, Acorus calamus*, and *Alsine longifolia*. In one place the party discovered the densest and most extensive pure stand of wild water-cress ever observed by any of the persons present. Several very interesting persistent or escaped and naturalized exotics were studied, including *Ilex opaca, Ailanthus altissima, Pinus resinosa, Alliaria officinalis, Ribes nigrum, Hesperis matronalis, Akebia quinata, Wisteria sinensis, Bignonia radicans, Viburnum opulus* var. *sterile, Hemerocallis fulva*, and *Paulownia tomentosa*, six of which were never hitherto known from the area outside of cultivation.

H. N. Moldenke

## Trip of June 4 to Stamford, Conn.

Seven members and guests were present on this, the Club's first scheduled trip to the Bartlett Tree Research Laboratories. The trip was made possible through the kindness and hospitality of Dr. Stanley W. Bromley, assistant entomologist on the laboratories' staff. Doctor Bromley explained the history and purposes of the laboratories and personally conducted us through the study laboratories and grounds, arboretum and gardens, explaining the landscape planting experiments, fertilizer investigations, investigations on blight-resistant chestnuts, insect and disease control tests, tree working equipment, tree-shaping and pruning experiments, etc. The characteristics of scores of injurious insects were explained, and their life histories and the marks of their work on host plants. The grounds comprise 200 acres and contain over 800 different species and varieties of trees and shrubs, including a wonderful collection of nut-trees—walnuts, hazelnuts, filberts, pecans, etc. Among the interesting trees and shrubs studied were the tree alder (*Alnus hirsuta* var. *sibirica*), angelica-tree (*Aralia japonica*), blue ash (*Fraxinus quadrangulata*), flowering ash (*F. ornus*), Manchurian ash (*F. mandshurica*), two other very rarely seen exotic ashes (*F. griffithi* and *F. holotricha*), Japanese birch (*Betula japonica* var. *mandshurica*), blue Atlas cedar (*Cedrus atlantica* var. *glauca*), Chinese corktree (*Phellodendron chinense*), Chinese orange (*Poncirus trifoliata*), Wessel's cypress (*Chamaecyparis wesseli*), Japanese and winged elms (*Ulmus japonica* and *U. alata*), leatherwood (*Dirca palustris*), golden larch (*Pseudolarix amabilis*), nannyberry (*Viburnum lentago*), Japanese oak (*Quercus dentata*), Spanish oak (*Q. digitata*), Willow oak (*Q. phellos*), persimmon (*Diospyros virginiana*), papaw (*Asimina triloba*), Formosan sweet-gum (*Liquidambar formosana*), China-fir (*Cunninghamia lanceolata*), thornless honey-locust (*Gleditsia triacanthos* var. *inermis*), Japanese heartnut (*Juglans sieboldiana* var. *cordiformis*), upright Scotch pine (*Pinus sylvestris* var. *watereri*), limber pine (*P. flexilis*), Jeffrey pine (*P. jeffreyi*), Korean pine (*P. koraiensis*), western yellow pine (*P. ponderosa*), sugar pine (*P. lambertiana*), Yeddo spruce (*Picea jezoensis*), Serbian spruce (*P. omorika*), Wilson spruce (*P. wilsoni*), and several firs, including *Abies balsamea, A. amabilis, A. firma,* and *A. holophylla.* Other interesting trees and shrubs included *Crataegus lauta, Elsholtzia stauntoni, Evodia chinensis, Juniperus horizontalis, Maackia amurensis* var. *buergeri, Zelkova serrata,* and several maples (*Acer cissifolium, A. diabolicum, A. ginnala,* and *A. sieboldianum* var. *microphyllum*). Hybrids of the filbert (*Corylus avellana*) and the famous Bartlett chestnut (hybrid of *Castanea mollissima*) were studied, as well as the "hickan," a hybrid between the pecan and hickory. In the beautiful rock garden and iris garden hundreds of interesting herbaceous plants were seen, mostly in full bloom. Some attention was also paid to the remarkable glossy-leaved violet developed as a ground cover at the laboratories.

H. N. Moldenke

## Trip of Sunday, June 4, to the Gorge of the Housatonic River

Plenty of drizzling rain sprinkled the members as they left the Wingdale station and headed for Route 22. By eleven o'clock the sun came out and chased all the gray mists away and left only a blue sky and domes of woolly clouds.

The party stopped at a wet field near Bull's Bridge and was treated to a spectacle of hundreds of *Castilleja coccinea,* the Scarlet Painted Cup, in full bloom. Surrounding several boulders the drier turf disclosed small companies of *Heuchera americana,* the Common Alum Root, in bloom. Accompanying these was the

Seneca Snakeroot, *Polygala senega*, several fine plants being noticed. In an adjoining field was a grove of *Larix laricina*, the American Larch, most of the trees appearing about fifty years old.

At Bull's Bridge the gorge was entirely disclosed since the recent dry spell did not allow any surplus water to spill over the dam a quarter of a mile upstream. The whole limestone bed of the river is pitted and pock marked by hundreds of potholes sometimes as much as ten feet across and about as deep. Many, having filled with rain water, contained hundreds of mosquito wrigglers. The sight of all these embryo disturbers of humanity filled us with great respect for the region. Various entomostraceans were also abundant in the water and it would appear that the Microscopical Society could get with little trouble many interesting specimens from these water-filled potholes and set up apparatus on the rocks nearby where there is plenty of light and room.

The banks of the one time seething gorge were carpeted in many places by *Taxus canadensis*, the Canadian Yew. Patches thirty feet across were not uncommon. Another plant, *Cystopteris bulbifera*, the Bladder Fern, was as common as Polypody is in the Ramapos. Along the cool, moist, shaded banks it flourished in long continuous patches. The party followed an old wood road north of the covered bridge on the west bank of the gorge. One single specimen of *Polygonatum commutatum*, the Great Solomon's Seal, was found just ready to bloom. It stood about six feet tall and was one of the finds of the trip. Near the dam a lone *Juniperus communis*, the Common Juniper, spread over an area thirty feet in diameter. One of the branches which grew at least twelve feet high was about five inches in diameter. Hemlocks and Cherry Birch were crowding the shrub and it seemed that the immediate vicinity had been drier and more open when the shrub commenced growing.

*Tilia americana*, the Linden, was very abundant indicating that this region might be a good bee country when the trees are in bloom. They seemed to be more common than in most localities of the local area.

The party flushed a mother partridge with chicks about a week old. The leader caught one of the chicks and the mother all fluffed up and uttering a shrill continuous cry approached to within three feet of her chick.

On the south side of Bull's Bridge and on the east bank the party scrambled over the ruins of an old iron furnace which stood right on the shore of the river gorge. It was completely overgrown by grasses and a scramble of *Vitis labrusca,* the Northern Fox Grape. From here downstream the potholes were fewer and soon disappeared, but the intermittant pools looked inviting so some of the party went swimming in fairly warm water. In a crack on a ledge nearby a single specimen of *Spiranthes lucida* had just opened its first blossom. One of the non-swimmers, rambling further downstream shouted *"Dirca palustris."* Only a single specimen was located. Last year on the leader's trip to the Seven Wells region three of these infrequent shrubs had been located.

On the way home on Route 7 the party stopped a few miles below the dam and cut nice clean swathes through a huge patch of *Radicula Nasturtium-aquaticum.* Cautious individuals who had saved lunch bags felt very happy at this opportunity.

A list of plants in bloom besides those mentioned follows: *Zizia aurea, Erigeron pulchellus, Senecio aureus, Iris versicolor, Iris pseudacorus, Galium verum, Ranunculus bulbosa, Lychnis alba, Viburnum prunifolium, Viburnum acerifolium, Aguilegia canadensis, Geum rivale, Aralia nudicaulis, Geranium maculatum, Asclepias quadrifolia, Hieracium venosum, H. aurantiacum,* and *H. pratense, Diervilla lonicera, Rubus villosus, Smilacina racemosa, Smilacina stellata, Celastrus scandens, Helianthemum canadense, Robinia pseudo-acacia, Chrysanthemum leucanthemum, Solanum dulcamara, Sisyrinchium angustifolium, Hypoxis hirsuta,* and *Chelidonium majus.*

Other plants of interest were *Pellea atropurpurea, Equisetum hyemale, Asplenium platyneuron* and *A. trichomanes, Woodsia ilvensis, Campanula rotundifolia, Adiantum pedatum,* and *Betula alba* var. *papyrifera.*

George F. Dillman

## Trip of June 24–25 to Pennsylvania Grand Canyon

This was a joint trip with the Southern Appalachian Botanical Club, the Muhlenberg Botanical Club, and the Western Pennsylvania Botanical Club. Fifty-two members and friends of these societies were present for the explorations of Leonard Harrison State Park on Saturday. This park is in Tioga County which is one of the northern tier counties of Pennsylvania. The entrance to the park is about ten miles from the town of Wellsboro. Most of the party arrived Friday evening. Some stayed at a cabin camp near the park and others in Wellsboro.

The so-called canyon has been formed by Pine Creek. For miles it has cut through the mountains. It is about 1,000 feet from the rim to the level of the stream. After the group assembled for the morning trip a little time was provided to take in the extensive view of the canyon country from the park look-outs and to listen to brief explanations of the geological and floral features.

The Saturday morning route circled over the wooded hillsides at the higher altitudes and included one minor ravine. Species which attracted most attention were *Pinus resinosa*, *Dirca palustris*, and *Rubus triflorus*. *Dirca* is not a common plant of the region. It was possible to locate other plants easily after the first one was found as practically every leaf had one or more yellow spots caused by *Aecidium hydnoideum*. This was the first collection of the rust in Pennsylvania. The alternate stage which is on *Carex pennsylvanica* was not found. Other interesting species noted were *Cornus circinata*, *Solidago squarrosa*, *Lonicera canadensis*, *Microstylis unifolia*, and *Betula alba*. There was some discussion as to identity of the varieties of the northern white birch. The white pine blister rust, *Cronartium ribicola*, was found in the form of old cankers on *Pinus Strobus* and in uredinial stage on *Ribes cynosbati*.

In the afternoon the trail to the canyon was followed. It is a steep descent into the narrow valley of the creek—so steep in places that steps were provided. Dry weather for several previous weeks had reduced the water-falls in this tributary gorge so as to rob it of much of its usual charm. On an island in the valley was an unusually fine stand of *Onoclea Struthiopteris*. Here also were found *Botrychium virginianum*, *B. matricariaefolium*, and *B. lanceolatum* var. *angustisegmentum* in surprising abundance. The red-berried elder, *Sambucus racemosa*, attracted some attention.

A trip to a sphagnum bog on Armenia Mountain near Sylvania was planned for Sunday morning. This meant going by automobiles along U. S. Route 6 to a point about thirty miles east of Wellsboro and then following a dirt road for several miles southward.

Locally this is referred to as a tamarack swamp, but no tamaracks were found. *Habenaria fimbriata* was abundant and the flowers were large. *H. lacera* and *H. orbiculata* were seen but were not abundant. *Rhododendron maximum* was in bloom. *Cornus canadensis* and *Azalea canescens* were common. *Oxalis montana* was in fine bloom. The most interesting feature was the remarkable abundance and fine development of several species of *Lycopodium*. Large areas were literally carpeted with these plants. *L. clavatum, L. obscurum, L. annotinum, L. lucidulum,* and *L. flabelliforme* were observed.

The weather was unusually fine during the two days. Comments indicated general satisfaction with the walks, scenery, and with the plants seen and collected. Thanks are due Dr. E. M. Gress, State Botanist, Harrisburg; Dr. O. E. Jennings, University of Pittsburgh; Dr. J. P. Kelly and Dr. L. O. Overholts, Pennsylvania State College, for their aid in the identification of many plants.

FRANK D. KERN

## TRIP OF JULY 16 TO BEAR MOUNTAIN

Some twenty-seven or twenty-eight people went to Bear Mountain by train and journeyed by bus to Long Mountain, while an equal number went in private cars. All assembled on the top near the inscription in memory of R. H. Torrey, at about eleven o'clock. Doctor Small introduced Mr. Place who then briefly stated the purpose of the assembly and called for responses from members of clubs represented. Among those responding were Mr. Semonsen, for the Green Mountain Club; Dr. W. S. Thomas, N. Y. Mycological Society; Mr. Murphy, Torrey Botanical Club; Mr. Luscher, Cygians; R. S. Barton, Westchester Trails Association; Mr. Place, Tramp and Trail Club; Joseph Bartha, and others. Mr. Adolph, forester of the Palisades Park, and Mr. W. H. Carr, of the Nature Museum, spoke of Torrey's work in the Park. Mr. Place concluded the exercises by reading some verse composed for the occasion.

The clubs dispersed, each according to its own plan.

Several members of the Torrey Botanical Club joining forces with the Tramp and Trail Club went to Deep Hollow Shelter for lunch; then, botanizing by the way, walked northward to the

Forest of Dean Road where a large section of the botanists turned back to reach the cars on Long Mountain Road, while the others continued down the road to Fort Montgomery.

The weather was ideal and all were eminently satisfied with the day. Mrs. Torrey, her son and son-in-law were present at the ceremony and displayed the medal posthumously awarded to Mr. Torrey by the American Scenic and Historic Preservation Society.

FRANK PLACE

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## R. H. T. July 16, 1939

The life that left us we will see no more,
For he has laid aside the weights of flesh,
The treadmill of this mortal, earthly life.
But he has taken immortality,
The life that sages say is "given" free
To him who digs a well, who binds
A wound, or guides a wand'ring soul,
Or through the darksome forest lays a path.
The pattern he has laid upon these hills
And vales remains the same from year to year;
The paths in learning and in daily life
Which he has followed all remain to us.
To us remains, indeed, the memory
Of all our friend had done and planned to do.
But other duties, too, are left for us:
To tread these paths and keep the pattern plain;
To lead upon them those who knew him not;
To keep the goal in mind whatever swamp
Or cliff at times detour the forward course.
When we have carried on his plan and work,
And each has done his bit, however small,
Why then we've earned the right to say with him:
"It *is* a great life" . . . May he rest in peace . . .

## NEWS NOTES

On July 24, the fiftieth anniversary of his joining the Department of Agriculture, David Fairchild was presented with the Frank N. Meyer Medal in recognition of his work as a plant explorer. The establishing of this medal with funds left by Meyer in his will for members of the Bureau of Plant Introduction is described in Fairchild's book, *The World Was My Garden.*

A collection of 8,257 herbarium sheets of plants from England, continental Europe, northeastern United States and adjacent Canada, has been presented to the New York Botanical Garden by Mrs. T. W. Edmondson. The plants were collected by Dr. Edmondson, professor of mathematics and physics, and at the time of his death last fall professor emeritus, at New York University. The plants were collected on vacations over many years.

L. J. Brass, botanist of the Archbold Expedition of the American Museum of Natural History to New Guinea, has recently returned. His botanical collections include over 5,000 numbers, mostly obtained from areas above 3,000 feet. He also made a collection of 150 negatives of typical landscapes of the regions where he collected. These latter will be used in making backgrounds of proposed museum habitat groups.

Dr. Henry C. Cowles, professor emeritus of botany at the University of Chicago, died on September 12 in his seventieth year. Doctor Cowles became an instructor in botany at the University of Chicago in 1902, an assistant professor in 1907 and was chairman of the department from 1925 to 1934, when he became professor emeritus. He was editor of *The Botanical Gazette* from 1925 to 1934. He was the author of several books and of articles on plant ecology.

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BY

GEORGE T. HASTINGS

John Torrey, 1796-1873

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# TORREYA

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## Granite Outcrop Vegetation in Alabama

Roland M. Harper

In various parts of the world, particularly in the southeastern United States, there are numerous approximately level areas of bare rock of several kinds, with interesting vegetation in crevices, pockets, etc., usually quite different from that growing on cliffs and stream-beds of the same sort of rock.[1] Flat rock vegetation is usually exposed to the sun and wind most of the day, while cliffs may be shaded most of the time, if they face away from the equator or have trees growing in front of them. And flat rocks may not have as complete protection from fire and grazing animals as cliffs do.

Although granite is one of the commonest of rocks, flat or gently sloping outcrops of it are less frequent than cliffs and boulders, in the eastern United States at least. But such exposures (including gneiss, which is very similar chemically) are scattered through the Piedmont region from North Carolina[2] to eastern Alabama, with isolated areas in Arkansas[3] and Texas.[4] They are

[1] For a sketch of several types of flat rock vegetation, with special reference to the cedar glades of Tennessee, see Ecology **7**: 48–54, pl. 1. 1926. Another type, investigated later, that has some of the characteristics of flat rock vegetation, is described in Torreya **29**: 127–130. 1929.

[2] For descriptions of granite outcrops in western North Carolina, intermediate in character between flat rocks and cliffs, see H. D. House, Torreya **10**: 29–34. February, 1910; Oosting & Anderson, Ecology **18**: 280–292. April, 1937. The two authors last named have since published a very detailed description of granite outcrop vegetation in east-central North Carolina. (Bot. Gaz. **100**:750–768, figs. 1–9. June, 1939.) There is no indication of just where or when the photographs were taken (possibly for protection against botanical vandals), but the vegetation is very similar to that here described, even to the weeds.

[3] See Ecology **7**: 54. 1926.

[4] See Eula Whitehouse, Ecology **14**: 391–405. 1933. This contains among other things a list of over 200 species of plants, arranged alphabetically in each subkingdom, with no indication of relative abundance, and no distinction between natives and weeds. About 15 percent of the flowering plants listed appear to be weeds.

probably most extensive in Georgia, particularly in the vicinity of Stone Mountain.

About 39 years ago[5] I listed the plants I had observed on flat granite or gneiss rocks around Athens, Georgia, from memory, in taxonomic order, and including a few weeds. The following year[6] I made a few additions to the list, from other similar localities in the same state. No list of granite outcrop plants for the whole state of Georgia seems to have been attempted yet, but Rogers McVaugh and others have recently published some interesting notes on particular species of such habitats.[7]

The known outcrops of granite in Alabama are very limited in extent, their aggregate area probably not exceeding one or two square miles; and most of them are in one county, Randolph, which borders on Georgia. They were rather remote from railroads and, therefore, inaccessible, in Dr. Charles Mohr's lifetime, and there is no mention of them in his great work, the Plant Life of Alabama, published in 1901.[8]

A soil map of Randolph County, published by the U. S. Bureau of Soils in 1912, shows the location of a few of the larger granite outcrops in the county, and they are described briefly in the text accompanying it.

Although I had been in all the Piedmont counties of Alabama as early as 1906, and in most of them several times, and had seen a few granite boulders, I had no acquaintance with the typical flat rocks in the state until 1936. In June of that year, while on a camping trip with a party of geologists and zoologists, I

[5] Bull. Torrey Bot. Club **27**: 328. 1900.

[6] Ibid. **28**: 461–462, 469, 473. 1901.

[7] Castanea (Jour. So. Appal. Bot. Club) **2**: 58–60, 100–105 (three articles). 1937; Bull. Torrey Bot. Club **66**: 411–415. June, 1939. (The third of these articles, on *Amphianthus,* was badly mixed by the printers, but straightened out in the reprints distributed by the author.)

[8] The large granite area around Almond (then called Flatrock) was mentioned briefly in the "Report of Progress" of Dr. Eugene A. Smith, state geologist, for 1874 (page 56), but he said nothing about its vegetation, though he was well versed in floristic botany, and about the same time collected many plants around Tuscaloosa, which were cited by Dr. Mohr. Dr. Smith's field notes show that he visited that and other granite exposures in the same county again in the '90s; but he missed the opportunity to add several species to the known flora of the state, probably indicating that he carried no plant collecting equipment on most of his geological field trips.

found an acre or less of granite or gneiss, partly flat and partly steeply sloping, near the Coosa River in Chilton County. A few days later, walking up the Tallapoosa River from Wadley, in Randolph County, along a railroad which skirts the river for several miles, I found a still smaller area of the same rock, too small to show on the soil map, with a few of the characteristic plants.

View on the granite outcrop near Blake's Ferry, showing bare rock in the foreground, a clump of stunted cedars at left of center, and *Nyssa sylvatica* at extreme left. June 8, 1939.

My first opportunity to visit any of the large outcrops in that county came on August 3, 1938, when I was on a botanical trip with Dr. H. K. Svenson, he kindly furnishing automobile transportation. Earlier in the day we had visited the Chilton County outcrop, and we were trying to find additional localities for some of the characteristic plants occurring there. Around the village of Almond, about three miles northwest of Wadley, we found many acres of exposed granite, some domelike and some nearly flat, which Dr. Smith had visited in 1874 and the soil surveyors in 1911. It was late in the afternoon when we reached the place, and we were still about fifty miles from where we had planned to spend the night, but I made what notes I could and collected a few specimens.

The soil map shows a still larger rock outcrop a little west of Blake's Ferry on the Tallapoosa River, about ten miles north of

Almond (visited by Dr. Smith on August 31, 1896, about a month after he had been on Cheaha Mountain with Dr. Mohr). Dr. Svenson and I did not have time to visit it last year, but Dr. McVaugh, at my suggestion, went there early in March this year, and in spite of the early date found there among other things *Isoetes melanospora* and *Amphianthus pusillus,* two species not known outside of Georgia before. I visited the same place on June 8th, walking from Lineville, a railroad station about nine miles away, and got many notes and a few specimens and photographs.

The next day I went by automobile with a friend who lives near the northwest corner of Randolph County, to look for a rocky area indicated on the soil map, near the Tallapoosa River and close to the northern edge of the county. On inquiring of people living in the neighborhood we were directed to the site of a Flat Rock Church, which had burned down last year, in the edge of a cut-over woodland. At the site the reason for the name was not apparent, for there was no rock in evidence, except fragments scattered over the surface, as is usual in hilly regions. But I thought I might as well make some notes of what vegetation was in sight, so as to have something to show for the trip, and we struck out at random on a little-used road through the woods. And in a quarter of a mile or so we came to a sloping area of gneiss, perhaps not more than 25 feet wide and 75 feet long, with more *Talinum Mengesii* than I had ever seen in a similar area before, and a few other characteristic plants, but a surprising number of weeds, though the place was not close to any house or field.

It is perhaps hardly necessary to remark that on all flat rocks, whether granite or other, there is a considerable diversity of plant associations, which could be treated separately in a very detailed study. The smoothest areas may have no vegetation visible to the naked eye, or a sparse covering of crustose lichens, or small mosses. Cracks and crevices give larger plants a foothold, and there are often shallow depressions produced by weathering. Some of these hold water long enough to support aquatic or semi-aquatic plants like *Isoetes* and *Amphianthus,* while others are dry most of the time, and occupied principally by such little plants as *Diamorpha.* Soil tends to accumulate in the pools and pockets, and around the edges of the rocks where it disappears beneath the surface; and where there is enough of it it supports copses of shrubs and trees. At the upper edge of a sloping rock outcrop, and at various other places where the surface is irregular, there may be a gentle seepage of water, giving rise to bog conditions.

In the following plant list all these minor habitats are combined, but only such trees and shrubs are included as occur in "island" copses, and not those in the bordering forests.. My notes are not complete enough yet to warrant going into finer details, as Miss Whitehouse did in her Texas granite study already cited and Oosting and Anderson in their paper on east-central North Carolina. But as usual I have separated trees, shrubs, herbs, etc., and then arranged the species in approximate order of abundance in each group. Evergreens are indicated by heavy type. Weeds, presumably brought in by cattle, sightseers, picnickers, etc., are omitted for the present, though of course it is not always possible to draw a sharp line between weeds and natives. Among the common weeds of such places, some of which may possibly be indigenous, are *Sarothra gentianoides, Diodia teres, Senecio Smallii,* and *Ambrosia elatior.*

This list is made up from observations in Randolph County only. The Chilton County locality previously mentioned (visited in June, 1936, May, 1937, and August, 1938) is omitted to avoid complications, because it is somewhat different in character, but some of its interesting plants may as well be noted in passing. *Cheilanthes tomentosa* occurs there under ledges, *Arenaria patula, Delphinium carolinianum* and *Talinum parviflorum* on gentler slopes, and *Rhapidophyllum* at the base of a cliff.[9] Some of these plants are often found on limestone, and it may be that the gneiss at that point is more calcareous than usual.

Visits to the rocks in Randolph County and elsewhere in spring and fall would doubtless reveal additional species, that are not readily recognizable in summer, and make more certain the identification of some that I could only guess at when flowers were not available, and thus eliminate some of the interrogation points in the list. But such an opportunity cannot be counted on in the

[9] See Castanea, **3**: 24. (March) 1938. Since the above was written W. Wolf has described the Chilton County *Talinum* as a new species, *T. appalachianum,* in the American Midland Naturalist for September, 1939. All or nearly all the known stations for *T. parviflorum* are west of the Mississippi river.

immediate future, and many other problems are pressing; so it seems desirable to put on record now some of the discoveries already made. Most species seen only once are omitted, for there is a greater possibility of mistaken identification with them than with the commoner ones, and they may not mean much anyway.

The list follows:

TREES

**Juniperus virginiana**
Quercus stellata
**Pinus taeda**
Quercus marylandica
**Pinus echinata**
Nyssa sylvatica

SHRUBS

Callicarpa americana
Rhus copallina
**Batodendrum arboreum**
Chionanthus virginica

VINES

**Gelsemium sempervirens**
**Bignonia crucigera**
Parthenocissus quinquefolia

HERBS

Juncus georgianus
**Opuntia** (perhaps two species)
Talinum Mengesii
Tradescantia reflexa?
Crotonopsis linearis?
Kneiffia subglobosa?
Polygala Curtissii
Arenaria bevifolia
Danthonia sericea
Fimbristylis autumnalis
Cyperus inflexus[10]
Senecio tomentosus
Helianthus longifolius?
Laciniaria microcephala
Commelina saxicola?
Manfreda virginica
Agalinis tenuifolia?
Ilysanthes refracta?
**Cheilanthes lanosa**
Andropogon sp
**Yucca filamentosa**
Lespedeza virginica?
Viguiera (Gymnolomia) Porteri
Stenophyllus capillaris
Lechea sp.
Silene virginica

MOSSES, ETC.

**Grimmia leucophaea**
**Cladonia** sps.
**Usnea** sp. (on Juniperus)
**Polytrichum commune?**
(and several other mosses and lichens).

This list of course has much in common with my Georgia list of 1900, and some of the others referred to above, but it is too incomplete to warrant any close comparisons, or statistical studies yet. *Juncus georgianus, Senecio tomentosus,* and *Viguiera Porteri,*

[10] This may be referable to McVaugh's *C. granitophilus* (Castanea **2**: 100–104. 1937), if that is a distinct species.

which are common on or around Stone Mountain (as are *Isoetes melanospora* and *Amphianthus*, mentioned in an earlier paragraph), seem to be here reported from Alabama for the first time. On the other hand, *Talinum Mengesii* seems to have its center of distribution in Alabama (where it grows also on sandstone).[11]

It is one of the great mysteries of nature how the species known only on rock outcrops, most of them with no known means of dissemination (except that wind might blow their seeds a few feet or yards) could have found their way to isolated localities many miles from other similar habitats. But time is long, and presumably in thousands of years several kinds of exceptional opportunities that we have little conception of could occur once or twice. Possibly tornadoes have been a factor in transporting small smooth seeds that are not particularly adapted for wind dispersal.

UNIVERSITY, ALA.

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## Lucy Millington

LIBERTY H. BAILEY

To the new country in southwestern Michigan in which I was born and reared came Lucy A. Millington in the spring of 1876. It was reported she was a botanist, and this aroused my curiosity. Long before that time I had borrowed a copy of Gray's Field, Forest and Garden Botany, which I had studied by myself in winter and the identical copy of which I still possess, and I had waited for the first crocus to make the book real. I began an herbarium. I had never seen a botanist except that Dr. W. J. Beal had come to our village to lecture. Would I now have someone to share my joy and to guide me through the difficult parts of the book?

The Millingtons settled beyond "Dyckman's Woods" and thus I would have additional reason to pass often through that enchanted place. Dyckman's Woods had not long been cut from the

[11] Dr. McVaugh writes me that he has found it in a few places in Georgia, where it is less common than *T. teretifolium,* which is not definitely known from Alabama, all the specimens hitherto referred to it in this state turning out to be *T. Mengesii,* according to Wolf's recent study referred to above.

primeval timber and it had never been cleared. Brush had been piled in great mounds and stacks, the old underbrush had been mostly cut and the place fairly cleaned up; a few old trees still stood. For years the area had lain fallow, fire had not devastated it, and animals had grazed it so that the avenues and twisting lanes

Mrs Lucy A Millington

between the aging brush-piles I thought must be like lawns about which I had read in diverting books. The place was far away from lines of common travel and apparently I was the only person who had regularly explored it. I had wandered there alone on many days and in varying seasons, and I knew its denizens and its moods. Now I would go through it with new anticipation.

Mrs. Millington came to South Haven with her brother, Dr. Bishop and family, who established a medical practice and became a prominent citizen. (I remember his fur cap and coat.) She purchased a small peach orchard in bearing age, returned to eastern New York, came back in the autumn with her husband and son, Frank. Their daughter and older son were married and did not come west with them. The family settled temporarily in the eastern part of the village, and it was there I began to visit her. They built a house on the orchard land, and my memories of her are mostly associated with the new home.

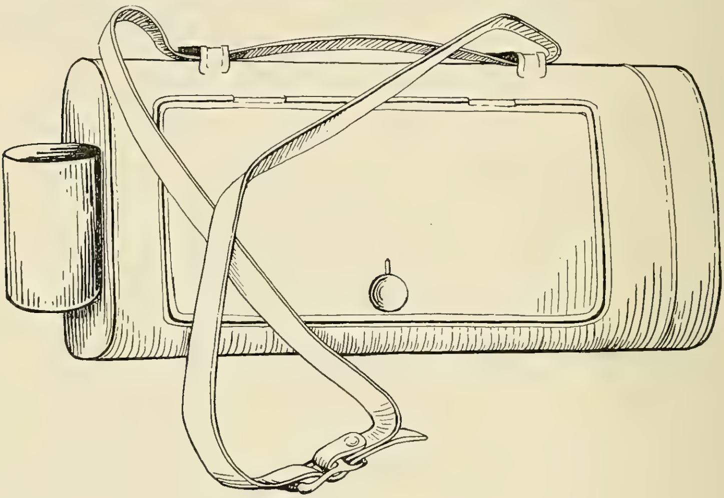
She always received me pleasantly, calmly, without haste. She listened to my joys of wonderful discoveries, told me the names of my plants and pronounced the strange words as if they were her common speech. She told me of her trips and her collecting in the Adirondacks whence she had come. She asked me to come again.

About two years the Millingtons lived there, and in that period she took such pains to encourage me and resolved so many of my puzzles that memory of her is yet a luster of my youth. In recent time one of her nieces wrote me that her aunt told her long ago of our "walks together through the pine woods and over the sand dunes near Lake Michigan."

One of the brilliant recollections was her remark about a broad-leaved grassy plant with a head of hanging stamens I had picked in Dyckman's Woods. She said it was a Carex, a very difficult group I should not then undertake to study. I suppose it was *Carex albursina.* That old challenge has followed me through life.

The Millingtons returned to northeastern New York, and I never saw them again. She left me a precious memento, however, which I still cherish. It is a small botany-case, painted bright red when she gave it to me and which I yet keep in that color. It is shown in the picture. The strap, of course, is recent but it is a duplicate of the old one, with the original buckle. The box is eighteen inches long and seven and one-half inches high, three inches thick. The right-hand end, as the reader sees it, is a compartment about three inches deep with a cover, in which to place moving or special things, for Mrs. Millington collected other objects than plants. On the other end is an open cup in which she carried a bottle of water, for she had a microscope and had studied infusoria. This collecting-case I carried through my college years and long thereafter.

The special interest of this vasculum lies in the fact that it carried the first specimens of the spruce mistletoe, *Arceuthobium pusillum,* for she was the discoverer of that strange plant. She had read of the ravages of a parasite on conifers of the far West, and she set out to determine what might be the cause of a similar trouble she had observed about Warrensburg in Warren County, New York. She found the mistletoe in 1871. Charles H. Peck is



Mrs. Millington's collecting-case.

the author of the species, having described it in a State Museum Report dated 1873 (25th Report. p. 69). It was based on collections by Peck himself, but it appears that Mrs. Millington had told him (as she also stated to me) of her discovery, and in the original description is the statement that it had been previously found near Warrensburg by Mrs. Millington. The State Herbarium contains a sheet of Peck's collection on which he has written (as Dr. House informs me) "these specimens are from the same locality in which the species was first discovered by Mrs. L. A. Millington." A letter from her is on file in the New York State Museum giving Dr. Peck definite directions for finding the locality. She had walked to the place and back, and the locality was fifteen miles from her home.

Lucy Millington contributed to botanical publications. Thus in Volume III, number 9 of the Bulletin of the Torrey Botanical

Club, September, 1872, she has a note on the fragrance of "a variety" of *Aspidium Thelypteris* and another on Fungi. In number 12, December, 1872, she records careful observation on "Arceuthobium shedding its seed." There are others in Volumes IX and X. She is listed in the Botanical Directory for North America and the West Indies, in the Bulletin of the Torrey Botanical Club, IV, November, 1873.

Mrs. Millington had come from Glens Falls, New York, but the Bishops were of New Russia, Essex County, in the Adirondacks. On her return east she lived in Glens Falls until the death of her husband, when she went to the Bishops at her birthplace and there she remained. On the elevation that is the cemetery of New Russia and where inscriptions attest to the prominence of the Bishops, I have read the inscription on the monument:

Lucy A. Bishop
wife of
Stokes P. Millington
1825–1900

In the village a great boulder has been placed by neighbors, friends and visitors, and from the bronze tablet one may read:

To the memory of
THE BISHOP FAMILY
1793–1905
Endowed with many talents
Leaders in pioneer activities
Good neighbors
Lovers of these hills

Lucy Millington was naturalist, writer, nurse to the afflicted, endowed with keen observation and poetic fancy, a leading spirit in her neighborhoods. She was author of "Summer Days at Lake George" long ago published in St. Nicholas, and of other articles.

In Michigan her son Frank, and Dr. Bishop's two sons and three daughters, were my mates in school. Frank is gone, as also two of the Bishop daughters and the older son, and the younger son is in a neighboring state; Viola Bishop McGregor still lives there in her father's house.

Ithaca, N. Y.

## Guide to the Lichens of the New York Area—Part 4*

G. G. Nearing

Group 6. The Larger Shield Lichens. Mats of paper-like structure growing close to the foothold, or the tips and margins rising somewhat from it. Dividing into radiating trunks more or less branching and lobed, or the central parts uniting in a confused fabric, some of the branches or lobes usually broader than 5 mm. Fruits brown, sometimes purplish or greenish. Spores undivided, colorless. Algal cells not in chains.

This group is distinguished from all other large Papery Lichens by the undivided, colorless spores, but as many of the species commonly fail to fruit, characters other than the spores must be stressed. Foreign lichenists have attempted to substitute chemistry for botany in separating the species of this and of other puzzling groups. Since the two most noted American lichenists, Tuckerman and Fink, have declined to recognize chemical determinations, we may assume that the American tradition permits us to use the botanical, thereby avoiding the added confusions which result from chemical methods.

### *Parmelia saxatilis* Stane-Raw

A common tree-lichen, found in swamps, woods and highlands, everywhere that lichens grow; also seen at times on rocks. It forms

* It is the aim of this Lichen Guide to enable those who have no special knowledge of lichens, to identify the majority of the more common species, and all the more conspicuous ones, without technical study and, if necessary, without the use of a compound microscope. If it were possible to accomplish this by brief and concise keys, the detailed descriptions here would be unnecessary. But if such keys could be written, it would not have remained for me to write them.

Therefore, as a substitute for the ordinary key, I have adopted a system of grouping and cross-reference, to be used as follows: First decide whether the lichen is Stalked (Groups 1 to 4), Papery (Groups 5 to 12), Flake (Group 13) or Crust (Groups 14 and on). Then read the description of each group head in that division, select the most likely group, and look over the illustrations. If an illustration looks like the specimen, read the description, noting especially the comparisons which follow it. If the description does not agree with the specimen, one of the species compared with it probably will. This method, though inexact, will accomplish the purposes of a key, and because the descriptions are given in repetitive detail, should prevent wrong determinations.

flat rosettes very variable in shape and size, but often 10 cm. or more across, and with branches up to 7 or 8 mm. wide, though usually much narrower. The substance is thin, and the margins may curl upward slightly, especially in much wrinkled forms. The shining greenish gray upper surface is wrinkled in a net-like pattern, with shallow pits between the raised wrinkles. Brownish granules are often strewn along these wrinkles, and in var. *furfuracea* they lengthen into minute prongs or coral-like growths, often massed all over the center of the lichen. The under surface is black, with many short, black, root-like holdfasts, often dense to the very tip.

Fruits, not often seen, are deeply saucer-shaped, chestnut-brown, with a rim often roughened and warty. Spores undivided, colorless, 10 to 20 by 7 to 12 microns.

*Parmelia saxatilis* is one of the few rosette lichens with a net-like pattern of pits and wrinkles, and though this marking may be faint, it usually serves to distinguish the species from all others, for the pitted members of *Cetraria* (Group 4) and *Sticta* (Group 7) tend to raise at least their tips free from the footholds, while *P. saxatilis* usually lies flat. The other typically pitted lichens also have the under surface pale in contrast with the black of this species and its conspicuous black holdfasts. Though var. *furfuracea* may look at first glance like the paler *Cetraria aleurites* (Group 5), the black under surface will distinguish it at once. The most likely confusion is with *P. sublaevigata,* a subspecies of *P. tiliacea* in some respects intermediate between the two species. Typical *P. tiliacea,* which has the margins curled downward, and parallel wrinkles across the larger trunks, and which commonly bears many fruits, could hardly be mistaken for typical *P. saxatilis,* but intermediate forms between these two common lichens are sometimes difficult to name, and the invention of a subspecies, as usual in such cases, only increases the difficulty, making two series of intermediates in place of one. *P. Borreri* and *P. rudecta* sometimes appear slightly pitted, but can be distinguished by their larger size, flat, round, white soredia rather regularly studded over the upper surface, and by the under surface being brown rather than black. *P. omphalodes,* a small, brown form of *P. saxatilis* growing on rocks in the north, need not be described here because it does not occur in the New York area.

Because of the variability of *P. saxatilis,* and because it is often sterile, it presents difficulties in conjunction with other species of this group, which are best solved by learning the typical forms of the long-recognized species, rather than by giving names to the confusing intermediate forms. Yet some of its variations are so striking in appearance that they require separate description to make identification possible. *P. saxatilis* is further discussed in relation to *P. tiliacea* under that species.

### *Parmelia sulcata.* Furrowed Shield Lichen

Also called *P. saxatilis* var. *sulcata,* or var. *rosaeformis.* Though actually only a phase of *P. saxatilis,* this lichen has an appearance so striking and so easily recognized, that it may be treated as a subspecies for the sake of emphasis. It is larger, sometimes 20 cm. across, and with branches 1 cm. wide. The margins and ridges are studded with raised, dusty, white soredia, lengthened or ranged in lines accenting the net-like pattern, In the rare cases where fruits are found, soredia may cover the rims. In no other respect does it differ from *P. saxatilis.*

Somewhat similar arrangements of soredia are seen on *Sticta pulmonaria* (Group 7), but that species has the under surface nearly white, and the pits are much deeper, with rounded, instead of angular ridges between. *Parmelia sulcata* is not easily mistaken for any other lichen.

### *Parmelia frondifera*

A name recently given to a rare, freakish development of *P. saxatilis,* in which the tiny prongs of coral-like growth characteristic of var. *furfuracea* become flattened into miniature lobes more or less covering the lichen. This modification is probably no more worthy of being named a species than are the fasciated forms of some higher plants, but it does give a decidedly different appearance suggesting *Physcia aquila* var. *detonsa* (Group 8), which, however, is moss-green or brownish, and *Pannaria microphylla* (Group 10) which is greenish brown. Both these species have a dull surface, contrasting with the smooth and somewhat shining texture of *Parmelia frondifera.*

*Parmelia tiliacea.* Linden Lichen

Also called *P. quercina.* An extremely variable lichen found commonly on trees and occasionally on rocks, anywhere that lichens grow, but particularly abundant in swamps. It forms typically flat rosettes, which may reach 10 cm. or more across. The trunks are often thickened, slightly arched, and crossed by warty wrinkles. The manner of branching varies greatly, but often where two lobes meet, their sides touch or overlap slightly, while the sinus between them may show as an almost circular opening, a pattern typical of few other lichens. Lobes may be wider than 5 mm. or much narrower, and some forms are so small that they might belong with the Smaller Shield Lichens (Group 5). The upper surface is greenish or bluish gray, the under is black, often dark brown near the margins, with many short, black, root-like holdfasts.

Fruits are usually abundant, up to 12 mm. in diameter, irregularly saucer-shaped, chestnut to ocher-brown, usually shining, with a thin, smooth to broken or toothed rim. Spores undivided, colorless, 5 to 11 by 4 to 7 microns.

Most of the small or medium sized Shield Lichens found on trees (these must not be confused with the still smaller and rather more common Blister Lichens, Group 8) are either *Parmelia tiliacea* or *P. saxatilis.* The many black holdfasts on the black under surface of both these species distinguish them at once from all the Smaller Shield Lichens except their own subspecies. The puffed forms, *P. physodes* and *P. colpodes* (Group 5), are sufficiently distinguished by their puffed or thickened tips, and though black beneath, have few holdfasts. The Larger Shield Lichens also fail to show any species with comparable abundance of black holdfasts, except *P. perforata* and its subspecies, which are much larger, with raised tips and black, marginal hairs. The Blister Lichens (Physcia, Group 8) have mostly small, blackish or gray fruits, and dark 2-celled spores.

The most important character for separating *P. tiliacea* from *P. saxatilis* is the absence of any regular pitted pattern on the upper surface of *P. tiliacea.* The branches of *P. tiliacea* are also shorter and broader, with a tendency to progress in wave-like humps rather than stay flat, but the small form called *P. sublaevigata* spreads in long, flat, fern-like branches which, unless fruited, somewhat resemble *P. saxatilis. P. tiliacea* will usually fruit when larger than 5 cm. across, and is then more easily distinguished from *P. saxatilis,* which seldom fruits.

These two species may also grow on rocks, where they somewhat resemble the more common *P. conspersa,* which has a yellowish tint, and an under surface usually brown, with comparatively few holdfasts.

*P. perlata, P. perforata,* and their subspecies are distinguished by the larger size of their parts, and the tendency of their tips to lift away from the foothold. *P. rudecta* and *P. Borreri,* also larger, have the upper surface dotted with tiny white soredia, and the under surface drab, with few holdfasts.

### *Parmelia tiliacea* var. *sublaevigata*

Also called *P. sublaevigata.* A variety or subspecies hardly distinct from *P. tiliacea,* but mentioned and illustrated to show the limits to which the species may vary. It radiates in flat, regularly branching trunks reaching a length of 4 or 5 cm. without much overlapping or intermingling. Sometimes it resembles *P. saxatilis,* but lacks the net-like pattern on the upper surface.

### *Parmelia tiliacea* var. *isidioidea*

A name sometimes given to a rather common and often large form of the species, growing on trees and rocks especially in western New Jersey. Though typical *P. tiliacea* has no soredia, granules, or coral-like growths, this variety has the shorter lobes and more central parts humped up, and bearing on their summits crowded hollow warts about 0.2 mm. across, often opening crater-like, or again breaking down in pale, powdery soredia. Fruits are rare. This variety approaches *P. Borreri,* but the soredia are closely clustered instead of scattered, are distinctly wart-like instead of flat, and the black under surface is covered with black holdfasts. Or it might be taken for a small form of *P. caperata,* which often has similar sorediate warts on its ridges, but the blue-gray color is wholly unlike the pale yellow of *P. caperata,* which also has few holdfasts. However, it is one of the most puzzling forms of this difficult group, and different opinions may well be held regarding it.

## *Parmelia conspersa.* Boulder Lichen

The most frequent and conspicuous of all lichens that grow on stone. Seen on boulders, stone fences, cliffs, and occasionally the roots of trees, in shade or full sun. In size it varies from dwarfed rosettes 4 or 5 cm. across, with parts hardly more than 1 mm. wide, to mats that spread a meter or more over the rock, with little to show whether it is all a single lichen reviving again where old and broken, or a number of lichens tangled together. The humped branches grow over each other shingle-fashion, and may end in blunt lobes more than 5 mm. wide, or more commonly divide into many narrowed and pointed tips. So tangled and confused are the parts that the trunks cannot usually be traced or measured. There may be abundant fruits or none. Nearly the whole lichen may be lost under dense coral-like growths 2 or 3 mm. high. Or the lichen may be reduced to a few straggling unconnected tips scattered over the rock.

The upper surface has nearly always a yellowish tint toward the tips, which are pale, but the older central parts may blacken or turn olive-green, or sometimes burn brownish in the sun. The tips are usually pale yellowish or greenish, smooth and shining. The under surface, commonly brown, but sometimes turning brownish black, shows a few dark, root-like holdfasts.

Fruits, often many and crowded, are saucer-shape, up to 12 mm. across, dark brown, purplish or greenish, the rims nearly smooth or toothed. Spores undivided, colorless, 8 to 12 by 4 to 7 microns.

If you glance at a rock covered with Papery Lichen and say it is *P. conspersa,* you will be right most of the time, because this species is common everywhere. On closer examination, the characters to remember are shining, pale yellowish tips which mostly turn downward and touch the rock; also a brown under surface with comparatively few holdfasts. *P. caperata* has similar coloring, but the upper surface, instead of shining, has a texture like kid leather, the lobes are much broader, the tips wavy margined, not pointed, and instead of the coral-like growths, it has small warts dusty with yellowish soredia. *P. saxatilis* and *P. tiliacea* are distinct in their lack of any yellow tint, and in their black, rather than brown under surface, with many black holdfasts. *P. Borreri* and *P. rudecta* also occasionally grow on rocks. They are distinctly blue-gray, and dotted with very tiny, flat, white soredia. *P. perlata, P. perforata* and their subspecies are easily distinguished by the tips, which rise usually 1 cm. or more clear of the rock, and by their frequent lumpy, white soredia or black hairs along the margins. *P. centrifuga,* found only in the north, has uniformly narrow branches, with pale under surface. Species of Physcia (Group 8) may be recognized by their small size, dull surface, and small blackish or gray fruits, never shining. *Sticta amplissima* (Group 7) has broad parts and light red fruits, and turns bright green when wet, as does *Dermatocarpon aquaticum* (Group 12), which is of more leathery texture, with a dull gray surface. These are the Papery Lichens most frequently found growing with *P. conspersa.*

### *Parmelia Borreri.* Borrer Shield Lichen

Instead of describing this fairly common lichen, it is simpler to consider only its much more plentiful variety *rudecta,* here named as a subspecies. For *P. rudecta* has become so widely known under that name, that to return it where it properly belongs, as a variety of *P. Borreri,* would not help the popular comprehension of lichens. There is no difference between the two, except the absence in *P. Borreri* of the central coral-like growths so conspicuous in *P. rudecta.*

### *Parmelia rudecta.* Rough Shield Lichen

Also called *P. Borreri* var. *rudecta.* The commonest of the conspicuous rosette lichens on tree-bark, and sometimes seen on rocks; forming more or less circular patches visible at a distance of many meters, along the roadside or in open woodland anywhere. It often spreads 15 cm., occasionally 30 cm., covering the bark almost completely without much overlapping of the parts, for the lobes are flat and wide, and their edges, meeting, tend to grow together, leaving few traceable trunks or older branches. The center of the lichen is more or less covered with granules and coral-like growths, which may form a crust 3 or 4 mm. thick, appearing thicker where the bark is lumpy. Lobes are as much as 1 cm. wide, rounded, but often with finely cut margins, which, however, lie flat, the upper surface pale blue-gray, often with a


PLATE 7

Fig. 1. *Parmelia saxatilis,* pale gray.
Fig. 2. *P. saxatilis,* tip showing black holdfasts.
Fig. 3. *P. sulcata,* showing ridges of soredia.
Fig. 4. *P. frondifera,* covered with miniature lobes.
Fig. 5. *P. tiliacea,* pale gray.
Fig. 6. *P. tiliacea,* with irregular fruits.
Fig. 7. *P. tiliacea* var. *sublaevigata,* fragment showing long branches.
Fig. 8. *P. tiliacea* var. *isidioidea,* blue-green with soredia.
Fig. 9. *P. conspersa,* yellow gray.
Fig. 10. *P. conspersa,* with coral-like growths.
Fig. 11. *P. conspersa,* fragment of a form with broad tips.
Fig. 12. *P. conspersa,* spores.

purplish iridescence when wet. There is a slight tendency toward netted wrinkles as in *P. saxatilis,* but these are vague. Sprinkled everywhere on the smooth and rather shining surface, are white dots of soredia averaging perhaps 0.05 mm. in diameter, and hardly visible without a lens. These may lie perfectly flat, but are usually slightly raised on older parts. The under surface is smooth, pale drab at the tips, sometimes darkening, and occasionally almost black toward the center, where it is shaggy with drab holdfasts.

Fruits, rarely seen except on very large specimens, are irregularly cup-shaped, dark brown, up to 5 mm. across. Spores undivided, colorless, 10 to 16 by 6 to 9 microns.

The central rough crust, and the pale, blue-gray color, dotted with tiny, white soredia, will distinguish *Parmelia rudecta* from all other lichens, after a little observation, and the smooth, pale under surface of the tips usually prevents confusion with *P. saxatilis* var. *furfuracea* and *P. tiliacea* var. *isidioidea,* which are black beneath. Another lichen with the central coral-like growths is *Cetraria aleurites* (Group 5), without blue-gray color or white dots. *P. Borreri* lacks the central crust, but the other characters are identical with *P. rudecta,* and there is little chance for confusion. Yet *Sticta amplissima* (Group 7) has found its way into herbaria under the label of *P. Borreri,* and the differences should be carefully noted. *Sticta amplissima* is pinkish gray or pearl-gray, with plentiful light red fruits. The upper surface is smooth, or stretched into wrinkles and has no white dots. The under surface is clothed with a pale felt. In the field, it is only necessary to wet the Sticta, which will almost immediately turn deep grass-green. *P. Borreri* turns color hardly at all when wet, becoming somewhat more blue or purplish. *P. perlata* is sometimes mistaken for *P. Borreri,* especially as it may have small, faint dots on the upper surface. The raised margins, often edged with lumpy soredia, and the black under surface, chestnut-brown at the tips, should suffice to distinguish it.

### *Parmelia caperata.* Wrinkled Shield Lichen

A rival of *P. rudecta* for the frequency with which it is seen on trees, and certainly without rival for showiness, whether on bark, or with *P. conspersa* on boulders. Roadside oaks are often blanketed with its pale lemon-yellow mats 30 or 40 cm. across, reaching far up the boles and over the larger boughs. You can see them plainly from a passing car. The radiating branches and lobes, usually about 1 cm. wide, lie fairly close to the foothold, especially at their tips, but crowd each other into ridges and mounds often 1 cm. high. The tips spread out as much as 2 cm. wide, shallowly lobed and with scalloped margins. The pale yellowish upper surface is not quite shining, but rather of the texture of kid leather. Older parts darken to yellowish gray or grayish olive, often overspread with pale, new tips from another direction. Besides the larger wrinkles, this lichen has small ones, about 2 to the mm., beginning a little back from the tips and flowing with the direction of growth, or again spreading irregularly and crossing each other. The higher ridges may break into warts dusted with yellowish soredia. The under surface is black with very short black holdfasts, but at the tips becomes shiny brown, without holdfasts, or with the holdfasts reduced to dots.

Fruits are very rare, up to 12 mm. across, saucer-shape, chestnut-brown, with a wavy and often warty rim. Spores undivided, colorless, 13 to 20 by 7 to 10 microns.

The same tree will often show *Parmelia caperata* and *P. rudecta,* with their contrasted shades of pale yellow and pale blue-gray. This difference in color is usually sufficient distinction, but *P. rudecta,* for further contrast, has white dots scattered over the upper surface, and a pale drab under surface. Small specimens might be confused with *P. tiliacea* var. *isidioidea,* which, however, is always blue-gray or blue-green. *Sticta amplissima* (Group 7), an infrequent lichen in the New York area, forms very large, somewhat similar rosettes, which are pinkish gray with many light red fruits, and turn deep grass-green when wet. If on rocks, *P. caperata* must be separated from *P. conspersa,* of similar color, by its wider, less shining tips, by its black under surface, and by its small, rather regular wrinkles. Few other lichens reach comparable size. *Sticta pulmonaria* (Group 7) is pale brownish both above and beneath, and deeply pitted. *Parmelia perlata, P. perforata* and their subspecies have tips which rise 1 cm. or more from the foothold, and none are yellow except the rare *P. sulphurata,* which is sulphur colored also within, as seen when broken, and probably not found in the New York area. (*P. caperata* is white within.) The yellow of *P. caperata,* which is very pale, must not be confused with the bright yellow and orange tints of the much smaller lichens in Group 9.

### *Parmelia perlata.* Broad Shield Lichen

Seen occasionally in the highlands, particularly on rocks, where it stands out by the breadth of its lifted lobes, often 2 or 3 cm. across, and rising 1 cm. from the foothold. It spreads in crumpled sheets rather than by trunks and branches, and may be 20 cm. across or more. The upper surface is smooth, pale greenish gray, the margins often thickened by masses of whitish soredia. The under surface is black, shining brown near the margins, smooth, or with a very few black, root-like holdfasts.

Fruits are rather rare, up to 12 mm. across, saucer-shape, chestnut-brown, with a thick, smooth rim. Spores undivided, colorless, 10 to 17 by 6 to 10 microns.

*Parmelia perlata* is not too easily determined, yet the real species with which it can be confused are few. It resembles the somewhat smaller *Cetraria glauca* (Group 4), which, however, has frequent coral-like growths on the often torn and jagged margins, and shows a net-like pattern of pits and wrinkles on the upper surface. *Sticta amplissima* and *S. pulmonaria* (Group 7) are pale and felted beneath. The only other lichen of similar color with wide, lifted tips is *P. perforata,* including its subspecies, with black hairs along the margin. Some botanists have allotted a few marginal hairs to *P. perlata,* but Tuckerman follows the older lichenists in insisting that *P. perlata* has no marginal hairs, and thus we have a simple means of differentiating the two species.

### *Parmelia perforata.* Ragged Shield Lichen

On the bark of trees in swamps and bogs, often high up, out of reach, sometimes on rocks, not common, but to be met throughout the New York area. Though not usually forming large rosettes, it is conspicuous for its wide lobes with ragged and fringed margins. The tufts are irregular in shape, often 15 cm. across, with no clearly radiating trunks or definite branches. The tips rise as much as 2 cm. clear of the foothold, and bear conspicuous black hairs along their crinkled margins. The upper surface is smooth, greenish gray or pale olive, the under surface typically black, wrinkled, covered in places with large, black, root-like holdfasts.

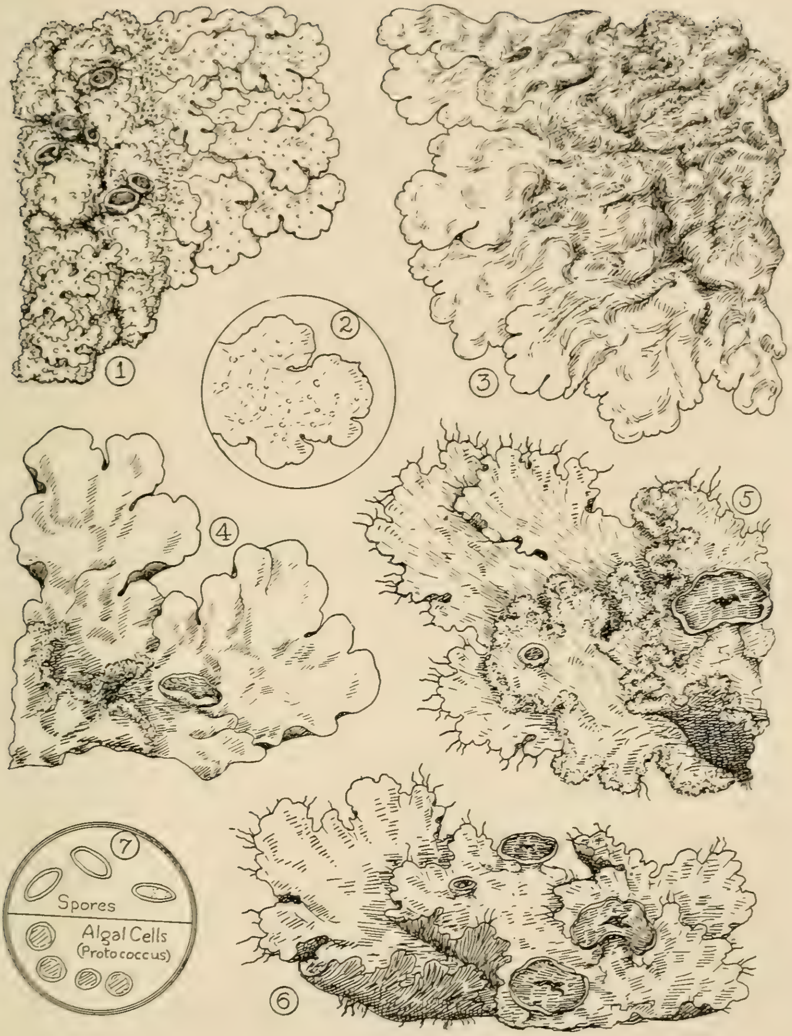



PLATE 8

Fig. 1. *Parmelia rudecta,* blue-gray.

Fig. 2. *P. rudecta,* tip showing white dots.

Fig. 3. *P. caperata,* yellow-gray.

Fig. 4. *P. perlata,* blue-gray.

Fig. 5. *P. perforata* var. *cetrata,* greenish gray.

Fig. 6. *P. perforata,* greenish gray.

Fig. 7. *P. perforata,* spores.

When the under surface is pure white or pale brownish, the lichen is usually referred to its subspecies, *P. hypotropa.*

Fruits frequent, as much as 2 cm. across, lifted on spurs sometimes 1 cm. high. They are cup-shape, flat or irregular, with a thin, wavy rim, and in the center usually a torn hole. Spores undivided, colorless, 9 to 14 by 6 to 8 microns. They sometimes appear vaguely 2-celled.

*Parmelia perforata* can be determined easily as the only Shield Lichen with hairs on the margin and holes in the fruits. In fact, no comparable Papery Lichen has this combination of characters. The only other local Shield Lichen with marginal hairs is *Cetraria ciliaris,* with much more finely divided lobes, and with blackish granules scattered along the margin. The only other with perforated fruits is *C. lacunosa,* which has a net-like pattern of pits and wrinkles seldom seen in *P. perforata* and no marginal hairs.

But because *P. perforata* is variable, it has been divided unnecessarily into several subspecies, which are here described briefly to avoid confusion in case it is desired to study the group further. All are alike distinct from other lichens, with ragged hairy margins lifted high, and frequently, but not always, with central holes in the fruits. For most purposes it is sufficient to name them all *P. perforata,* and if desired, to add these names as varieties, for they were so listed by Tuckerman.

*Parmelia cetrata* differs from *P. perforata* only in having lumps of dusty soredia ranged along the margins. In this respect it approaches *P. perlata,* from which it is distinguished by the marginal hairs and perforated fruits.

*Parmelia hypotropa* has soredia like *P. cetrata,* but the under surface is, at least in part, pure white or pale brown, blackening toward the center. In this it approaches *Cetraria lacunosa,* but the marginal hairs and soredia distinguish it.

*Parmelia crinita* is densely covered with minute granules or coral-like growths. The rare fruits are usually without any central hole, and have soredia on the rims. Spores also are larger, 17 to 22 by 9 to 15 microns. This may perhaps deserve to rank as a distinct species, but as it is rare in the New York area, it may more conveniently be considered a subspecies or variety.

(Group 7, the Leather Lichens, will include Sticta, Nephroma, Solorina and Peltigera.)

Ridgewood, N. J.

## FIELD TRIPS OF THE CLUB

### TRIP OF JUNE 18 TO FREEHOLD, N. J.

Botanical exploration in New Jersey has had its greatest interest in the pine barrens and in the limestone areas in the northwestern part of the state. The intermediate areas have been somewhat neglected, and it was felt that the areas west and southwest of Pemberton might well offer some things of botanical interest. To me especially it would be interesting to find a good stand of *Listera australis,* which is known from a single collection on Long Island and a very few scattered collections in New Jersey. Dr. Small and other members of the party met us at Freehold, increasing the number to twelve.

Proceeding westward from Freehold we stopped at an old fallow field covered with a good deal of *Convolvulus sepium, Euphorbia corollata,* and *Carex annectens.* These are common species of no great interest except in their abundance. A few miles southwest of Freehold toward Smithville we came to the first wild area of *Pinus rigida,* with an equal amount of *P. echinata.* It is difficult for people at first to distinguish between the two species, but after the trees are once seen and carefully observed the short needles, small cones, and upward tilt of the branches of *P. echinata* can be readily distinguished. It was Dr. Chrysler who first pointed out to me during the Atlantic City meeting a few years ago the great frequency of *P. echinata* in the pine barrens and the distinguishing features by which it can be recognized. On roadside cuts *Tephrosia virginiana* was in full flower, exposing the long roots which have earned it such a name as "devil's shoe-strings" in the South. We were pleasantly surprised by the great amount of mayflower, *Epigaea repens,* in these woods.

Continuing southward on the old road to Prospertown we cut into the open margin of a pine barren swamp, with the usual flora: *Xerophyllum asphodeloides,* a few inflorescences still intact; *Leiophyllum buxifolium; Polygala lutea;* and traces of the beautiful purple-scaled pine barren sedge *Carex Barrattii,* which proved to be fairly abundant in the open, very wet bogs closer to the road, where it was accompanied, as is so often the case, by *C. bullata.* At the edge of a ditch *Glyceria canadensis* was abundant, a species certainly not common in the pine barrens and perhaps an introduction through roadside fill. Along this ditch were found three sundews, *Drosera rotundifolia, D. longifolia,* and *D. filiformis,* in abundance. The greatest interest of the party seemed to be in the great abundance of shadbush, *Amelanchier oblongifolia,* loaded down with juicy purple fruits which in their estimation were better than the blueberries which were also abundant, both the high-bush and low-bush. We do not hear very much about the use of *Amelanchier* fruits; they are used (especially *A. oblongifolia*) for pies on Cape Cod under the name "swamp cherry." On the opposite side of the road (that is, toward the west) a path led into a cranberry bog partially abandoned. Here there were splendid examples of the giant club moss of the pine barrens, *Lycopodium alopecuroides,* and good stands of chain ferns, *Anchistea virginica* and *Lorinseria areolata.*

Under the kind leadership of Dr. Small we proceeded south to Prospertown, where we had lunch at the ruins of an old mill dam, now overgrown with a fine display of fox grape, *Vitis labrusca,* the leaves, entire to 3-parted, showing a gleaming white tomentum. Nearby we were shown a fine stand of *Opuntia,* now in full flower along pathways in the sandy woods.

J. J. Copeland

## Trip of June 25 to Quarry Lake

Sixteen members and guests were present on this trip to the Nathan Straus estate at Valhalla, N. Y. The Club and its Field Committee are deeply grateful to Mr. and Mrs. Straus for their great kindness and courtesy in making this trip to their beautiful estate possible and for their wonderful hospitality to the group. Our sincere thanks are due also to Mr. and Mrs. Ernst Hoelle, who so generously guided us over the estate, provided delicious refreshments, and did so much to make the day a perfect one.

Most of the estate's 42 acres were explored, including the beautiful rock garden, stately formal garden, arboretum, fruticetum, pine plantation, orchards, decorative walks and borders, landscaped spring-fed Quarry Lake (75 feet deep) and its sandy beach, the extensive natural woods, and bridle paths. Mr. Hoelle imparted to the group a vast amount of valuable information on the making of the perfect lawns found on the estate, spraying against borers of peaches and nectarines, transplanting, grafting, making successful cuttings, methods of control of borers of pines and other insect pests and fungous diseases, purifying and chlorinating the water-supply, pruning to give desired effects, landscaping, flagstone-pathway planting, etc.

Among the hundreds of interesting plants identified were *Cotoneaster horizontalis* (rockspray), *Hunnemannia fumariaefolia* (Mexican tulip-poppy), *Hedera helix* var. *baltica* (Baltic ivy), *Lychnis coronaria* (mullen-pink), *Picea omorika* (Serbian spruce), *Centaurea moschata* (sweet-sultan), *Ulmus parvifolia* (Chinese elm), *Arnebia cornuta* (Arabian-primrose), *Paeonia suffruticosa* (tree-peony), *Kolkwitzia amabilis* (beauty-bush), *Thermopsis caroliniana* (Aaron's-rod), *Lonicera tatarica, Viticelal jackmani, Sorbus hybrida, Ceratostigma willmottianum, Spiraea henryi, Hydrangea bretschneideri, Penstemon barbatus, Arctotis breviscapa, Hypericum patulum* var. *henryi* (flowers 2½ inches across!), *Magnolia soulangeana* var. *lennei, Viburnum theiferum, Symplocos paniculata, Campanula garganica, C. latifolia, C. bononiensis, C. lactiflora* var. *coerulea, Dicentra formosa, Inula ensifolia, Aquilegia longissima, Heliophila linearifolia, Ursinia anthemoides, Zinnia haageana, Abies nordmanniana, Daphne cneorum, Philadelphus lemoinei* and its var. *erectus, Lilium martagon* (with dull purple-black flowers), *L. candidum* (Madonna lily), *L. tenuifolium, L. dauricum, Salvia farinacea, Mimulus cardinalis* var. *grandiflorus, Matricaria parthenoides, Ismene calathina, Heliopsis scabra* var. *zinniaeflora,* and our own native *Liatris scariosa, Ilex opaca, Magnolia virginiana,* the rare *Tsuga canadensis* var. *pendula* and *Franklinia alatamaha,* and a fine ground-cover, *Uva-ursi procumbens* (bearberry). Those interested in edible plants found quantities of *Prunus armeniaca* (apricot), *Amygdalus persica* var. *nucipersica* (nectarine), *Castanea sativa* (Eurasian chestnut), *Cynara scolymus* (artichoke), *Tragopogon porrifolius* (oyster-plant) *Beta vulgaris* var. *cicla* (Swiss-chard), *Brassica caulorapa* (kohl-rabi), and *B. oleracea* var. *italica* (broccoli) and var. *botrytis* (cauliflower). A great number of species and varieties of *Sedum, Thymus, Chamaecyparis, Juniperus, Taxus, Pinus, Picea, Abies, Euonymus,* and *Syringa* (including *S. amurensis* in bloom!) were pointed out. Box and hemlock hedges, European beeches, galls on oaks and goldenrods, bagworms on scrub oaks, grebes on the lake, and beavers along its margin, all came in for their share of attention.

In the native woods and along the trails quantities of whorled loosestrife (*Lysimachia quadrifolia*) were found in bloom, including the anomalous opposite-leaved form apparently developing when the main stem is decapitated and side branches are produced. The anise-scented goldenrod (*Solidago odora*) was very common, and three species of cinquefoil (*Potentilla argentea, P. recta,* and *P. monspeliensis*), those three common weeds of which so few members seem to know the names—knawel (*Scleranthus annuus*), carpetweed (*Mollugo verticillata*), and devilweed (*Galinsoga ciliata*), and both species of cattail (*Typha angustifolia* and *T. latifolia*) and what appeared to be a natural hybrid between them, were studied.

H. N. Moldenke

### Trip of July 22 to the Fern Garden of Mr. W. H. Dole, West Orange, N. J.

A party of eight gathered to see the sixty-odd species of ferns collected mostly from the northeastern states, but including a number from the west and from the orient, all growing together in a comparatively small area. Here it has been demonstrated that most of our hardy ferns are easily satisfied and can be grown to advantage under ordinary garden conditions, if a little attention is given to their requirements as to soil, position, light and moisture. Many ferns, however, do equally well in positions somewhat different from their normal habitats. *Dryopteris goldiana* in a dry position at the top of the slope is as thrifty, though not as large, as specimens grown in a moister position at the foot of the bank. The specimens at the top of the slope were set in place some ten years ago and have increased in number.

A fine specimen of *Osmunda regalis* (now a group of six or eight) 48 inches and more in height has been growing in a comparatively dry position for twenty years and its self-sown sporlings, of which a dozen or more have appeared on the dry slope, were in each case above the parent fern though generally from under the edge of a stone.

The great variety of shades and tints of green in the fronds of the different species lends an added charm to the fern garden and much can be done in the grouping of ferns to bring out the contrasting tints. The bright yellow-green of *Thelypteris noveboracensis* is in sharp contrast to the blue-green of *T. palustris* (marsh fern) or the brownish green of *Dryopteris cristata* or the bluer green of *D. clintoniana.*

It was noted that some of the characteristics by which ferns can be identified may be lost in herbarium specimens. A frond of *Osmunda cinnamomea* when placed beside one of *O. claytoniana* was shown to be glossy and waxy looking in contrast to the dull matt surface of *claytoniana.* In color both are a deep green in shady locations and a warm yellowish green in the sunlight. Of the spinulose group, *Dryopteris campyloptera* (broad leaf) showed the warmest yellowish green and *D. dilatata* (western broad leaf) the deepest green. These two ferns, similar as pressed specimens, are in sharp contrast when seen growing together.

Among the less common ferns were a group of *Lygodium palmatum* with the fertile portions of the fronds nearly fully developed, *Thelypteris simulata, Anchistea virginica, Lorinseria areolata* with fertile fronds still green, *Asplenium ruta-muraria* var. *cryptolepis, Phyllitis scolopendrium,* in a shady "well-top" of limestone, *Woodsia ilvensis* in several locations in the rock garden, *Cheilanthes lanosa* in a fairly sunny position in the rock garden where it has grown happily with increase for five or six years, *Polystichum braunii* (this has shown itself a good fern for the garden, several specimens brought from Greene County, N. Y., as small plants five years ago are now much larger and finer than when planted), *Pellaea atropurpurea, Camptosaurus rhizophyllus* (protected by wire screening to prevent uprooting by birds). A specimen of *Dryopteris floridana* (*ludoviciana*) with its glossy deep green, waxy looking fronds, planted in the garden a year ago, came through the winter with only slight protection.

Among the western ferns that have proved successful as garden material are *Lomaria* (*Blechnum*) *spicant* from Oregon, said to grow further north than any other fern, *Athyrium alpestre* var. *americanum* from Mt. Ranier, *Atherium filix-femina* (*A. cyclosorum*), *Dryopteris nevadensis, D. dilatata, D. filix-mas* from Colorado, *Polystichum munitum, Woodwardia fimbriata* (*W. radicans* var. *americana*) the California giant chain fern, which has gone through three winters protected with litter, and *Cryptogramma crispa* var. *acrostichoides* (parsley fern).

Dryopteris hybrids are well repesented and include *D. cristata* × *intermedia* (*bootii*—in several forms from small to large plants which may include *D. clintoniana* × *intermedia*), *D. cristata* × *marginalis*, *D. goldiana* × *marginalis* and *D. goldiana* × *clintoniana*.

W. Herbert Dole

### Trip of July 30 to the Lower Raritan River

On Sunday, July 30, a congenial group of eight enjoyed a trip to marshes of the lower Raritan River and Raritan Bay. Three distinct lowland types were included.

At New Brunswick a fresh water marsh showing a slight infiltration of salt tolerant plants was visited. Dominant species here were *Calamagrostis canadensis, Acorus Calamus, Phalaris arundinacea, Impatiens biflora, Elymus virginicus, Rudbeckia laciniata, Eupatorium purpureum, Peltandra virginica* and *Zizania palustris* among others. Five miles downstream near Sayreville a large brackish area was characterized by *Spartina cynosuroides, Phragmites communis, Typha angustifolia, Typha latifolia, Erechtites hieracifolia, Panicum virgatum* and *Hibiscus moscheutos.* A typical salt marsh was visited at Morgan, on Raritan Bay, this having the usual association of *Spartina patens, Distichlis spicata, Juncus Gerardi, Iva oraria, Salicornia* sp. and *Spartina glabra.* Another nearby lowland was largely occupied by *Typha, Hibiscus,* sedges and fine stands of *Glyceria obtusa.* Approximately 100 species were seen.

The trip was led by Doctors M. A. Johnson and W. E. Roever of the Department of Botany, Rutgers University, New Brunswick, N. Y.

W. E. Roever

### Trip of July 23 to High Rock State Park near Seymour, Conn.

A group of sixteen persons gathered at the Seymour R. R. station and proceeded to the park, which in former years was a popular picnic and recreation ground.

Mr. A. E. Blewitt of the Connecticut Botanical Society showed the Mountain Spleenwort, *Asplenium montanum,* growing on an enormous boulder in the parking area and although the plants were small it did not seem necessary to make a hard climb to locate more luxuriant individuals. A little way from the parking space a beautiful group of Mountain Mint *Pycnanthemum incanum* was seen by the roadside and several specimens of Matricary Grape

Fern, *Botrychium matricariaefolium* were found in the rocky woods adjoining.

After eating lunch at picnic tables maintained by the State the party explored the ravine of Spruce Brook, noting the Twisted Stalk, *Streptopus roseus* in fruit with bright scarlet berries and the Moose Wood, *Acer pennsylvanicum*. A little higher up a plant of Green Fringed Orchis *Habenaria lacera* was seen in flower. Near the top of the climb where the land was somewhat more level was a large stand of Whorled Pogonia, *Isotria verticillata,* some showing immature fruit. Still higher up the ladies discovered a quantity of blueberries which were enjoyed more for their flavor than for their botanical interest.

E. B. Harger

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## PROCEEDINGS OF THE CLUB

### Meeting of April 4, 1939

The meeting at the American Museum of Natural History was called to order by the President at 8.15 P.M.

Sixty-nine persons were present.

The following people were elected to associate membership: Miss Catherine Sheridan, 658 West 188th Street, New York; Miss Esther Barag, 2995 Marion Avenue, New York; Mr. Seymour Barrett, 1025 Gerard Avenue, New York; Miss Anna E. Lofgren, 575 West 172nd Street, New York; and Mrs. Edith J. Hastings, 2587 Sedgwick Avenue, New York.

The resignation of Dr. Gilbert L. Stout, Office of Plant Pathology, Department of Agriculture, Sacramento, Calif., from annual membership was accepted with regret.

The scientific program consisted of an illustrated lecture on Eucalyptus of California by Mr. George T. Hastings. The author's abstract follows:

"There are growing in California probably over two hundred species of Eucalyptus. Of these the most common is the blue gum, *Eucalyptus globulus,* which was introduced into the state in the late 1850s or early 1860s. It is also the most commonly grown eucalypt in other parts of the world where they have been introduced. The claims made twenty or thirty years ago that the growing of eucalypts would be a profitable business on dry land have not proved true, but as a shade and ornamental tree, for windbreaks in citrus groves and for the production of fire wood the trees are of great value. As with most species of Eucalyptus the blue gum has two types of leaves, opposite, broad, bluish juvenile ones and alternate, narrow, yellowish-green ones on older trees. All of the eucalypts have flowers in which the sepals and petals are fused into a cap that covers the bud, falling as the flower opens. Stamens are usually numerous, over 1,100 in the blue gum and more numerous in some other species, but in a few kinds not over 20. The scarlet-flowered gum, *Eucalyptus ficifolia* is commonly planted as an ornamental shade tree—it is a small tree, the large panicles of brilliant flowers make it very beautiful. The manna gum, *Eucalyptus. viminalis* is one of the large species, specimens over three hundred feet high have been reported from Australia (claims of trees 400 or more feet high have all been disproved) making it a rival of the Coast Redwoods as the tallest tree of the world. Of the over five hundred species of Eucalyptus growing in Australia, Tasmania and a few neighboring islands some are tall trees, others are little more than shrubs. One, the coral gum, *Eucalyptus torquata,* is said to flower when only a foot or two tall when grown in pots. A score of species are commonly grown in California, others are to be found as specimen trees on estates, or in large collections of the trees such as that at the Huntington Gardens in Pasadena. Possibly the most curious of them all is the bushy yate, *Eucalyptus Lehmanni,* in which the flowers are in compact clusters, the ovaries fused together and the caps making slender horns up to two inches long. In this species pollination often occurs before the caps fall, the latter being pushed off as the fruit begins to develop. One of the most beautiful species is a low form from Western Australia, *Eucalyptus erythrocorys,* in which the caps are brilliant scarlet above the green ovaries, the stamens are grouped in four clusters and are bright yellow. A few forms, such as *Eucalyptus pulverulenta,* have the adult leaves round and opposite. *E. pulverulenta* is a small tree, grown chiefly to furnish cut branches to use for decoration alone or with large masses of flowers."

Clyde Chandler
Recording Secretary

## Meeting of April 21, 1939, at Columbia University

The President, Arthur H. Graves, presided. There were seventy-four persons present. The scientific program consisted of a lecture on "Tissue Culture in Plants" by Dr. Philip R. White of the Rockefeller Institute for Medical Research at Princeton, N. J. The author's abstract follows:

"The idea of cultivating isolated tissues and cells, as a means of studying the supposed 'totipotency' of the cell as an 'elementary organism,' first clearly formulated by Gottlieb Haberlandt in 1902, first successfully carried out with nerve cells by Ross Harrison in 1906, offered a potential means of answering many questions in plant and animal physiology. Irwin Smith, seeking to use such a method in studying crown gall tumors of plants was balked by the lack of a satisfactory technique. Beginning in 1924, the speaker has studied this problem intensively and there has resulted the demonstrations, first that a differentiated plant organ, the root, could be grown in a normal condition for indefinite periods (1934), second, that this capacity is shared by roots of a great many, if not all, species of flowering plants (1938), third, that such organs can be so grown in a relatively simple nutrient, all of whose constituents are known and of high purity (1939), fourth, that relatively simple masses of undifferentiated callus tissue can likewise be grown for indefinite periods in this simple synthetic nutrient (1939) and, fifth, that these undifferentiated masses are actually 'totipotent' since they can be made to differentiate at will by subjecting them to relatively simple treatments (unpublished). A technique such as was visualized by Haberlandt and repeatedly sought since his day is thus now available. Some of the steps in the development of this technique were presented in detail and the implication of these steps were discussed briefly with illustrations to show the precision with which each factor can and must be controlled. Some applications of the method were outlined and future problems suggested."

Clyde Chandler
Recording Secretary

## Meeting of May 2, 1939, at the American Museum of Natural History

The meeting was called to order by Mr. George T. Hastings at 8.15 P.M.. Forty-nine persons were present.

The following people were elected to membership in the Club: Annual—Mr. Lawrence O. Dohrmann, 25–47 38th Street, Long Island City, N. Y. Associate—Dr. Thelma G. Maginnis, 79 Washington Avenue, Arlington, N. J.; Miss Cecelia Fortmüller, 6217 Catalpa Avenue, Ridgewood, N. Y.; Mrs. Alfred B. Thacher, 486 Scotland Road, South Orange, N. J.; Mrs. Lillie Hellerman, 10 Westminster Road, Brooklyn, N. Y.; Mrs. Augusta Altschuler, 251 Herze Street, Brooklyn, N. Y.

The resignations of Dr. C. W. Argue, University of New Brunswick, Fredericton, N. B., Canada, from annual membership and Mr. Joseph Heikoff, 140 East 35th Street, Brooklyn, N. Y., from associate membership were reported.

No further business was transacted.

The scientific program consisted of the showing of colored slides, Kodochromes, and movies of "Travels in Inca Lands" by Dr. E. H. Fulling, editor of Botanical Review. The speaker's abstract follows:

"In 1912 Professor Hiram Bingham of Yale University, director of several expeditions under the auspices of Yale University and The National Geographic Society to study the old Inca civilization of Peru, discovered Macchu Pichu, the lost capitol of the Incas. It was a city of refuge built in the canyon of the Urubamba River, 2,000 feet above the stream with surrounding mountains that tower a mile high. This former capitol of white granite is now in ruins under encroaching tropical vegetation and is one of the great archeological sites of the Americas.

The most striking feature of the West Coast of South America is the extensive arid region which extends some 1,800 miles from Ecuador to the middle portion of Chile. The bleak barrenness of this area, destitute of any conspicuous vegetation extends inland to the high plateau of Bolivia and is watered only here and there by rivers, in the valleys of which there is natural vegetation and farming. The aridity of this region, where rain seldom falls, is a result of the cold Humboldt current which flows north along the coast and meets the warmer Japan current near the northern end of the barren coast. This cold current teems with fish which sustain the world's greatest flocks of birds, the cormorants, pelicans and others, which have built up the valuable guano deposits of the Peruvian coast.

South of Santiago there is sufficient rainfall to sustain farming and about 40° S. latitude forests of virgin timber are encountered about the beautiful Lake Region of Southern Chile."

Clyde Chandler
Recording Secretary

## Meeting of May 17, 1939, at the New York Botanical Garden

The meeting was called to order by the President, Dr. Arthur H. Graves, at 3.15 P.M.

Twenty-two persons were present.

Minutes of the previous three meetings were approved as read.

Mr. Harry L. Weaver, Columbia University, New York City, and Dr. George B. Cummins, Agricultural Experiment Station, Lafayette, Ind., were elected to annual membership.

Mr. C. A. Butt, 11 Hawthorne Avenue, East Orange, N. J., and Mr. Louie C. Hardy, 6 Valley Street, Newark, N. J., were elected to associate membership.

The resignation from associate membership of Miss Gretchen D. Taylor, 59 Mercer Street, Somerville, N. J., was reported.

The President asked Dr. Harold N. Moldenke to serve on the membership committee.

The scientific program consisted of a talk by Dr. W. G. Whaley on "The Apical Meristem in Plant Development." The author's abstract follows:

"A study was made of the developmental behavior of the apical meristem in three species of *Lycopersicon, L. esculentum, L. racemigerum, L. pimpinellifolium*. A direct correlation was found between the size of the meristem at any given stage and the size of the determinate organs of the plant. Generally, the volume of the apical meristem increases as the plant grows. There is also a parallel increase in organ size. There is a progressive decrease in meristem cell size during development presumably because cell division takes place more rapidly than protoplasmic synthesis. This progressive decrease in cell size during development is attended by a similar decrease in nuclear size except that for a short time either during or immediately following germination there is an increase in nuclear volume. Both cells and nuclei reach a constant minimal volume when the plants begin to mature. It is suggested that this progressive decrease in cell and nuclear size at the meristem may be characteristic of indeterminate growth as opposed to determinate growth as in the development of fruit tissues where a progressive increase in cell size is the rule."

Clyde Chandler
Recording Secretary

## NEWS NOTES

Dr. Laetitia M. Snow, professor of botany at Wellesley College, retired from active service at the close of the last academic year with the title of professor emeritus. She will make her home in Pacific Grove, Calif., where she will continue her research at the Hopkins Marine Station of Stanford University.

John H. Lovell died at Sanford, Me., on August 2. He was seventy-eight years old. He had devoted many years to the study of the relation of northern plants to their environment, methods of pollination, relation of flower colors to insect visitors and other topics. He was the author of The Flower and the Bee and The Honey Plants of North America. Since 1926 he had contributed daily articles on New England plants to the Boston Globe and to other New England papers.

### A Nature Essay Contest

An essay contest, open to all nature lovers and offering cash prizes totaling $225, is announced by Claremont Colleges, Claremont, Calif. Manuscripts should be of suitable length for magazine publication but should not exceed 3,000 words, and must reach the judges before February 1, 1940.

The contest, sponsoring officials state, is part of a project to foster interest in the study of nature and to encourage an appreciation of beauty and other values in nature as a force in noble living. This project, it is explained, has been made possible by an anonymous donor to Claremont Colleges and is known as the John Muir Nature Enterprise.

Three cash prizes are offered in the contest: first prize, $100; second, $75; third, $50. Each essay should consist of an original study of some subject in nature or about nature and should embody the appreciation of such factors as beauty, strength, form, variation, and other values thus observed. Illustrations, such as drawings and photographs, should be used if possible.

Complete information concerning the contest may be obtained by writing the John Muir Nature Enterprise, Room 100, Harper Hall, Claremont, Calif.

### European Journals and the War

The non-receipt by a subscriber of any European chemical or other scientific journal seriously needed as research material should be promptly reported to the American Documentation Institute.

The Cultural Relations Committee of ADI, which cooperates closely with the Cultural Relations Division of the Department of State, is working on this problem, and hopes to be able to surmount such war obstacles as interrupted transportation, embargoes and censorship, which so grievously affected the progress of research during the last war.

The principle should be established, if possible, that the materials of research having no relation to war shall continue to pass freely, regardless of the countries of origin or destination.

Reports, with full details of where subscription was placed and name and address of subscriber, volume, date and number of last issue received, should be addressed to American Documentation Institute, Bibliofilm Service, c/o U. S. Department of Agriculture Library, Washington, D. C.

### Dates of Publication of Torreya in 1939

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| 6, | November-December | December 15, 1939 |

# INDEX TO TORREYA—VOLUME 39

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