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A NEGLECTED VARIETY OF HELIANTHUS ATRORUBENS L.

W. A. Anderson

In August, 1923, Professor F. T. McFarland, of the University of Kentucky, and the writer collected a sunflower in western Kentucky, which they later proposed as a new species, *Helianthus kentuckiensis*.[1] In 1928 the writer revisited the station, and obtained some rootstocks which were planted in his father's garden at La Center, Kentucky, where they have grown and flowered abundantly the past two years.

Upon restudy, this plant has been found to be *Helianthus atrorubens* L., var. *pubescens* O. Ktze,[2] and furthermore it has been found that this variety is the only representative of the species in the Mississippi valley, while *Helianthus atrorubens* proper grows only on the Atlantic coastal plain, and in the mountains of North Carolina, Tennessee and Georgia.

Kuntze's selection of a varietal name for this plant is not a happy one, since the true *H. atrorubens* is conspicuously villous, and his brief diagnosis, "Caulis folia pilis parvis munita," does not give the essential differences between the two plants. Nevertheless, examination of the type specimen, now in the herbarium of the New York Botanical Garden, shows conclusively that Kuntze's varietal name should be applied to this plant of the lower Mississippi valley. The type specimen was collected at Cairo (Illinois) "am Mississippi."[3]

About fifty years previous to Kuntze's publication Nuttall had collected this plant in the plains of Arkansas, recognized its close relationship to *H. atrorubens*, and described it as a new species under

[1] McFarland, F. T. and Anderson, W. A., Jr., Amer. Midl. Naturalist ix. 139 (1924).
[2] Kuntze, O., Rev. Gen. Pl. i. 343 (1891).
[3] Kuntze, O., Rev. Gen. Pl., Vorwort, p. x.

the name *Helianthus silphioides*.[1] Torrey and Gray[2] treated Nuttall's name as synonymous with *H. atrorubens*, which disposition of *H. silphioides* has been followed by all subsequent authors.

Before publishing *Helianthus kentuckiensis* as a new species, Dr. McFarland and the writer sent a specimen of it to Mr. E. E. Watson of East Lansing, Michigan, who was then preparing a monograph of the genus. It was at his suggestion that the plant was described as a new species. Later, when his monograph appeared[3] Watson disposed of *H. kentuckiensis* as "not a *Helianthus*," while he treated *H. silphioides* and *H. atrorubens*, var. *pubescens* as synonyms of *H. atrorubens*. This interpretation is difficult to understand, since the floral characters of *H. kentuckiensis* are identical with those of *H. atrorubens;* and the author must have seen other specimens of *H. atrorubens*, var. *pubescens*, including type material of *Helianthus silphioides*.

Synonomy and descriptions of *Helianthus atrorubens* and its variety *pubescens* are as follows:

HELIANTHUS ATRORUBENS L. *H. sparsifolius* Ell., Sketch Bot. S. C. & Ga. ii. 415 (1824). *H. atrorubens*, var. *normalis* Kuntze, Rev. Gen. Pl. i. 343 (1891). Not *H. gracilis* Bert. Misc. Bot. vii. 41 (1848).[4] 7–12 dm. high from a short, woody rootstock: stem more or less hispid, often nearly glabrous above: leaves always in pairs, *ovate to oblong-lanceolate, acute, tapering or abruptly contracted into a winged petiole;* upper surface scabrous-pubescent; lower surface smoother, with long hairs on the veins and petiole; branches of panicle few, elongate, each bearing one to three heads: involucral bracts in about three rows, obovate-oblong, rounded at the tips, mucronulate, glabrous, ciliate: disk 1–1.5 cm. across: disk-flowers purplish brown; ray-flowers yellow: disk-scales three-toothed at summit: pappus of two scarious, ciliolate, tapering scales: achenes quadrate in cross section, dark purple or speckled with yellow, with a circle of hairs around the top and a few on the angles.

HELIANTHUS ATRORUBENS, var. PUBESCENS Kuntze, Rev. Gen. Pl. i. 343 (1891). *Helianthus silphioides* Nutt. Trans. Amer. Phil. Soc., vii. 366 (1841). *H. atrorubens* in part, Torr. and Gray, Fl. N. Amer. 322 (1842), and subsequent authors. *H. kentuckiensis* McFarland

[1] Nuttall, Thomas, Trans. Amer. Phil. Soc., vii. 366 (1841).

[2] Torrey and Gray, Fl. N. Amer., ii. 322 (1842).

[3] Watson, E. E., Contr. to a Monograph of the Genus Helianthus, Papers of the Mich. Acad. Sci. Arts & Let. ix. 343 (1929).

[4] Watson (l. c.) cites this as a synonym of *Helianthus atrorubens*, but Bertoloni's description and plate show that the name applies to some other plant: "Cephalum solitarium, terminale, . . . diametri sesquipollicaris, . . . squamis . . . lanceolatis, . . . externis brevioribus, acutis, internis acuminatis."

and Anderson, Amer. Midl. Nat. ix. 139 (1924). Much stouter than typical *Helianthus atrorubens,* often 2 meters high, very scabrous-pubescent throughout: leaves all opposite or the upper ones alternate; *blades as broad as long, truncate or even slightly cordate at base;* petiole narrow-winged: flowering heads few, on long naked branches: involucral bracts, scales of the receptacle and flowers similar to those of *H. atrorubens.*

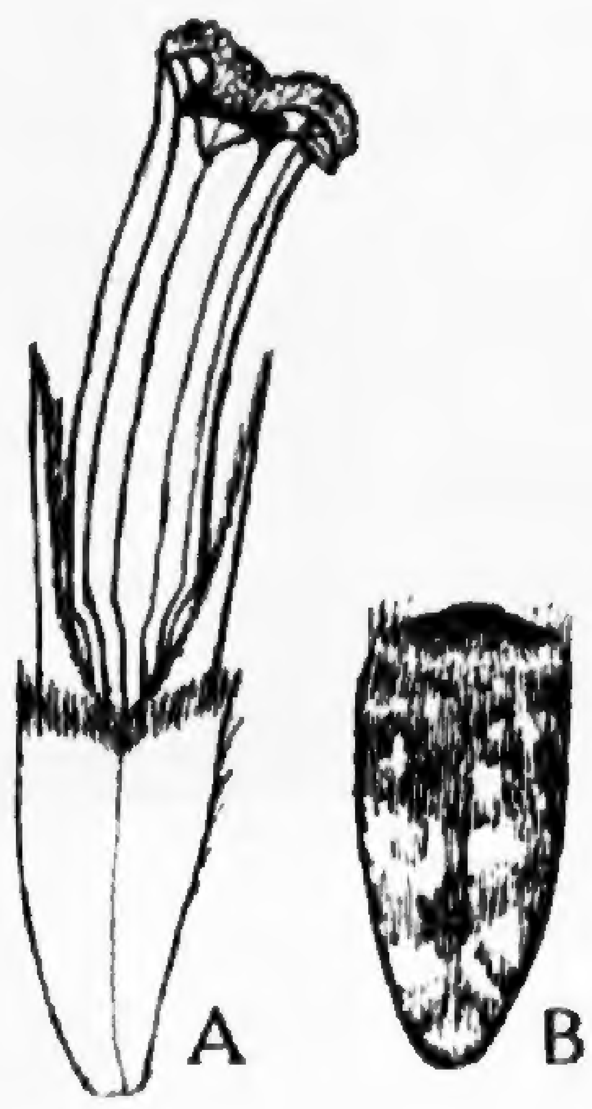

Fig. A. Disk-flower of Helianthus kentuckiensis MacF. & Anderson.
Fig. B. Achene from type specimen of Helianthus silphioides Nutt.

Specimens of *Helianthus atrorubens,* var. *pubescens* which have been examined by the writer are as follows: Illinois: Cairo, *Kuntze,* in 1874 (Type). Kentucky: Near Clinton, Hickman County, *Anderson,* no. 1041. Missouri: Pleasant Grove, *Bush,* no. 304; Dunklin County, *Bush,* no. 72. Arkansas: *Nuttall,* fragments of the type of *H. silphioides.* Alabama: *Buckley.* Louisiana: *Hale,* in 1842.

Material from the type station of *H. kentuckiensis,* McF. and Anderson, collected by the writer and cultivated at La Center, Kentucky has been placed in the Gray Herbarium, and living specimens have been planted in the Harvard Botanical Garden. With the original publication of *H. kentuckiensis* it was stated that a cotype was deposited in "Herbarium Harvard University." There is no such specimen in the Gray Herbarium, so it must have been lost in sending.

As represented by specimens in the Gray Herbarium, true *Helianthus atrorubens* does not extend into the Mississippi valley. Its presence in the mountains of North Carolina, Tennessee, and Georgia, as well as on the Atlantic coastal plain, may be explained on the basis that it has moved out of its ancestral home in the ancient region, now occupied by the southern Appalachian upland, to the present coastal plain, leaving a few isolated survivors in favorable spots in the mountains.[1] Strains from this ancient stock which spread from the ancient region into the lower Mississippi valley have become modified in foliage, but not in floral characters.

The writer is indebted to Dr. S. F. Blake, who examined his specimen of *Helianthus kentuckiensis*, and suggested its relationship to *H. atrorubens;* and to Dr. Elmer D. Merrill, of the New York Botanical Garden, who generously loaned the type specimen of *H. atrorubens*, var. *pubescens*.

THE STATE UNIVERSITY OF IOWA.

SOME FIELD NOTES: A NEW VARIETY AND SOME FORMS OF PLANTS FROM THE MIDDLE WEST; ALSO TWO FORMS FROM MASSACHUSETTS

H. C. BENKE

PURSUING the study of the wild asters in the Chicago Region in the fall of 1929 in continuation from previous years, special attention was given by me to such details as leaf-form, branching habit, association in the field and coloration.

The growing season of the year 1929 in this region seems to have been subject to a most favorable combination of climatic influences resulting in an uncommonly fine development of coloration in plants. And never was there a more gorgeous display of the autumnal tintings in vegetation.

The region about Chicago in a great semi-circle to the north, west and south of some fifty miles, with a twenty-mile tangent southeast into the Valparaiso Moraine in Indiana was revisited and specimens, with field notes, were secured of promising material. Great masses of white, blue and purple were in continued procession—for the genus Aster predominates in our late fall landscape. Other specimens, besides asters, were also secured—all in very limited amounts, since only the new or novel was sought.

In early spring a trip to the southwest as far as New Mexico to near the Rio Grande was made, over Kansas and the Panhandle

[1] See Fernald, M. L., Specific Segregations and Identities in some Floras of Eastern North America and the Old World, RHODORA xxxiii. 25–63 (1931), also Small, J. K., Altitudinal Distribution of Eastern American *Iris*, Jour. N. Y. Bot. Gard. xxxii. 49–66 (1931).

Plains of Oklahoma and Texas. This was followed by a summer trip over central Kansas. A short summer trip northward, into Wisconsin was also undertaken and a few interesting specimens for the herbarium were obtained on each tour.

Some of this material has been distributed to other workers for their study, but my own examinations aided by such of my field notes as are of taxonomic interest have revealed findings which can now be reported. Particularly, the favorable conditions before mentioned have been utilized in observations on color forms.

The suggestion might here be made that the separation of a new variety or form from a species, based mainly or wholly on color, should not be attempted except from careful observation in the field, or from reliable and authentic notes of the collector. Colors are unstable in dried specimens, rendered even more so by chemical treatment in and for the herbarium. The most startling metamorphoses may take place. To cite a conspicuous example; the floral ligules of *Lactuca Scariola* L. are of a golden yellow in the field, but turn to blue in drying! So the taxonomist describing the plant, wrongly as to color of flowers from an herbarium specimen, would not agree with its true delineation in the field.

Another reason against undertaking taxonomic color work away from the field of living plants lies in the fact that they often have flowers of the intermediate gradations or shades from one color to another; for example from purple-blue to purple-red, or from blue to white, or vice versa.

In taking the long trip before mentioned, to the Rio Grande, one will note with interest how the mesophytic flora of the Middle West gradually changes to the xerophytes of the New Mexico desert. Notes on range of plants were obtained—one of which may here be noted, the case of *Oxybaphus nyctagineus*. This species was an almost constant companion along the railroad-bed as far west and south as Waynoka, Oklahoma. Other species of *Oxybaphus*, however, of sparser growth came into evidence.

On the Panhandle Plains of Oklahoma quite a showing of the first spring flowers enriched the landscape after the middle of April. In places the prairies were bright with them, as *Androstephium coeruleum* (Scheele) Greene, *Corydalis aurea* Willd. var. *occidentalis* Engelm., *Lesquerella gracilis* (Hook.) Wats., *Astragalus lotiflorus* Hook., *Astragalus crassicarpus* Ker., *Astragalus mexicanus* A. DC., *Phlox longi-*

folia Nutt., *Lithospermum angustifolium* Michx., *Oenothera laciniata* Hill, *Anemone caroliniana* Walt.; species of *Comandra, Actinea* and *Hymenopappus* and the splendid *Castilleja sessiliflora* Pursh. Here occurred, also, the curious dwarf *Celtis occidentalis* L. var. *pumila* Muhl. about a meter in height, in maturity. Ordinarily *Celtis* species are large forest trees.

Soon afterwards (about the middle of April), in the Panhandle Plains of Texas the early grasses and sedges, as *Bromus unioloides* (Willd.) HBK., *Eleocharis palustris* (L.) R. & S. and *Carex stricta* Lam. were coming into bloom, along with a flora similar to that just listed from Oklahoma with added species, among them, *Ranunculus Cymbalaria* Pursh and *R. circinatus* Sibth., *Lesquerella ovalifolia* Rydb., *Parosela formosa* (Torr.) Vail, *Sophora sericea* Nutt., *Vicia exigua* Nutt. and *V. sparsifolia* Nutt., *Linum rigidum* Pursh and *L. Berlandieri* Hook., *Glossopetalon spinescens* Gray, *Euphorbia Fendleri* T. & G., *Hybanthus verticillatus* (Ort.) Baill., *Gaura coccinea* Pursh, species in *Lomatium, Cymopterus montanus* T. & G., *Convolvulus arvensis* L., *Gilia acerosa* (A. Gray) Britton, *Lappula texana* (Scheele) Britton, *Lippia cuneifolia* (Torr.) Steud., *Pentstemon albidus* Nutt., *Scutellaria resinosa* Torr., *Pyrrhopappus scaposus* DC., *Aster Leucelene* Blake, *Townsendia grandiflora* Nutt., *Erigeron commixtus* Greene and *Berlandiera lyrata* Benth.

These lists are of interest as indicating the flowers in earliest spring bloom on the plains of the Oklahoma and Texas Panhandles.

The species *Astragalus mollissimus* Torr. appears to be most in evidence about Clovis, New Mexico.

Proceeding south over New Mexico in early May the flowering season becomes well advanced with an array of species whose listing will not be attempted here, but a few having uncommon characteristics, from the southeast part of the state, in the region about Hagerman and Carlsbad, may be cited, specimens of which were collected on the trip and deposited in the Field Museum Herbarium:

Astragalus Nuttallianus DC., *Hoffmanseggia densiflora* Benth., *Euphorbia acuta* Engelm., *Ammoselinum Popei* T. & G., *Cryptantha crassisepala* (Gray) Greene, *Plantago erecta* Morris, *Baccharis Wrightii* Gray and *Verbesina nana* (Gray) Robinson.

During the summer trip to Wisconsin a jaunt was made into the wonderful region, northeast of Two Rivers, where evergreen species parallel the sand dunes of Lake Michigan for miles. From here a curious case of rufescence must be reported. With a plant life, along these narrow ridges, composed almost entirely of evergreens, the large patches, meters in extent, of *Arctostaphylos Uva-ursi* (L.) Spreng. are most luxuriant. The very striking occurrence here was the fact that some of these colonies were of plants entirely green—the leaves being of a lustrous, summer verdure well known in this species; while in other colonies they were of a bright magenta-red, a royal purple, in the ends of the branchlets ranging from about five in number to twenty-five, while the older leaves were of the usual green color. The young leaves became progressively changed to green as they became older and the branches of the plants grew longer, always the younger leaves purple-red and the older, green. This quality was common to an entire colony, sometimes more extensive than a colony wholly green, sometimes less so, but growing on the same sandy soils, at similar elevations of dune ridges and in openings between taller evergreens (*Pinus resinosa* Ait., *Pinus Strobus* L., *Juniperus communis* L. var. *depressa* Pursh, *Thuja occidentalis* L. etc.) under similar conditions of light and shade.[1]

A rare plant, and one hardly suspected as having been able to survive in Manitowoc County, Wisconsin, was found near Wells (Brillion R. R. 3) in the depths of a small swamp, a mile to the south, on June 20, 1921. It is the beautiful *Cypripedium acaule* Ait.[2]

Some twenty years ago, when the writer resided in that neighborhood, *Hieracium aurantiacum* L. was a rare plant. It has become so common that it must now be classed among the pernicious weeds, in spite of its great beauty![3]

During my summer trip over parts of Kansas many field notes were taken but only a few of these can here be reproduced.

Near Kansas City, Missouri, was seen the unusual representation of both *Impatiens pallida* Nutt. and *Impatiens biflora* Walt., growing together in considerable colonies on the springy bluff-sides.

Paronychia Jamesii T. & G. was found in great fields, but so only in one locality—Hoisington, Kansas.

Stenosiphon linifolium (Nutt.) Britton makes a very pretty showing, when massed in the fields as about Concordia, Kansas, but nothing can compare to the great, golden blooms of *Oenothera missouriensis*

[1] Specimen in Field Museum, *Benke* No. 4953.

[2] In Field Museum and Gray Herbarium, *Benke* No. 4960.

[3] Wells (Brillion R. R. 3), Wis. *Benke* No. 4965. Subject of an article, by myself, in Brillion (Wis.) News, page 1—July 5, 1929, "*Pretty Wildflower is Becoming a Weed.*"

Sims[1] coming almost out of the ground and decking the hill-side pastures about Strong City, Kansas. The flowers, up to 15 cm. across, remind one of some of the great blooms of tropical regions.

At Cottonwood Falls, Kansas, and Strong City nearby were seen many plants (of a weedy nature there) of *Chaerophyllum procumbens* (L.) Crantz, growing together with others qualifying as *C. Tainturieri* Hook. It here appeared as though the classification depended upon the age of the fruits—as to width of intervals between the ribs on their faces. Another case demanding further study, it seems, as to characteristics in respect to age is that of *Vernonia illinoensis* Gleason to differentiate from *V. missurica* Raf. Specimens from Claflin, Kansas, apparently have their pappus in purplish tinge when young, turning tawny when old, which may lead the taxonomist to different conclusions in the same plant, the main character being in the color of the pappus.

The hill-sides about Strong City have yet another characteristic plant to grace them—*Erigeron philadelphicus* L., all with rays snow-white in this region and of very healthy, vigorous growth.

A few notes from the Chicago environs may be given on some outstanding species. Asters, though so abundant here, are rare in the species *Aster macrophyllus* L. To the north, about Glencoe there occur plants of this species in which the rays are not the usual white, but of a rose-color, rather pale, however (*Benke* 4939).

For the first time in my long experience with asters in the field, that rare and beautiful plant with its snow-white rays, *Aster novae-angliae* L. forma *genesseensis* House (*Benke* 4942) was found near Schiller Park (Cook County), Illinois, Sept. 23, 1929 and again, two days later, several miles farther to the southwest near Berkley.[2]

Aster ericoides L. forma *caeruleus* (Benke) Blake[3] (*Benke* 4947) was, for the second time, found near Schiller Park. This charming aster—the type—was first seen near Bushnell, far down-state, Sept. 29, 1927 (*Benke* 4373). Here, again the same blue rays (not purplish, but with the faintest suggestion of it) were in evidence; with the same strict habit, apparently lifting it above the white-rayed plants of *A. ericoides* in proximity; and the plainly later anthesis, so that, if seen in the field, it would appear to be eligible to varietal rank.

[1] Specimens in Field Museum and in Gray Herbarium, *Benke* No. 5153.
[2] In Field Museum and in Gray Herbarium, *Benke* No. 4941.
[3] See Benke, RHODORA **30**: 77–79. 1928 and Blake, RHODORA **32**: 139. 1930.

The collecting trips of 1929 are uncovering various novelties, some of which can now be listed as below:

I. To the north of Chicago there is a great marsh—the famous Skokie—now partly drained by ditching and road-building operations. At one time it was a number of miles in length and a half mile wide in places, and is still no inconsiderable stretch of swampy marsh. The plant association here includes vast fields of Aster species and their kin, the beautiful Boltonias, growing in luxuriant profusion. They are particularly at home along the ditches and rivulets, formerly centering about a sluggish but considerable stream.

Far beyond the borders of the marsh, near some streamlets in the central reaches, we may see some patches of magenta red (rose-red, in fact) among the great fields of white. These are the rare Boltonias of a color (but more in rose) resembling that of a somewhat similar variety with larger flowers and wider leaves sometimes cultivated—but here we are far away from any garden.

The plant is worth distinguishing with a name:

Boltonia asteroides (L.) L'Hér., forma **rosea**, f. nov., a forma typica ligulis roseis differt.—Illinois: Glencoe, Cook County, Oct. 6, 1929. *H. C. Benke* 4940 (type, Field Museum).

With the species; rays rose-red. No other specimen in Field Museum Herbarium.

II. In the valley of the Arkansas River at its great bend southward in central Kansas nestles a beautiful city named for this feature—Great Bend. The valley here has a distinctive flora typical of the river bottoms of the central plains. Springy places with saturated areas about have their own plant associations, with *Aster exilis* Ell. very conspicuous. Here, also, occur *Heteranthera limosa* (Sw.) Willd. in great numbers. The flowers in their spathes show a deep blue color, but at one place there is a small colony of pure white ones. No intermediate tints being in evidence, the form may be named:

Heteranthera limosa (Sw.) Willd., forma **albiflora**, f. nov., perianthio albo.—Kansas: Great Bend, Barton County, Aug. 10, 1929. *H. C. Benke* 5127 (type, Field Museum).

Like the species; perianth pure white.

III. Oklahoma, too, in its western parts is rich in the plains flora and an early-flowering feature is the dotted blue in parts of the landscape, *Androstephium coeruleum* (Scheele) Greene.[1] But here was one

[1] This name truthfully suggests the floral color, in this region—rather than *A. violaceum* Torr.

in pure white. The specimen was secured; a few others of the same color form being past anthesis were not taken and the luck which was trusted to, for finding further samples for duplicates, did not arrive that day though many more blue ones were seen.

ANDROSTEPHIUM COERULEUM (Scheele) Greene, forma **leucanthum**, f. nov., a forma typica non nisi perianthio albo differt.—OKLAHOMA: Mooreland, April 22, 1929. *H. C. Benke* 5004 (TYPE, Field Museum).

IV. High ridges and hills in long slopes rise from valleys far below in north central Kansas, each with its distinctive flora—very luxuriant in the valley. About Concordia, among its most common plant life is *Verbena stricta* Vent., acres in extent. Hardly, however, is it to be classed as a weed, for it thrives only in limited areas and at limited times, certain soil conditions seeming to be necessary for its maintenance.

The only area where the roseate-corolla form of this plant has been seen in my experience lies to the northwest of the city. Here, in a field of creek bottom some twenty acres in extent, was found an almost solid mass of the species in the usual purplish-blue, with lesser patches, here and there—about a quarter part of all—of the rose-colored form. This variation of color made a very charming impression in the landscape's features. With no intermediate colors to confuse, there can be distinctly separated:

VERBENA STRICTA Vent., forma **roseiflora**, f. nov., a forma typica differt corolla roseo-rubra.—KANSAS: Concordia, Cloud County, July 24, 1929. *H. C. Benke* 5164 (TYPE, Field Museum).
Form with species; corolla rose-red.

V. Visiting the old home farm where my youthful days were spent near Claflin, Kansas, patches of brilliant yellow showed at intervals along Cow Creek which runs through the land. These were masses of Silphium with flowering-heads unusually large and showy—not tall for this genus, but well massed. After careful comparison with much herbarium material and in literature, justification is felt for the separation of an interesting variety:

SILPHIUM INTEGRIFOLIUM Michx., var. **mesochorum**, var. nov., a forma typica differt caulibus glabris pallidissimis in sicco interdum discoloribus; folia ut bracteae involucri subtus glabra supra scabra setoso-ciliata; planta quam in forma typica humilior, capitulis paucis majoribus usque ad 7 cm. diam. speciosis; achaeniis circa 11 mm. latis, margine circa 2 mm. lato.—KANSAS: Claflin, Barton County, Aug. 19, 1929. *H. C. Benke* 5176 (TYPE, Field Museum).
With the species, but stem glabrous, very pale—almost white—

shining in the field, discoloring in parts in age or in drying; leaves all opposite, entire, except the lower cauline leaves which are remotely dentate with low teeth, glabrous below, harsh above and ciliolate on the margins; plants lower than the species, but the few heads much larger, up to 7 cm. in diameter, very showy; achenes about 11 mm. long with margins about 2 mm. wide.

The variety differs from other glabrous or subglabrous species or varieties in *Silphium*, as the var. *laeve* T. & G. of the species, *S. laevigatum* Ell., or *S. speciosum* Nutt., in some or all of such characters as its low stature (less than a meter in height) but large flower-heads with but medium-sized, broadly-winged achenes, and especially its very pale, almost white, shiny stem.

VI. When one travels, day after day, among fields of wild asters, with an endless array in masses of white, and in shades of blue and purple, a variation to red, or rose is most striking. In this region the growing season comes to a grand climax with a great burst of bloom of aster species, in the main.

In all the Chicago region the species *Aster pilosus* Willd. with its variety *demotus* Blake[1] is predominant. Great numbers of these have been seen by me for years past, always with the typical white rays, so my pleasant surprise may readily be imagined when a small colony—and another one not far away—of this species with most beautiful rose-red ray-florets suddenly came to view in an old field near Valparaiso, Indiana. The novelty is here named:

Aster pilosus Willd., forma **pulchellus**, f. nov., a forma typica differt caulibus foliisque sparse hirsutulis; ligulis pulchre roseo-rubris. —Indiana: Valparaiso, Porter County, Sept. 17, 1929. *H. C. Benke* 5083 (type, Field Museum).

Differing from the species, which is typically very villous-hirsute, and from its var. *demotus* Blake, which is glabrous, in being but sparsely hirsutulous in all specimens examined from the two colonies. Rays a beautiful rose-red. The distinctions might give it varietal rank, but I prefer to leave it conservatively as a form, though the application of the terms variety and form are rather ambiguous.

Its vigorous growth, with its great masses of pretty flower-heads, gives this plant its name. No more beautiful aster, wild in the fields, is known to me.

Other specimens of my 1929 collection likely to uncover some-

[1] This variety and its species have been confused till recently with *A. ericoides* L. See Blake, Rhodora **32**: 136–140. 1930.

thing new in species, varieties or forms require further study before definite reports can be made on them.

VII. Through the kindness of Dr. Blake some interesting exchange material in *Compositae* has come into my hands, and two of the numbers of his collecting have yielded distinct color forms which are deemed well worthy of recording. So, we will now take a great stride from the Central West to New England—to Massachusetts. The first:

SOLIDAGO NEMORALIS Ait., forma **pallens** f. nov., ligulis et disco ochroleucis; ceteris ut in forma typica speciei.—MASSACHUSETTS: South Easton, Sept. 8, 1926. *S. F. Blake* 9656 (TYPE, Field Museum). With the species; rays and disk very pale, cream color.

Dr. Blake's note states, "Rays and disk yellowish-cream color; at least two clumps of this form, normal form also present; open, gravelly ground."

When one considers the usual deep yellow color of this species (carried even into the bracts) it will be admitted that an interesting plant has been here disclosed by its collector.

VIII. The second form is one of *Aster linariifolius* L.

This fine species occurs in this region some forty miles to the westward in the morainic gravel hills about Crystal Lake and is very common to the southeast in the dune region of northern Indiana. It has never been my good fortune to come upon a white-rayed plant of this species.[1] An interesting separation of form can here be made:

ASTER LINARIIFOLIUS L., forma **leucactis** f. nov., a forma typica differt ligulis albis.—MASSACHUSETTS: Stoughton, Sept. 17–24, 1927. *S. F. Blake* 10514 (TYPE, Field Museum).

To quote the collector "Rays pure white, disk yellow; about 20 clumps, some of good size, scattered over stretch of 100 yards among the abundant lavender ones—in shrubby, gravelly field, Stoughton."

CHICAGO, ILLINOIS.

POTENTILLA TRIDENTATA, F. AURORA IN THE WHITE MOUNTAINS.—On August 5, 1931, I collected what appears to be *Potentilla tridentata*, f. *aurora* Graustein, RHODORA xxxiii. 211 (1931), between Tuckerman's Ravine and the summit of Mt. Washington, New Hampshire. The

[1] The only variation from the usual violet-blue (nearly blue) color of rays in this species which has been found by me is a specimen with rays considerably lighter in shade than common. It is, INDIANA: Inland Manor, Lake County, Sept. 18, 1925. (*Benke* 5088).

petals, which fell while the plants were in the vasculum, were pink, especially toward the base, and the pressed material shows as unusual amount of red coloring in the styles, filaments and calyx-lobes.—N. C. Fassett, University of Wisconsin.

THE VARIATIONS OF ASTER FOLIACEUS IN NEW ENGLAND

Ludlow Griscom and R. J. Eaton

In Rhodora, vol. 17, 1915, pp. 13–16, Prof. M. L. Fernald published a valuable critique of the hitherto little recognized *A. foliaceus* Lindl. in extreme eastern British America and northern New England, a species further complicating the difficulties of clearly distinguishing the large-headed Asters of the section *Vulgares*. This plant with few, large heads, with essentially equal herbaceous or foliaceous involucral bracts "is quite as variable as other species of its affinity, but in spite of its great variability it holds within the Hudsonian and Canadian area indicated the characters above defined and seems to be a pronounced trend such as is ordinarily considered a species in the genus *Aster*." Prof. Fernald then continues to show that lower plants from alpine and more northern habitats, with short monocephalous branches leafy about the heads, are typical *A. foliaceus* Lindl.; other taller plants have ample leaves and many of the heads on long almost erect naked or nearly naked peduncles (var. *frondeus* Gray); others differ in more serrate leaves, more spreading or arching branches and peduncles (var. *arcuans* Fernald); still others have leafy peduncles and very crenate leaves (var. *crenifolius* Fernald); another variation has the median leaves abruptly contracted and broadly subpetioled (var. *subpetiolatus* Fernald); while a final variation strongly resembles the last in foliage, has the habit of typical *A. foliaceus*, but is easily distinguished by the small usually paired heads and the absence of outer foliaceous bracts (var. *subgeminatus* Fernald). All of these variations were cited from the Gaspé Peninsula, Quebec, or from Newfoundland, but no mention was made of New England material.

The senior author was quite familiar with most of these variations in Quebec and Newfoundland, and was much surprised to find a plant of this affinity with a totally different aspect in the Connecticut River Valley in New Hampshire and Vermont last summer. This plant in its narrowly linear-lanceolate leaves tapering gradually from the middle to a slightly clasping base and in its sometimes much smaller heads is disquietingly close to *A. longifolius* Lam., but is easily separable in possessing well developed herbaceous bracts, some of which are longer than the inflorescence is high. An examination of the material in the Gray Herbarium and the herbarium of the New England Botanical Club shows that this form is the dominant one from the lowlands of northern New England. It *decreases rapidly* northeastward where some of the other varieties become abundant, and very few sheets indeed exist from localities in Quebec and Newfoundland, where relatively southern elements in the flora do not occur. It is also particularly characteristic of river- or lake-banks throughout its range. It is clearly one extreme of the species, with a definite geographic trend, and would appear fully as worthy of formal separation as other described varieties. It may be characterized as:

ASTER FOLIACEUS, var. **sublinearis**, n. var., caule tenui, 1½–5 dm. alto, glabro vel piloso; foliis patentibus vel subascendentibus tenuibus glabris lineari-lanceolatis vel lanceolatis acuminatis, basi angustatis vel cordato-amplexicaulibus, obscure serratis vel subintegis, mediis ½–1 dm. longis ½–1 cm. latis; involucro 5–8 mm. alto, bracteis lanceolatis herbaceis vel exterioribus foliaceis elongatisque.

Stem 1½–5 dm. high, glabrous or pubescent; leaves spreading or somewhat ascending, thin, glabrous, linear-lanceolate or lanceolate, acuminate, narrowed at base or cordate-clasping, obscurely serrate or subentire; the median ½–1 dm. long, ½–1 cm. wide; involucre 5–8 mm. high, the bracts lanceolate, herbaceous, or the outer foliaceous and elongate.—VERMONT: alluvial bank of Connecticut River, Weathersfield, Windham County, September 4, 1931, *Eaton and Griscom,* no. 14754 (TYPE deposited in Gray Herbarium).

It should be noted that the variations given in the description, other than the bracts, exactly parallel those of *A. longifolius* Lam. and, as in that species, the broader-leaved forms with leaves less attenuate at the base are distinctly rarer southward. Both extremes are represented in the type-collection sheets. Several sheets examined from Quebec are transitional to typical *A. foliaceus,* and Prof. Fernald records similar transitional specimens for other varieties. In so polymorphic a species and section this is only to be expected. Indeed it is merely a question of time and experience before the collector will find plants which impugn in one way or another one or more elements of a specific concept in this most interesting genus.

An older generation ignored such specimens, or in a few famous cases deliberately destroyed them. It is the modern fashion eagerly to collect these less usual mutations, and as a result either to question the value of the older specific concepts or to call the majority of *Aster* specimens hybrids. Both courses are childish, and futile in devising a stable taxonomy, and both ignore the fundamental biology of the group, a genetically unstable and aggressive one, many elements of which have recently recaptured or entered much new territory in northeastern America and have not as yet had time to crystallize by elimination into specific concepts sufficiently definite to satisfy the longings of the amateur in the field or the taxonomist in the herbarium.

An excellent illustration of this principle is the record of *A. foliaceus* from Sandisfield, Berkshire Co., Massachusetts, in Hoffmann's Flora, p. 337. This specimen has been most carefully studied, and we are quite unable to endorse this determination. It is true that the heads have well developed herbaceous bracts. But the whole stem from the root up is harshly pubescent or hispid, the leaves are hairy or even scabrous on the upper surface, with very broadly clasping bases, and we have no hesitation in declaring this specimen to be an abnormal form of *A. puniceus*, extreme forms of which are known to develop herbaceous bracts. The only other conceivable course would be to regard this specimen as a hybrid between *A. foliaceus* and *A. puniceus*. This course would be biologically preposterous, until some evidence is discovered to show that typical *A. foliaceus* occurs in the region from which the supposed hybrid came. Considerable evidence exists that *A. foliaceus* does *not* grow there, nor could it be reasonably expected.

We give below a list of the varities of *A. foliaceus* definitely occurring in New England, citing the majority of the specimens, and all those seen of var. *sublinearis*.

1. Typical A. FOLIACEUS Lindley. NEW HAMPSHIRE: Numerous collections recorded by Pease in Flora of Coos Co. from alpine and subalpine habitats of the White Mts. VERMONT: a single collection from the summit of Mt. Mansfield (Gray Herbarium).

2. Var. ARCUANS Fernald. NEW HAMPSHIRE: Berlin Falls, July 27, 1899, *W. W. Eggleston*, no. 1806. Now in Gray Herbarium, determined by Fernald. Duplicate in N. E. B. C.

3. Var. SUBLINEARIS Griscom and Eaton.

In Gray Herbarium: NEWFOUNDLAND: headwaters of Rocky River, Whitbourne, Avalon Peninsula, 8 Aug. 1911, *Fernald & Wiegand*, no. 6319; Rushy Pond, Exploits River, Aug. 1911, *Fernald, Wiegand & Darlington*, no. 6320; Buchan Junction, 19 July, 1930, *K. P. Jansson;* Table Mt., Port-à-Port Bay, 10 August, 1910, *Fernald & Wiegand*, no. 5121. QUEBEC: River St. Augustin, Saguenay Co., 6 Aug. 1915, *St. John*, no. 90,764; Natashquan, north shore, Gulf of St. Lawrence, 1 Aug. 1928, *Victorin & Rolland-Germain*, no. 28,700; Ste. Anne des Monts, Gaspé Co., 3–17 Aug. 1905, *Collins & Fernald;* St. Raymond, Co. Portneuf, Aug. 1914, *Victorin*, no. 617. NOVA SCOTIA: Yarmouth, 24 July 1920, *Fernald, Bean & White*, no. 22,780. MAINE: Boundary Lake, Aroostook Co., 12 Aug. 1902, *Eggleston & Fernald;* Limington, York Co., 28 Aug. 1916, *Fernald & Long*, no. 14,735. NEW HAMPSHIRE: Berlin, 27 July, 1899, *Eggleston*, no. 1301; North Woodstock, Grafton Co., 3 Aug. 1915, *Fernald*, no. 11,910; Plymouth, Grafton Co., 30 July, 1915, *Fernald*, no. 11,912.

In Herb. N. E. B. C.: NEW HAMPSHIRE: Gorham, Coos Co., 27 Sept. 1916, *Pease*, no. 16,942; Thompson & Meserve Purchase, 12 Aug. 1910, *Pease*, no. 12,834; Bath, Grafton Co., 18 Aug. 1917, *Fernald*, no. 15,586; Ashley's Ferry, Claremont, Sullivan Co., 7 Sept. 1931, *L. Griscom & F. W. Hunnewell*, no. 15,046. VERMONT: Weathersfield, Windham Co., 4 Sept. 1931, *Eaton & Griscom*, no. 14,754; West River, Dummerston, Windham Co., 5 Sept. 1931, *Eaton & Griscom*, no. 14,758.

TWO NEW EVERGREEN HOLLIES FROM CENTRAL FLORIDA

JAMES B. MCFARLIN

WHILE I was engaged in field work for the University of Michigan during the past year, an apparently new and localized species of *Ilex* was discovered in the scrub about Lake Marion, Polk county, Florida. It grows mixed with *Ilex opaca* Ait. and *Ilex arenicola* Ashe but is readily distinguished from both by its extremely small leaves and compact manner of growth. Several colonies have been found scattered through the scrub. Only sterile material was at first collected, February 22, 1931. Flowers were obtained March 17, 1931 at the original station, and again on May 27, 1931 from another location.

Growing with *Ilex arenicola* Ashe on the inland sand dunes about Lake Jackson, near Sebring, Florida, I discovered on June 9, 1931 a small shrub which at first sight I took to be the same as the new Ilex from the Lake Marion region, but further examination showed that it was not the same. In spite of diligent search only the one bush could be found. As the dunes supported an abundant growth of *Ilex arenicola* Ashe and but a single bush of this odd Ilex I propose to give it the name *Ilex arenicola* Ashe f. *sebringensis.* Although it is very clearly distinct, it may have originated by mutation as a single plant and cannot be described as other than a form until it is found to be more widely distributed. It will have a distinct horticultural value if it can be got into cultivation by propagation from the original plant.

A careful study of herbarium material and of the literature failed to bring to light names or descriptions of the foregoing hollies.

Ilex **pygmaea,** sp. nov. A compact shrub or small tree 2.5 to 3 m. high, with very closely appressed ascending branches. Bark of the trunk and branches gray, very young shoots brown, puberulent. Leaves coriaceous, persistent, numerous, dark-green and nearly glabrous above except for a slight puberulence along the sunken mid-rib, pale yellow-green and glabrous or essentially so beneath, flat or sometime slightly revolute, obovate to obovate-elliptic or sometime elliptic, 1.5 cm. (usually 2.5 cm.) to 3 cm. long and 0.6 cm. to 1.5 cm. wide; margin sinuate-spinescent with ascending teeth; apex truncate or acute, mucronate; base acute or rounded, sometimes slightly cuneate; petiole 4 to 5 mm. long, pubescent. Flowers borne in few-flowered cymes on the new growth. Petals 4, fused at the base, white, broadly ovate, 3 mm. long and 2 mm. wide, cupped, imbricate in the bud; stamens 4, alternate with the petals, slightly shorter than the petals; filaments glabrous, dilated at the base, about 1.4 mm. long; anthers ovate, 1.4 mm. long and 1.2 mm. wide, ciliate, acute or short acuminate. Fruit not seen. A close relative of *Ilex arenicola* Ashe, from which it differs in the extremely small, usually flat leaves and its dense habit of growth. Since it is found growing together with *Ilex arenicola* Ashe in the scrub, its characteristics are undoubtedly genetical and not environmental. Type (in the Herb. Univ. Mich.), *J. B. McFarlin* 4508, Lake Marion, Polk County, Florida; in the deep scrub.

Frutex vel arbuscula parva 2.5–3 m. alta; ramis appressis ascendentibus; cortice trunci et ramorum majorum griseo; ramulis brunneis puberulis; foliis planis vel paululo revolutis, obovatis vel ellipticis coriaceis persistentibus numerosis atroviridibus superne glabriusculis sed costa media impressa sparse puberulis, inferne pallide luteo-viridibus glabris vel sparsissime puberulis, 1.5–3 cm. (plerumque 2.5 cm.) longis, 0.6–1.5 cm. latis, sinuato-spinosis, apice truncatis vel acutis, mucronatis, basi acutis vel rotundatis; dentibus ascendentibus; petiolis 4–5 mm. longis pubescentibus; floribus solitariis vel in cymis paucifloris in ramulis novellis; petalis 4, basi connatis, albis, late ovatis, 3 mm. longis, 2 mm. latis, canaliculatis, nondum apertis imbricatis; staminibus 4, quam petalis alternantibus paulo brevioribus; filamentis glabris, basi dilatatis, circa 1.4 mm. longis; antheris ovatis, 1.4 mm. longis, 1.2 mm. latis, ciliatis, acutis vel breviter acuminatis. Fructus ignotus. Ilici arenicolae affinis a qua differt habitu humillimo et denso foliis multo minoribus plerumque subplanis. Specimen typicum (in Herb. Univ. Mich.) *J. B. McFarlin* 4508, prope Lake Marion, Polk County, Florida.

Ilex arenicola Ashe, f. **sebringensis**, f. nov. A small compact shrub 0.5 to 1 m. high with very densely ascending branches. Bark of trunk and branches gray, that of the new growth a light brown, puberulent. Leaves coriaceous, numerous, persistent, deep green and glabrous above or minutely puberulent along the sunken mid-rib, yellow-green and glabrous or essentially so beneath, 1.5 cm. to 3 cm. long and 3 mm. to 11 mm. wide; blade usually strongly revolute with a sinuate-spinescent margin; apex generally acuminate but sometimes truncate or acute with a long spine-like termination; base cuneate or rarely acute; petiole pubescent about 4 mm. long. Flower and fruit not seen. Differs from the typical form in the smaller, narrow leaf with mucronate apex. Since it occurs in the same habitat with the type its characteristics are undoubtedly genetical and not environmental. Type (in the Herbarium University of Michigan) *J. B. McFarlin* 5714, Sebring, Highlands County, Florida; in scrub on inland sand dunes.

Frutex compactus parvus 0.5–1 m. altus; ramis densis ascendentibus; cortice trunci et ramorum griseo; ramulis brunneis puberulis; foliis coriaceis, persistentibus, numerosis, atroviridibus superne glabriusculis vel costa media impressa minute puberulis, inferne luteo-viridibus glabris vel glabriusculis 1.5 cm.–3 cm. longis, 3 mm.–11 mm. latis, plerumque valde revolutis, sinuato-spinosis, apice truncatis, acuminatis, vel acutis mucrone longo praeditis; basi cuneatis vel raro acutis; petiolis 4 mm. longis, pubescentibus. Flores et baccae ignotae. A forma typica differt foliis minoribus angustioribus apice acuminato mucronatis. Specimen typicum (in Herb. Univ. Mich.) *J. B. McFarlin* 5714, prope Sebring, Florida.

University of Michigan.

Notes from Southeastern Wisconsin.—The following color variations are thought worthy of record:

Liparis liliifolia (L.) Richard, forma **viridiflora**, n. f., petalis labelloque pallide viridibus. Petals and lip light green.

We have been finding a few of this green-flowered *Liparis* (reminding one somewhat of *L. Loeselii*) each year for several years in an area where there are several hundred normal plants. It might be observed here that the Manual's characterization, "flowers 5–15," in *Liparis liliifolia* is too modest in the case of our Wisconsin plants. "Flowers 5–40" are not at all uncommon with us.

Verbena stricta Vent., forma **albiflora**, n. f., corollis albis. Seemingly rare; seen only once, along a roadside where it was interspersed with the normal purple-flowered form.

Cirsium discolor (Muhl.) Spreng., f. albiflorum House. Rather common along roadsides in our southern counties.

We have been watching closely for white-flowered forms of other thistles, but they appear to be confined to *C. discolor*.

Liatris scariosa Willd., forma Benkei Macb.

Evidently a very rare form, only a single plant with white flowers having been observed by the writer during the years that he has been familiar with the purple-flowered form. The latter is very abundant with us and very prominent in the summer floral aspect.

Helianthus grosseserratus Martens, forma **pleniflorus**, n. f., floribus omnibus ligulatis.

This double-flowered form is occasionally met with along roadsides and railroads in southeastern Wisconsin and across the line in Illinois. I have watched closely for double flowers in other species of *Helianthus*, but without success.

Sheets of all the above excepting *Liatris scariosa* are deposited with the Gray Herbarium; the latter is in my own herbarium.—S. C. Wadmond, Delavan, Wisconsin.

An Illustrated Flora of Quebec.—Readers of Rhodora have become familiar with the painstaking and scholarly discussions, group by group, and the considerations of problems in the flora of Quebec by Brother Marie-Victorin (see Rhodora, xxviii. 18–20; xxx. 79–80; xxxi. 19–20; xxxii. 11–15) and members of the New England Botanical Club have taken pride in the accomplishments and versatility of their genial fellow-member at the University of Montreal. Now, one of Brother Victorin's former students, our other member from the Province of Quebec, Father Louis-Marie (Professor Louis Lalonde) of l'Institut Agricole d'Oka, whose happy personality will be remembered by all who knew him when he was a graduate student at Harvard, has brought great credit to his former teacher at Montreal as well as to himself by issuing for the Province of Quebec a manual,[1] which should start many students on the road to botany. Intended especially for the young naturalist, the book gives very briefly a general introduction to botany, with simple (perhaps too concise) introductions to cells and tissues and the

[1] Père Louis-Marie, O. C., *Flore-Manuel de la Province de Québec*, Illustrée de plus de 2100 dessins par Marcel Makhes. Contribution No. 23, Institut Agricole d'Oka. Price, post-paid, in the United States $2.00. (Canadian).

principal organs of higher plants; in a word, a much abbreviated summary of morphology. This is followed by directions for collecting and preparing specimens and the preparation of the herbarium; a brief introduction to the systems of classification; and a condensed resumé of the groups of plants found in Quebec, ending with keys, descriptions and illustrations of the majority of vascular species of the province.

In such a brief volume (320 pp.), with the first pages in the nature of a text-book, the treatments of species are, necessarily, reduced to simple diagnoses and those from "le Bas-Québec" (Côte Nord, Labrador, Anticosti and Gaspé) are often omitted. But for the warmer and more densely populated regions of Montréal, Trois Rivières and Québec it is very complete.

The illustrations by M. Makhes have a decidedly continental European style. Grouped several on a page they are remarkably life-like and well drawn, though often a bit too crowded for quick and clear interpretation. It is unfortunate that they had to be printed as pages of text, for if they could have had good plate-paper they would show to greater advantage. As it is they are vastly superior in their display of detail to most drawings available in eastern America. Such plates as no. 1 (illustrating in very French fashion the Cell), 5 (flower and inflorescence), 14 (*Pinaceae*), 15 (*Typhaceae, Sparganiaceae*, etc.), 18 (*Festuceae*), 20 (*Aveneae*), 37 (*Betulaceae*), 63 and 64 (*Umbelliferae*) and several others are beautifully reproduced in the copy at hand; but some others have suffered from an intensification of blackness and the crowding already mentioned.

Altogether the book is a notable step forward for French Canadian botany and every ambitious young naturalist, whether speaking French or English, in eastern Canada or in the northern United States will want a copy. Older botanists, too, will find the book a worthwhile addition to their stock of reference works. There is nothing quite like it in either country. Canadian botanists are to be congratulated upon the two leaders who are developing botany in Quebec upon progressive lines. Their published works represent quite different approaches and methods of presenting results—both to be highly commended. May they long live to coöperate and mutually develop their science in Quebec and throughout Canada.—M. L. F.

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SOME GENERA AND SPECIES OF RAFINESQUE

M. L. Fernald

Constantine Samuel Rafinesque [Schmaltz], the most erratic student of the higher plants, has made unending trouble for American and (although they apparently do not realize it) European botanists. Much of his work (like his segregation of *Carex* into many genera, often with the same species as types of different genera) was obviously the product of an abnormal mind; much of it is too obscure for clarification; but some of his books, for instance his extensive *Autikon Botanikon,*[1] contain accurate descriptions of genera and species which it is a duty to maintain. The task of sifting the comparatively few perfectly sound grains from the chaff and the distorted or unrecognizable grains is a thankless one and, above all, it should be undertaken only by those with intimate knowledge of the floras concerned. In any other hands the interpretation of Rafinesque might often lead to confusion and the perpetuation of doubtful names.

I should have, consequently, the gravest misgivings if assigned the unwelcome task of interpreting much of Rafinesque's publication. A few cases, however, have recently come to my attention in which the current names of familiar plants are necessarily altered by the valid and quite clear publication of Rafinesque. These are discussed below.

Trillium **Gleasoni,** nom. nov. *T. declinatum* (Gray) Gleason, Bull. Torr. Bot. Cl. xxxiii. 389 (1906), not Rafinesque, Autikon Botanikon, 135 (1840). *T. erectum* var. *declinatum* Gray, Man. ed. 5: 523 (1878).

[1] This, one of the most significant works of Rafinesque, with "Botanical illustrations [*i. e.* diagnoses] of 2500 New . . . Plants," published in 1840, has unfortunately, not yet been admitted to *Index Kewensis:* consequently, many names now current are upset by its well published genera and species.

Rafinesque's *Trillium declinatum* was from Alabama and Florida, a plant with oblong or elliptical leaves said by its author to be near *T. Catesbaei* Ell. It is very different from *T. declinatum* of Gleason, a northern plant with broadly rhombic leaves. Since the name *T. declinatum* is preoccupied by the southern plant it is a pleasure to associate with the broad-leaved northern species the name of the botanist whose study established its specific value.

Lychnis (§ Melandrium) **furcata** (Raf.), comb. nov. *Silene (Viscago) furcata* Raf. Autikon Botanikon, 28 (1840). *L. affinis* J. Vahl, in Fries, Mantissa, iii. 36 (1842) as to Greenland reference only, not the Finmark plant described. *Melandrium affine* J. Vahl in Fl. Dan. xiv. fasc. xl. 5, obs. sub t. mmccclvi. (1843).

Lychnis furcata is the very characteristic plant of Greenland, Arctic America and northern Labrador and perhaps of Spitzbergen which has been passing as *L. affinis* J. Vahl in Fries, Mantissa, iii. 36 (1842) or *Melandrium affine* J. Vahl in Fl. Dan. xiv. fasc. xl. 5, obs. sub t. mmccclvi. (1843) or *Wahlenbergella affinis* (J. Vahl) Fries, Bot. Not. (1843) 143. Rafinesque's specific name should be taken up not only because it antedates *L. affinis* by two years but because it belongs to an apparently quite distinct and more arctic species than the Lapland plant which should stand as true *L. affinis*. To be sure, Ostenfeld urged the taking up for these plants of the still earlier name *L. pauciflora* Ledeb. Mém. Acad. Imp. Sc. St. Petersb. v. 537 (1815) and published the combination *Melandrium pauciflorum* (Ledeb.) Ostenf. Meddel. om Grønland, lxv. 173 (1923); but Hultén definitely shows[1] that Ledebour's *L. pauciflora* was a mixture, the type-sheet preserved in Herb. Hort. Petrop. consisting partly of the circumpolar *L. apetala* L. (1753), partly of the Asiatic *L. brachypetala* Hornem. (1819), and he rightly refrains from using the Ledebour name, since Ledebour's description was based on a mixture of two species (*nomen confusum*).

It has been customary to regard as one species, *Lychnis affinis*, the plants of the arctic and subarctic areas and to give the entire series the name *Lychnis affinis* or *Melandrium affine*, an interpretation reflected in the broad range given by Hultén, whose detailed statements of distribution are so unusually complete:

"Geographical area: Europe: very rare in northern Scandinavia and on Kola; Spitzbergen, Nova Zembla, Arctic Russia, in the Urals at least to Sob river (!). Asia: from Jalmal and the mouth of Yenisei (!)

[1] Hultén, Fl. Kamtch. ii. 91 (1928).

to the mouth of Lena (!) and Chukch Penins., southwards to Vilju distr., Jakutsk distr. and southern Kamtchatka. Also in the mts. of Central Asia southwards to Pamir and Himalaya. America: Arctic Alaska to Ellesmereland, Baffin Land, Hudson Bay and Labrador, southwards to Alberta acc. to RYDBERG. W. Greenland from about 66° N. lat. northwards, E. Greenland from Scoresby Sound northwards."[1]

Lychnis affinis was originally described by Fries from Finmark, his very detailed description applying primarily (if not entirely) to the Lapland plant and his citation of specimens covering the Lapland (Finmark) plant only: "Ad Alten Finmarkiae occidentalis locis graminosis herbidis. *Laestadius, Vahl,*[2] *Blytt.*" Unfortunately, however, Fries gave two manuscript names in synonymy:

"Lychnis affinis. *J. Vahl.! Fl. Gr. Mscr.*
L. Dorothea. *Laestad.!*"

It is evident that Fries, describing and citing only the Finmark plant from material collected there by Laestadius, M. Vahl and Blytt, rejected the unpublished name which Laestadius had assigned it and, unhappily, took up for the Finmark plant a manuscript name which J. Vahl was applying to the quite different plant of Greenland, a plant which J. Vahl formally published the next year as *Melandrium affine*. The Lapland plant should, therefore, be called *L. affinis* of Fries, not of "(J. Vahl) Fries," since Fries's ascribing of it to J. Vahl was due to his misidentification of the Greenland plant of J. Vahl.

The distinctive characters of the two plants are given below and the quite different calices and the seeds are well brought out in the figures: FIG. 1 a characteristic fruiting calyx of *L. furcata* from Labrador (*Woodworth*, no. 219½), FIG. 2, a flowering calyx from Greenland (Godhaven, *Porsild*), FIG. 3 a flowering calyx of *L. affinis* from Torne Lappmark (*Alm*), FIG. 4 a fruiting calyx from Torne Lappmark (*Samuelsson & Zander*), FIG. 5 seeds of the latter, FIG. 6 seeds of *L. furcata* from Greenland (*Porsild*); the calices × 1¾, the seeds × 10.

L. FURCATA. Surfaces of upper (and commonly the lower) leaves more or less pubescent: flowering calyx inflated, ellipsoid-campanulate, 5–10 mm. in diameter; fruiting calyx urceolate or gibbous-campanulate, 10–15 mm. long, up to 12 mm. thick, the lobes deltoid to semi-orbicular; veins dark-purple, the principal ones oblanceolate or spatulate, 1–2 mm. broad above the middle; intermediate veins

[1] Hultén, l.c. ii. 92 (1928).
[2] Martin Vahl, not the younger J. Vahl.

Figs. 1 and 2, Calices of LYCHNIS FURCATA, × 1¾; figs. 3 and 4, of L. AFFINIS, × 1¾. (Photos. by *H. M. Raup.*)

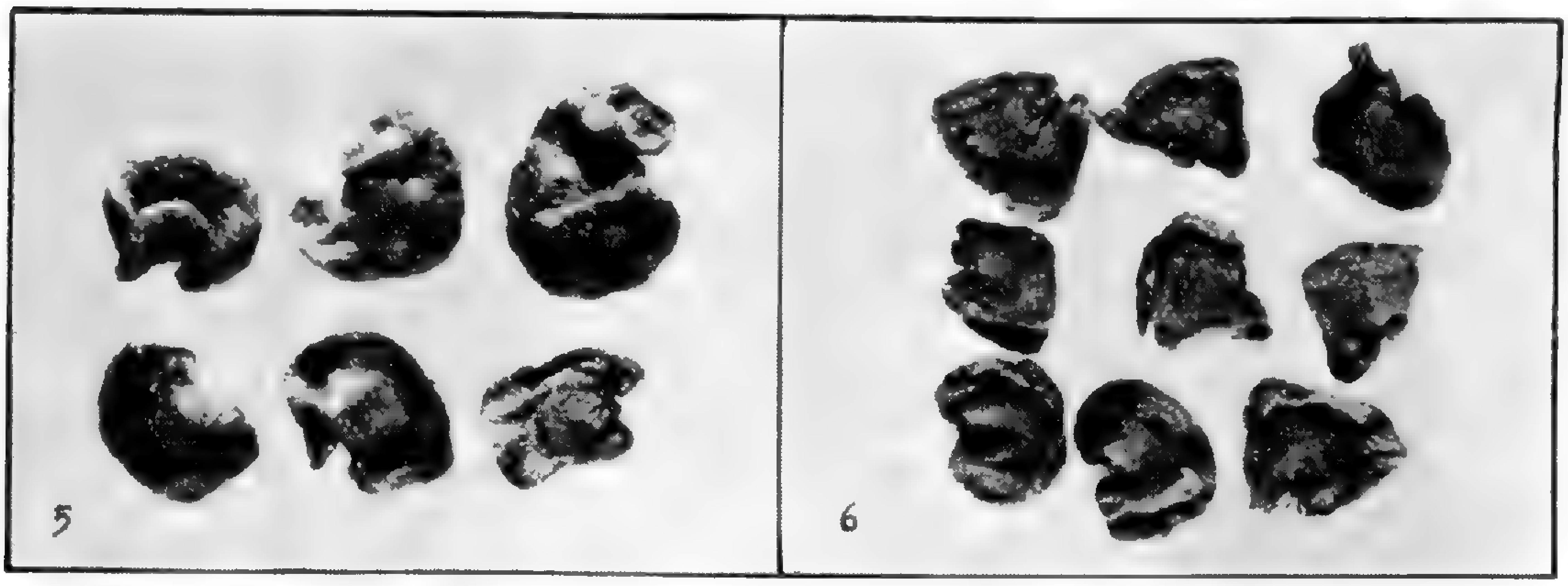

FIG. 5, Seeds of LYCHNIS AFFINIS, × 10; fig. 6, of L. FURCATA, × 10. (Photos. by *H. M. Raup.*)

coarse, oblanceolate, simple or rarely forking at tip: petals with a pair of oblong appendages: capsules 10–15 mm. long; the tips of the valves (before splitting) 2–4 mm. long: wing mostly narrower than the body of the seed.—Greenland, Arctic America and northern Labrador; ?Spitzbergen.

L. AFFINIS. Surfaces of upper leaves glabrous or essentially so: flowering calyx slenderly ellipsoid-cylindric, 3–6 mm. in diameter; fruiting calyx 10–12 mm. long, 5–7 mm. thick, the lobes oblong-ovate; veins green or purple, the principal ones linear to linear-oblanceolate, mostly only 0.2–0.5 mm. broad, rarely 1 mm. broad at summit; intermediate veins delicate, linear-filiform, often forking from near the middle: petals of pistillate flowers unappendaged: capsules 9–11 mm. long; the tips of the valves (before splitting) 1–3 mm. long: wing mostly as broad as or broader than the body of the seed.—Arctic Europe.

All material which I have seen from Greenland, Labrador and arctic America forms a consistent species apparently quite distinct from the plant of Finmark and Torne Lappmark. The Spitzbergen material before me is not in satisfactory condition but it seems to be *L. furcata.* I have seen no good specimens from Nova Zembla, arctic Russia and Asia and am, therefore, unable to say whether they belong with *L. furcata* or *L. affinis* or connect the two. Some of the specimens from northwestern America, especially from Yukon and Alaska, are not satisfactorily placed in the two species as here defined, and fuller collections are needed from that area before they can be properly worked out.

Rafinesque's description was as follows:

238, Silene (Viscago) furcata Raf. pubescens, caule bifloro vel furcato, ramis unifl. fol. cuneatis acutis, superis lanceol. remotis paucis, cal. brevis teretis, dentib. latis, petalis brevis angustis bifidis—Labrador and Hudson Bay, remarkably like the last plant [*Physocarpon vespertinum* Raf., based on *Lychnis vespertina* Sibth.], but a real Silene not dioical and with 3 styles, smaller 4 to 6 inches high, calix and petals shorter, incarnate.

The plant of Labrador, Arctic America and Greenland is 0.5–3 dm. high, with simple or forking stems and 1–9 flowers, with calyx and petals very suggestive of those of *L. alba* Mill. (*L. vespertina*) but shorter; and the calyx strongly "incarnate," the petals white of roseate. It is obviously what Rafinesque was describing.

Euphorbia **purpurea** (Raf.), comb. nov. *Agaloma purpurea* Raf. Autikon Botanikon, 94 (1840). *E. nemoralis* Darl. Fl. Cestr. ed. 2: 518 (1837) not Salisb. Prodr. 390 (1796). *E. Darlingtonii* Gray, Man. 404 (1848).

Rafinesque's genus *Agaloma,* based on the white-flowered *Euphorbia corollata* L., was fully defined by him in Flora Telluriana, genus no. 1188, p. 116 (1838); and by those who see in it a genus the name *Agaloma,* with clear priority and validly published, should be used instead of *Tithymalopsis* Kl. & Garcke (1859) which was, likewise, based on *Euphorbia corollata.*

Rafinesque's description of *Agaloma purpurea* is unequivocal:

655, Agaloma (Raf. fl. tell. 1188) *purpurea* Raf. glabra caule elato angul. striato fistuloso, fol. lanceol. acutis basi attenuatis subtus glaucis; fl. ad apice axil, pedunc. unifl. invol. 2 delt. subflos, caps. glabris—very remarkable sp. of this G. linking with last, 3 feet high, leaves 4 inches long one broad, flowers not white as in most species but purple rather small: Glades of Pennsylvania Alleg. Mts. very rare.†

Darlington's original description of his *Euphorbia nemoralis* is strikingly like Rafinesque's account of *Agaloma purpurea,* though more detailed:

Stem 2 to 3 feet high, . . . smooth. . . . Leaves 3 or 4 inches long, and about an inch wide, . . . lance-oblong, and oblanceolate-oblong, rather acute . . . more or less tapering towards the base, . . . the under surface pale, or subglaucous, . . . *Heads* of florets in a terminal umbel . . . and also lateral, on slender axillary branches . . . ; *bracts* . . . wider than long, broadly ovate . . . ; *petaloid segments* of the involucre . . . purplish-brown within; . . . *Capsule* . . . often becoming nearly smooth.

Hab. Moist woodlands: not very common.

Pyrola minor L.

Some botanists[1] separate *Pyrola minor* from the other Pyrolas as a genus *Erxlebenia* Opiz (1852). They have overlooked the earlier and valid name Braxilia Raf. Autikon Botanikon, 102 (1840). Rafinesque's diagnosis was clear:

BRAXILIA Raf. diff. Pyrola, cal. 5 part. petalis vix patens, stam. rectis brevis, stylo brevis recto, stigma 5 dent. & c.

Braxilia was launched with five Rafinesquian species: *B. parvifolia* (*Pyrola minor* L.), *B. media*, and three doubtful segregates from America.

Pyrola secunda L.

Some botanists (not including myself) treat *Pyrola secunda* as a genus distinct from *Pyrola*. In doing so they[2] take up for the "genus" the name *Ramischia* Opiz (1852). There is an earlier and perfectly valid generic name in Orthilia Raf. Autikon Botanikon, 103 (1840). There can be absolutely no question about what Rafinesque intended:

ORTHILIA Raf. diff. Pyrola, cal. 5 dent. petalis campanulatis, stam. rectis, stylo elongato filif. recto, stig. 5 dent. caps 5 gona profunde umbilicata. *Caulib. ramosis, floribus racem. secundis.*

Rafinesque proposed three species, *O. parvifolia* Raf. (a renaming of European *Pyrola secunda*) and *O. procumbens* and *O. dentata*, variations of the plant in eastern North America.

Sabatia amoena (Raf.) G. Don, forma **albiflora** (Britton), comb. nov. *S. maritima* Raf. Med. Fl. 77 (1830). *S. stellaris* Pursh, forma *albiflora* Britton, Bull. Torr. Bot. Cl. xvii. 125 (1890).

Sabatia amoena (Raf.) G. Don, Gen. Syst. iv. 207 (1837) was based directly on *Chironia amoena* Raf. Desv. Journ. Bot. i. 224 (1809),[3]

[1] Rydb. N. Am. Fl. xxix[1]. 28 (1914) *et al.*

[2] Rouy & Foucaud, Fl. France, iv. 16 (1897); Rydb. N. Am. Fl. xxix[1]. 28 (1914) *et al.*

[3] The title page of Desvaux's Journal de Botanique, tome 1, is dated 1808, but Rafinesque himself stated in Atlantic Journal, i. 207 ("Winter of 1833") in his *Cronological Index* of his own botanical writings, that the paper was "re-printed in Desvaux' Journal of Botany, Paris, 1809." Desvaux complicated the question by himself stating in a volume dated 1814 that "*Nous avons publié en 1810, deux Volumes de 384 pages chacun et de 12 gravures*" (see Fernald, Rhodora, xxix. 227 (1927). Since Vol. 1 (dated 1808) is the only one of the two volumes with 384 pages and 12 plates (Vol. 2 having 384 and 13 plates), we have Desvaux's word that it did not come out until 1810.

which was the French translation of the original description in English previously published by Raf. Med. Repos. hex. ii. v. 359 (1808). It has been customary to refer *Chironia amoena*, consequently *Sabatia amoena*, to the synonymy of *S. gracilis* (Michx.) Salisb. (1806), based on *Chironia gracilis* Michx. (1803) or to that of *S. campanulata* (L.) Torr. (1824) based on *Chironia campanulata* L. (1753). But the whole matter has been sadly confused. *S. campanulata* is a perennial with numerous branches springing from a subligneous base and having erect or strongly ascending, naked or nearly naked peduncles, and flowers 2–3.5 cm. broad. It occurs on damp and fresh (acid) sandy and peaty soils of southern Massachusetts; from Monmouth County, New Jersey to Bucks County, Pennsylvania; and from the mountains of North and South Carolina and Tennessee southward to southern Georgia and southern Alabama. South of Monmouth County, New Jersey it is not a coastal plant. *S. gracilis*, like *S. campanulata*, is a perennial with subligneous rhizomes; but its branches are more divergent and leafy and terminated by rather smaller flowers (mostly 2–2.5, rarely –3 cm. broad). Its upper leaves and calyx-lobes are more slender than in *S. campanulata*. It seems to be a rather well defined species, occurring from eastern North Carolina to middle Georgia and northwestern Florida, west to Louisiana; but it may be better to treat it as a southern coastwise variety of *S. campanulata*. Whether it be considered a species or a variety, it seems to be unknown along the coast north of North Carolina.

Rafinesque's *Chironia amoena* was the sea-shore plant of Maryland, Delaware and New Jersey, *i. e. S. stellaris* Pursh, Fl. Am. Sept. 1. 137 (1814), an annual or biennial species with solitary stems and without a caudex. This plant is very characteristic of the sea-shore of these and adjacent states and there seems to be no reason why Rafinesque's description does not apply to it. To be sure, he states that the calyx is equal in length to the corolla, while Pursh says that it is "semibreviore," but as already pointed out by Bicknell this character is "unstable in a very marked degree,"[1] an observation which I promptly indorsed,[2] since the specimens show plenty of calyx-lobes equaling or even longer than the coralla-lobes. Bicknell and later I, in the same discussions, emphasized the acute, lanceolate leaves of *S. stellaris* as opposed to the obtuse and linear or linear-oblong leaves of *S. campanulata*.

[1] Bicknell, Bull. Torr. Bot. Cl. xliii. 31 (1913).
[2] Fernald, Rhodora, xviii. 145 (1916).

With these points in mind it will be seen that there is not much difference between the description of *S. stellaris* by Pursh and of *Chironia amoena* by Rafinesque.

Pursh's description read:

> 2. S. erecta; ramis dichotomis elongatis 1-floris, foliis lanceolatis acutis, calyce subulato corollae semi-breviore, laciniis corollae obovatis, caule tereti. *stellaris*
> Icon. *Bartram ic. ined. t. 13, in Musaeo Banksiano.*
> In salt marshes: New York, New Jersey, &c. ♂.
> Aug. *v. v.* The flowers are large and a beautiful rose colour, with an elegant yellow star in the centre, which is surrounded by a deep red border; . . . It varies with white flowers.

Rafinesque's account, except for the point noted, was nearly the same:

> 6. Chironea amoena, graceful chironia; stem cylindrical, dichotomous, leaves narrow-lanceolate, acute, flowers terminal, calix equalling in length the corolla, which is wheeled; grows on the sea-shores of Maryland, Delaware, and Jersey; the flowers are rose-colour, with a double star in the centre, the interior one yellow, the exterior one red. A variety has white flowers, with the same star.

Somewhat later, Rafinesque described the white-flowered form as *Sabatia maritima* Raf. Med. Fl. 77 (1830).

A Note on Salix Dodgeana.—While making a study of the willows of Wyoming in the summer of 1930, the writer noticed a specimen of *Salix Dodgeana* in the Rocky Mountain Herbarium which varied somewhat from material from the type locality. On July 27, 1931, the writer visited the type locality, collecting many specimens of the plant. Comparison with these indicated the first-named specimen to represent a distinct form.

Salix Dodgeana Rydb. Bull. N. Y. Bot. Gard., **1.** 277 (1899); Ball in Coulter and Nelson, New Manual of Rocky Mountain Botany, 131–132 (1909); Rydberg, Flora of the Rocky Mountains and Adjacent Plains, 195 (1917); Schneider, Bot. Gaz. **28.** 38, 54–55. (1919); Hawkins, Trees and Shrubs of Yellowstone Natl. Park, 62. (1924).—Wyoming, Montana. Specimens examined: Montana, type locality: Electric Peak, Yellowstone Natl. Park, alt. 10,000 feet, August 18, 1897, *P. A. Rydberg, Ernst A. Bessey* no. 3921, three sheets.

Salix Dodgeana Rydb. forma **subrariflora**, f. nov. A forma typica differt foliis ovatis ad suborbicularibus; amentis feminis 3-pluris floris; stylo praesenti, minus quam 1 mm. longo.—Wyoming:

Sublette County, in the vicinity of Green River Lakes, moist slope, Sheep Mt., alt. 11,000 ft., August 1, 1925, *E. B.* and *L. B. Payson* no. 4505. (TYPE, Rocky Mountain Herbarium.)

Numerous specimens seen and collected at the type locality agree with the original description, having the pistillate aments 1–2-, occasionally 3-flowered, and the leaves oblong to ovate.—LEON KELSO, U. S. Biological Survey, Washington, D. C.

EUKRANIA AND CYNOXYLON NOT GENERA OF RAFINESQUE

OLIVER ATKINS FARWELL

SOME of our local manuals rate the Flowering Dogwood as a distinct genus under the name of *Cynoxylon,* attributing the name to Rafinesque; likewise the Dwarf Cornel under the name of *Cornella* or *Chamaepericlymenum,* rejecting *Eukrania* of Rafinesque. If they accept *Cynoxylon* Raf. as a generic name, they must, if they are consistent, accept *Eukrania* Raf. in the same sense and as Rafinesque used it, for the Dwarf Cornels. To be sure, Rafinesque referred to it the European *Cornus mascula* but the only sense in which he used it was for the Dwarf Cornel, hence it must be the type. In the Index Kewensis we find *Cynoxylon* and *Eukrania* listed as genera of Rafinesque and *C. florida, E. Canadensis, E. mascula, E. Suecica* and *E. cyananthes* all attributed to Rafinesque, the last in Alsog. Am. p. 63 and the others on p. 59. A perusal of Rafinesque's paper on *Cornus* in Alsographia shows that he only construed these names as subgenera of *Cornus* and that in no case did he make any combinations under either *Cynoxylon* or *Eukrania.* Rafinesque writes of them as "G. or subgenera" and again as "groups." He has on p. 58:—"254. CORNUS Raf." and as types "most of the American sp. also *C. sanguinea, alba, dichotoma* &c." This is equivalent to *Svida* Opiz. "255 Subg. MESOMERA Raf. . . . Types the sp. blended in *C. alternifolia,* see 274 to 278."; "256 Subg. KRANIOPSIS Raf. . . . Types *U. paniculata* and *comosa,* 279, 280." The *U.* is evidently a typographical error. On p. 59: "257 EUKRANIA Raf. . . .—Types C. mascula, canadensis and suecica. Krania and Mesomora were grecian names of the Cornels"; "258 CYNOXYLON Raf. . . . Type C. florida, distinguished since 1828."; "BENTHAMIA Lindl. non Rich. Raf. syl. tel. 817. . . .—Type. B. or Cornus fragifera Wallich." "Having thus distinguished these *groups* [italics mine], I shall mention all the true Cornus, . . ." From the above it will be seen that *Cynoxylon* and *Eukrania* are parallel categories and that if one is a genus so is the other; or if a subgenus, so is the other. The "C." under each stands for *Cornus* and the species mentioned are the *Cornus* species referred to each group and cannot in any sense be construed as new combinations under each name respectively. Rafinesque made no combinations under either name, here or elsewhere, so far as I am able to determine. In the Medical Flora, Vol. 1, page 132 (1828) Rafinesque named and defined *Cornus*, section *Cynoxylon* for the Flowering Dogwood, *C. florida* Linn. This antedates and supersedes Section *Benthamidia* Spach. In Alsog. Am. p. 59, he raises it to subgeneric rank. That *Eukrania* is only a subgeneric name is proved by Rafinesque himself in this same paper (Alsog. Am.) where, on page 63, he lists and describes a species of *Cornus* as "281 *Cornus* (Eukrania) *cyananthes* Raf. atl. j. 151." I think the evidence is quite emphatic enough that Rafinesque, himself, considered the names "Cynoxylon" and "Eukrania" as subgeneric only. Under the International Rules, the name *Eukrania* must be retained for the group having the larger number of species, hence I choose *Cornus Canadensis* Linn as its type. *Cynoxylon* and *Eukrania* as genera would start with the Index Kewensis; likewise the binomials under them; the author of the genera and the binomials is of course B. D. Jackson, Editor of the Index Kewensis. Even this would make *Eukrania* antedate either *Chamaepericlymenum* or *Cornella.* I am indebted to Mr. C. C. Deam of Bluffton, Ind., for a copy of Rafinesque's paper on *Cornus* in the Alsographia.

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The Identity and Nomenclature of Apocynum androsaemifolium L.—During the course of a monograph[1] of the genus *Apocynum* published about two years ago, the writer subdivided the Linnaean *A. androsaemifolium* into two principal varieties, together with one other of local and minor importance. One of those varieties, indigenous to the northwestern United States and adjacent Canada from Nebraska and the Dakotas to British Columbia and northern Califor-

[1] Woodson, R. E., Jr. Ann. Mo. Bot. Gard. **17**: 41–149. 1930.

nia, was interpreted as fulfilling the original description[1] of the species with regard to the glabrity of the dorsal surface of the foliage, whereas the variety with the dorsal leaf-surface predominantly more or less pubescent, common to the northeastern States and adjacent Canada and to a less extent generally westward, was designated as coinciding with the requirements of A. de Candolle's var. *incanum*. This interpretation was the one previously made by the only revisors[2] of the genus, since the time of de Candolle, who had considered the eastern and the western plants as representing distinct varieties.

However, in spite of his diagnosis of the dorsal leaf-surface of the species as glabrous, Linnaeus stated that his plants had their habitat "in Virginia, Canada." Furthermore, according to Prof. M. L. Fernald, the specimen from the Hortus Cliffortianus preserved in the herbarium of the British Museum (Natural History) actually has the dorsal leaf-surface glabrous, and upon the foliage of a specimen of doubtful origin incorporated in the herbarium of Linnaeus at the Linnean Society of London the trichomes are perceptible only with the aid of a hand-lens. As a matter of fact "glabrous" was a relative term of not too great exactitude in the time of Linnaeus, and under the circumstances it is easy to see how the commonly pubescent eastern variety was so described.

In the light of the foregoing considerations it is undoubtedly necessary to restore the typical designation to the eastern plants, in which case var. *glabrum* Macoun, Cat. Can. Pl. **2**: 317. 1884 is the correct name of the western variety.—R. E. Woodson, Jr., Missouri Botanical Garden.

A FEW NOTEWORTHY PLANTS FROM SOUTHERN VERMONT

Richard J. Eaton and Ludlow Griscom

On September 4 and 5, 1931, the writers made two botanical trips, primarily for reconnaissance, to the valleys of the Connecticut River and its tributaries in southern Vermont and New Hampshire. No attempt was made to explore any one locality systematically or to collect a representative series of plants. Only such specimens were taken as appeared unusual or of personal interest. No mention

[1] L. Sp. Pl. ed. 1. 213. 1753.

[2] cf. Beguinot, A., & N. Belosersky R. Accad. Lincei Atti, Mem. Cl. Sci. Fis. V. **9**: 670–671. 1913.

will be made at this time of plants collected on the New Hampshire side of the river.

With West Dover as a base, the routes followed included the valley of West River at Dummerston, and West Putney, and the valley of the Connecticut River at Westminster, Bellows Falls, Charlestown (N. H.), Claremont (N. H.), Ascutney and Weathersfield. The following briefly annotated list of the more noteworthy plants found is arranged for convenience in Manual order. An asterisk denotes a plant which apparently has not previously been reported from Vermont. Unless otherwise noted, specimens have been retained in the possession of the writers.

* Panicum virgatum L. var. spissum Linder. Meadow, Springfield, 4 September 1931. Plant forming a dense clump or stool.

In technical characters it is clearly this variety, but the panicle is open and lax as in typical *P. virgatum,* which incidentally has been reported only from three or four stations in Vermont.

Muhlenbergia tenuiflora (Willd.) B. S. P. Alluvial bank of West River, Dummerston, 4 September 1931.

No published account of the occurrence of this species in Vermont has been found. However, Mr. Dana S. Carpenter writes that it is "occasional" in the State. There are two specimens in the New England Botanical Club Herbarium as follows: West Haven, Rutland Co., *G. L. Kirk,* 17 August 1913; Brattleboro, Windham Co., *L. A. Wheeler,* 19 August 1915.

*Eragrostis Frankii (F. M. & L.) Steud. Sandy bank of Connecticut River, Westminster, 4 September 1931.

A single vigorous plant was found of which a small portion has been deposited in the Herbarium of the New England Botanical Club.

Bromus ciliatus L. var. intonsus Fernald. Alluvial bank of West River, Dummerston, 5 September 1931.

This specimen differs from the type in possessing lemma and palea characters assigned to *B. Dudleyi* Fernald. See Rhodora **32:** 63–68. Typical var. *intonsus* is the common representative of the group in this region.

Elymus virginicus L., forma **monanthos,** n. f. spiculis omnino unifloris, rachilla nuda 0.5 mm. longa post paleam prominente; glumis parte tertia superiore margine manifeste scabris.

Spikelets *single-flowered* throughout, with naked, short (.5 mm.) rachilla-stumps projecting behind the paleas; glumes, exclusive of their scabrous awns, distinctly scabrous on margins along outer third of their length.—Edge of meadow, Springfield, 4 September 1931. TYPE placed in Herbarium of New England Botanical Club.

Further collections and study of herbarium material may require elevation of this form to varietal rank.

CYPERUS ARISTATUS Rottb. Sandy shore of Connecticut River, Ascutney, 4 September 1931. Frequent.

SANICULA TRIFOLIATA Bicknell. Rich pocket on rocky wooded hillside, Dummerston, 5 September 1931. Not common.

Duplicate specimen placed in Herbarium of New England Botanical Club.

GENTIANA ANDREWSII Griseb. Edge of thicket, West Putney, at altitude of 1200 feet, 4 September 1931.

A very scarce plant on the uplands of southern Vermont.

*SOLIDAGO BICOLOR L. × S. NEMORALIS Ait. Dry upland field, West Putney, 4 September 1931.

An unusual hybrid, with white rays and yellow disk flowers. This plant shows the small axillary leafy fascicles of *S. nemoralis* and the *regular* thyrsoid inflorescence of *S. bicolor*. In pubescence, and leaf outline, the plant is intermediate between the two. The assumed parents were abundant and in close proximity.

S. RUGOSA Mill. Gravel railroad embankment, Westminster, 4 September 1931. A gigantic specimen 2.5 + m. high, stem about 1 cm. thick at base. No specimen preserved.

ASTER DIVARICATUS L. var. **tenebrosus** (Burgess), comb. nov. *A. tenebrosus* Burgess in Britt. & Br., Ill. Fl. iii. 357, fig. 3736 (1898). Rich deciduous woods, West Dover, at altitude 1900 feet, 4 September 1931.

This specimen is conspicuously separable from typical *A. divaricatus* by its glabrate, dark green, long-acuminate leaves with relatively coarse teeth, and by its relatively firm broad obtuse bracts, green or rose-tipped, regularly imbricated to form a broad nearly hemispherical involucre, the innermost series not elongated or noticeably different in texture from the outer series.

In proposing this new combination, the authors consider the plant unworthy of specific recognition. On the other hand, they are strongly of the opinion that it deserves varietal rank as a well-marked extreme of the polymorphic *A. divaricatus* group, commonly replacing the species in the higher rich wooded hillsides of western New England, New York, and south to Virginia. Wiegand and Eames in their Flora of Cayuga Lake Basin state that this is the prevailing form of the species in central New York. When well developed var. *tene-*

brosus is recognizable at a glance in the field, but passes freely into typical *A. divaricatus.*

*A. glomeratus Bernh. Rich deciduous woods, valley of West River, Dummerston, 4 September 1931. Growing with *A. divaricatus* and *A. Schreberi.*

An indefinite and unsatisfactory species. Very few specimens are in the Gray Herbarium, which, like the present one, *possess all* the characters claimed for the species. Apparently it has never been collected except where the other two species occur together commonly.

*A. foliaceus Lindl. var. sublinearis Griscom & Eaton. Alluvial bank of Connecticut River, Weathersfield, 4 September 1931, *Eaton & Griscom*, no. 14754 (type); Weathersfield, 4 September 1931, *Eaton & Griscom.* Bank of West River, Dummerston, 5 September 1931, *Eaton & Griscom*, no. 14758.

These specimens are cited here because they demonstrate the range of variation in leaf width and size of heads which may be expected in this variety. For a discussion of the New England representatives of *A. foliaceus*, see Griscom and Eaton in Rhodora (**34**: 13). For a brief description of the species and several varieties see Fernald: Rhodora, **17**: 13.

NOTES FROM THE AMHERST COLLEGE HERBARIUM

Alfred S. Goodale

In the List of Herbaria of New England compiled in 1901 by the late Mary A. Day, the Amherst College Herbarium was described as containing "about 12,000 species of which 2,000 sheets represent European species and the remaining 10,000 American; the latter exhibiting chiefly the flowering plants from that part of the United States east of the Mississippi River." (Rhod. **3**: 68) During the thirty years elapsing since the publication of the above statement the size of this collection has increased to more than five times that previously recorded, and has so magnified its scope that it seems wise to give an account of its history and present status.

Apparently its nucleus was assembled by President Edward Hitchcock whose interest in botany was secondary only to his devotion to palaeontology. He was an enthusiastic collector and a critical observer of the plants occurring in Amherst and its nearby towns. To him is attributed the publication of the first list of plants of this vicinity.

In an address at the dedication of the Botany Building at Wellesley College on November 4, 1927, Dr. C. Stuart Gager appears to designate Dr. Edward Tuckerman as the first teacher to be appointed to a chair of Botany in any American college (Science N. S. **67**: 172). It is fortunate for this herbarium that the appointment of this preeminent lichenologist was made by Amherst College. While it is true that the bulk of his original collection of lichens ultimately went elsewhere many of his duplicates remained here. It is especially fortunate for us that we have a very full representation of the local plants gathered by him to furnish a valuable supplement to the work begun by Hitchcock. The fact that he exchanged quite widely undoubtedly accounts for the appearance in the Amherst Herbarium of the plants collected in the southeastern states by A. H. Curtiss with whom Tuckerman carried on an extensive correspondence. Even more interesting, perhaps, is the occurrence of many duplicates from the herbarium of Francis Boott, many bearing his signature in a bold hand. Whether he was responsible for obtaining many sheets of Algae bearing Greville's label is unknown. It is probable that Tuckerman also had exchange relations with such well-known collectors as Beardslee, Bebb, Canby, Chapman, Commons, Flint, Huntington, Garber, Gattinger, Hall, H. N. Patterson, Peters, Ravenel, Reverchon, Porter, and Vasey, for many sheets of specimens gathered by them appear in our collection.

During the period of Tuckerman's professorship at Amherst, George L. Goodale completed his undergraduate course. He later became a professor in the Department of Botany at Harvard University. Perhaps the most interesting specimen of local importance left by him in our herbarium was a sheet of *Saururus cernuus* L. which he collected in Plainville (Hadley, Hamsphire County)—a very unusual station for this plant. There are also sheets of plants collected when he visited the region of the St. John River in Maine.

In the latter part of the last century the following collections were obtained by purchase or exchange:

Austin's Musci Appalachiani; Sullivant's Musci Alleghanienses; Sullivant and Lesquereux's Musci Borealis Americanae; Macoun's Canadian Plants; duplicates collected by E. H. and J. Ray in England; and A. Orsini in Italy.

Other collections obtained, probably by gift, were a valuable set of Chinese ferns gathered by the late Rev. Charles Hartwell, for many years a missionary in Foochow; and a large collection of ferns collected in India by Samuel B. Fairbank, for a long time a missionary in that country. Our set of Chinese ferns was in 1929 augmented by the J. E. Walker collection gathered in the Province of Fukien.

The work carried on by Hitchcock and Tuckerman in our local area received still further enrichment from the activity of the late Professor Henry G. Jesup who, before going to his long service at Dartmouth College, occupied a pastorate in Amherst and was a keen student of nature.

During the first decade of the present century few additions were made to our herbarium and comparatively little systematic work was done by Amherst College in our region. In 1915 the gift of the Addison Brown Herbarium added approximately 25,000 sheets. In addition to those gathered by himself this herbarium includes sheets from the following well-known collectors:

R. M. Austin	California
J. M. Bigelow	Canadian River, Ft. Smith to the Rio Grande
S. B. Buckley	Florida
J. W. Congdon	Rhode Island
W. C. Cusick	Oregon and Washington
H. Eggert	Vicinity of St. Louis
W. W. Eggleston	Vermont
J. Hale	Louisiana
R. M. Harper	Southern states
A. A. Heller	Atlantic states, California, Hawaii
T. J. Howell	Northwestern states
M. E. Jones	Colorado and New Mexico
C. B. Metcalf	New Mexico
P. V. Leroy	Texas
C. Mohr	Alabama
D. T. MacDougal	Arizona
E. Palmer	Southwestern states and Mexico
S. B. and W. F. Parish	California
H. N. Patterson	Colorado
C. G. Pringle	Vermont, Southwestern states, Mexico
H. H. Rusby	New Mexico
J. H. Sandberg	Minnesota
J. K. Small	Southeastern states
P. C. Standley	New Mexico
W. N. Suksdorf	Washington
E. O. Wooton	New Mexico
B. Trask	California

and many others.

Two other gifts of plants since 1915 have been the Herbarium of Professor Levi H. Elwell (Rhod. **3**: 228) including about 2000 sheets comprising many local plants and, in addition, specimens from North

Carolina, Florida, Kansas and a few from British Columbia. A valuable collection of Japanese ferns was received from the late Professor Arthur W. Stanford of the Doshisha Theological School.

The cordial coöperation and interest of President Pease has given new impetus to the study of the local flora and he has generously given many sheets of his own collecting in the New England states, the northwestern states, Europe, and Canada.

During the last decade especial attention has been given to making a thorough survey of the flora of the Connecticut River watershed in Massachusetts. We are glad to find rarities because of their value in orienting the possible relationships and origin of our flora but we are firmly convinced that we need to know much more about our common plants which determine, as it were, the physiognomic characteristics of our area. For two summers three collectors have been working in the Swift River Valley which is to be inundated for the Metropolitan Water Supply. We have also done considerable collecting in the valleys of the Westfield and Deerfield Rivers.

The Amherst College Herbarium has thus increased from 12,000 sheets to approximately 70,000 with a corresponding increase of range. A conservative estimate indicates approximately 13,000 sheets from the watershed of the Connecticut River in Massachusetts. The Herbarium is filed in metal cases and is housed in 22 Appleton Hall at Amherst College. The writer extends cordial invitation to fellow botanists and nature students to use our facilities.

22 Appleton Hall, Amherst College,
Amherst, Massachusetts.

CALLITRICHE STAGNALIS IN EASTERN UNITED STATES

H. K. Svenson

While going over some material of *Callitriche* at the Gray Herbarium my attention was drawn to a specimen with unusually large leaves and fruit collected by Dr. F. W. Pennell in Waquoit, Massachusetts. The specimen, so clearly distinct from the other local material, was soon recognized by Professor Fernald as *Callitriche stagnalis* Scop., a species of wide distribution in the Old World; extending according to Hegi[1] through Europe (with the exception of the

[1] Ill. Fl. Mittel-Euro. V, 1. 197 (?1928).

extreme north), northern and central Asia, northern Africa and Macronesia. Hegelmeier[2] states that *C. stagnalis* is not known from the northern parts of Scandinavia, Scotland or Russia, and that outside of Europe there are three centers of distribution, Madeira and Teneriffe, Abyssinia, India and Ceylon.

Waquoit is a village in Falmouth on Cape Cod. A visit to the locality by Professor Fernald and myself was rewarded by finding the species abundant. The plants attain a great length in rapid water and in the Falmouth region the streamer-like growths pushed about by the current are conspicuous for a long distance. In such situations the plants do not usually have flowers or fruit but search in the quiet water of adjacent ditches or dried-out shores will reveal the fruiting plants. These are frequently only a few inches in height. In still water the plants are rather bushy, with prominent rosettes of broadly spatulate floating leaves which are much coarser than those of our other species. Submerged leaves are linear. *C. stagnalis* is resistant to frost and during the past two seasons I have noted it on Long Island in a green and thriving condition even in midwinter.

C. heterophylla is the American species closest in appearance, but from that species *C. stagnalis* is at once distinguished by coarser growth, and by much larger fruits. In *C. stagnalis* the fruits average 1.8 mm. in height and are of equal width. They are normally composed of four loosely united and strongly flattened carpels. The individual carpels average 1.7 mm. high and 0.9 mm. wide, and each has a broad semi-transparent wing on the outer margin. This broad wing is very characteristic of the species. In addition the fruit always remains green. In *C. heterophylla* the fruits are small (averaging 1 mm. high and 0.8 mm. broad) and the plump brown individual carpels are rounded on the outer face with no trace of wings.

Specimens in the herbarium of the Brooklyn Botanic Garden show that *C. stagnalis* has been a member of our flora at least as far back as 1905, and it seems to be a rather abundant plant in the area adjacent to the coast from Massachusetts to Pennsylvania. The following specimens are noted (G, representing the Gray Herbarium; B, the Herbarium of the Brooklyn Botanic Garden).

Massachusetts: Flowing water, Waquoit, *Pennell* 3381 (1914) (G); forming dense carpets in shallow pools and ditches, Quashnet R., Falmouth, *Fernald & Svenson* 952 (1928) (G); rapidly flowing water,

[2] Verhand. Bot. Ver. Brandenburg ix. 27 (1867).

Coonamessett River, Falmouth, *Fernald & Svenson* 953 (1928) (G); in sphagnum of ditch in cranberry bog, Coonamessett River, Falmouth, *Fernald & Svenson* 954 (1928) (G).

NEW YORK: Abundant in a flowing brook, Valley Stream, *Svenson* 4451 (April 5, 1931) (B, G); submerged in a small stream, Islip, *Svenson* 4452 (April 5, 1931) (B, G); covering the surface of a small brook, Richmond, *Svenson* 4493 (June 7, 1931) (B, G).

NEW JERSEY: in brook mud, Cherry Hill, *H. Dautun* (July 22, 1905) (B), (June 7 and July 17, 1908) (B), (Sept. 19, 1909) (B); in a flowing brook, in flower and fruit, Preakness, *Svenson* 4478 (May 31, 1931) (B, G).

PENNSYLVANIA: west branch, Indian Run, West Philadelphia, *H. B. Meredith* (May 17, 1923) (G); in a brook, West Philadelphia, *Svenson* 3486 (Nov. 24, 1929) (B, G).

BROOKLYN BOTANIC GARDEN.

CALLITRICHE STAGNALIS ON THE LOWER ST. LAWRENCE.—In the preceding article Dr. Svenson records the occurrence of *Callitriche stagnalis* Scop. in the coastwise region from Cape Cod to southeastern Pennsylvania. Familiar with the large foliage and fruit of the Cape Cod plant, and remembering the dark green color of the plant, as contrasted with the paler color of our commoner species, I have, naturally, watched for *C. stagnalis* elsewhere in Atlantic North America. In September last, while collecting on the always interesting tidal flats of the lower St. Lawrence, in this case on the borders of Anse St. Vallier in County Bellechasse, Quebec, I at once recognized the familiar dark green and broad foliage and the large fruits of *C. stagnalis.* At St. Vallier the *Callitriche*, growing on gravel and mud covered at high tide and exposed at low tide (typical estuarine conditions) forms extensive prostrate mats, heavily fruiting. Its associates are the characteristic plants of the St. Lawrence estuary, such as *Butomus umbellatus* L., *Leersia oryzoides* (L.) Sw. forma *glabra* A. A. Eaton, *Cyperus rivularis* Kunth, *Scirpus Smithii* Gray var. *levisetus* Fassett, *Eriocaulon Parkeri* Robinson, *Tillaea aquatica* L., *Elatine americana* (Pursh) Arn., *Epilobium ecomosum* (Fassett) Fern.,[1] *Gentiana Victorinii* Fern. and a puzzling aggregation of estuarine variations in *Bidens, Isoetes* and other genera awaiting study.—M. L. FERNALD.

[1] EPILOBIUM **ecomosum** (Fassett), comb. nov. *E. glandulosum*, var. *ecomosum* Fassett, RHODORA, xxvi. 48 (1924).

When Dr. Fassett described this plant he had only two collections and he separated it from *Epilobium glandulosum* Lehm., var. *adenocaulon* (Haussk.) Fern. merely by its ecomose seeds, itself a very remarkable character in a genus characterized by comose seeds. We now know *E. ecomosum* from several stations in Quebec, on the tidal shores from Cap Rouge to l'Ile d'Orleans and Anse St. Vallier, ten collections being before me. In addition to the lack of coma the seeds display another extraordinary character, in being heavily covered with approximate rows of whitish hyaline elongate trichome-like papillae; the seeds are also more abruptly rounded at base than in *E. glandulosum* and its var. *adenocaulon*, both typical *Epilobia* with normal coma. In the two latter the seeds are attenuate to the base and minutely pebbled with very low or often obscure papillae. The high and irregularly crest-like rows of trichome-like papillae of *E. ecomosum* are not closely approached in the surfaces of seeds of any other American species known to me. The nearest approach is in *E. franciscanum* Barbey of California.

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Farlow Bot Lab

Rhodora

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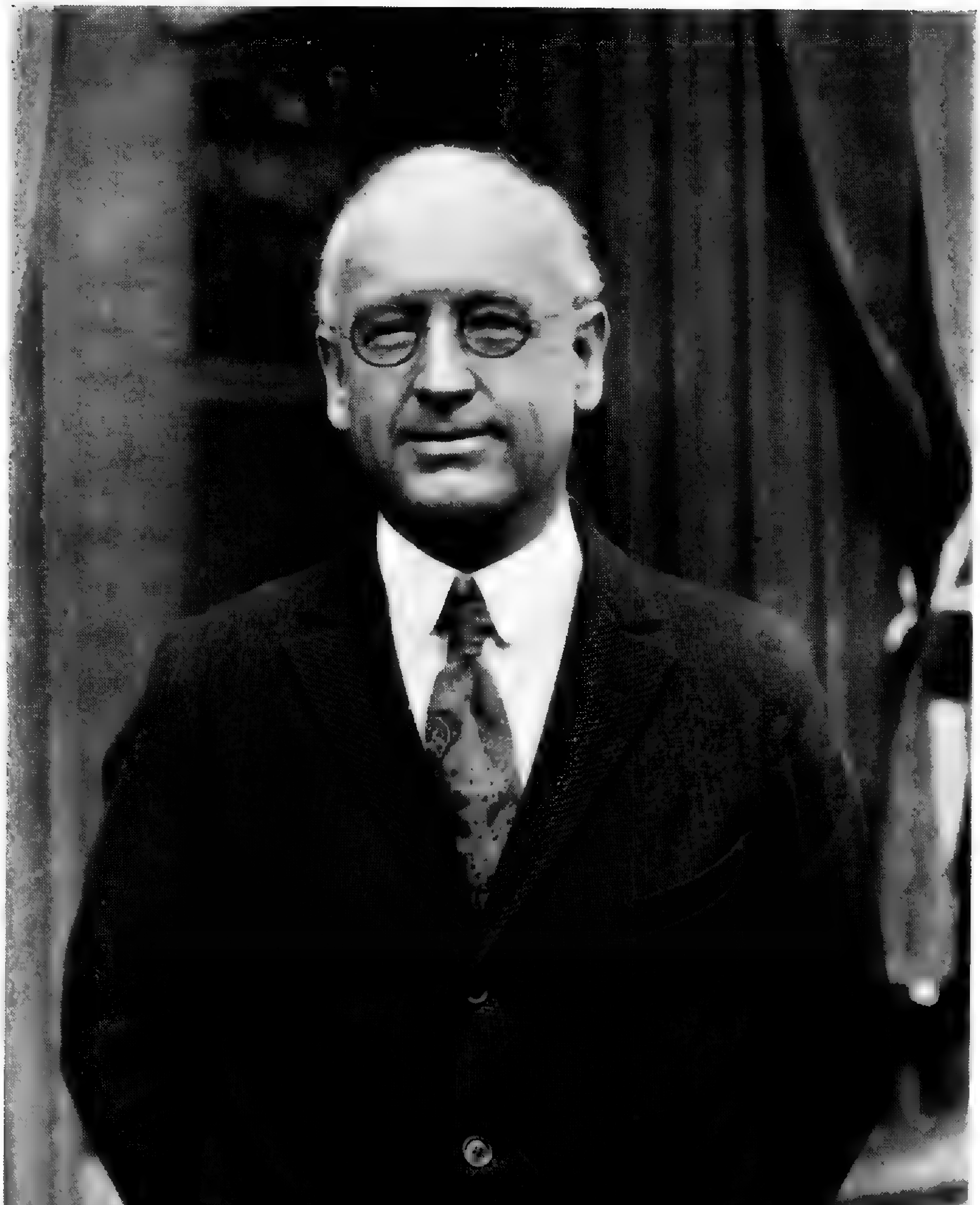

Sincerely,
F. D. Lambert

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

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FRED DAYTON LAMBERT

Clarence Hinckley Knowlton

(*With portrait*)

On Saturday morning, February 21, 1931, Fred Dayton Lambert died quietly, seated at his office table, at Tufts College.

Dr. Lambert was born in Muscatine, Iowa, October 28, 1871, the son of Daniel M. Lambert and Ellen (Scudder) Lambert. He had a perfectly natural boyhood in a Mississippi river town. He described his youthful experiences there as closely parallel to those of Tom Sawyer and Huckleberry Finn. He swam in the river, angled for catfish, built and navigated rafts, hunted game and did all the other things which were interesting to boys in those days. He always declared that no man could have had a more perfect boyhood.

After graduating from high school he came east and entered Tufts College. He was poorly prepared, and hardly knew what college was for at first, but he observed everyone and everything, read profusely, participated in athletics, and was generally active. His class standing was so poor, however, that he was very nearly dropped from college. He often said jokingly that if he had not come from such a distance he would have been dropped at once, but that Iowa looked well in the college catalogue, and so he was allowed to remain and prove his ability. His second year started in much the same way, till Professor John Stirling Kingsley of the Biological Department discovered that the young lad could draw, and set him to work. From this time on young Lambert developed an ever-increasing interest in science, especially biology, with a happy effect on his academic standing, for he graduated as a member of Phi Beta Kappa in 1894. Many a luckless freshman in after years was saved for a time at least by this example of Lambert. The question of dropping the student would come up in faculty meeting, and after discussion of the case some one was sure to remark, "There was Lambert's case, too. Why not give the boy another chance?"

Lambert had become a laboratory assistant before his undergraduate days were over, and he continued in this work while he was getting his Master's and Doctor's degrees, the latter being conferred on him in 1897. Following this he taught science in Edward Little High School at Auburn, Maine. Except for one lone sabbatical year this was his only year away from Tufts College. He had made himself so useful to Professor Kingsley and others that he was wanted again at his Alma Mater, and he returned there as instructor in Natural History. Promoted from time to time he became Professor of Botany in 1913, a position he held to the end.

In 1903 Professor Lambert was married to Mary Anna Ingalls of Auburn, Maine. She had been one of his students in biology at Tufts, where she graduated, and had full appreciation of his problems. They had one daughter, Elizabeth Allen, who inherits her father's gift for drawing, and is now a student at the School of the Museum of Fine Arts in Boston. The home life was very happy. The good professor's whimsicalities had full play here, a blessed relief from class-room routine. Both the Lamberts were intensely interested in the college life about them, and the Professor liked to feel that the home was a part of his equipment as a teacher, an additional means for friendly contacts with his students. As Mrs. Lambert says, "He often said he wanted to be able always to send a student to his home at the necessary psychological moment, and to feel sure that the student would find some one there to welcome him or her. He was never so happy as when he was the genial host at his own fireside to hungry boys and girls away from home. Only the limitation of a small salary saved his home from becoming a clubhouse. Many a graduate in after years has said 'I shall never forget photosynthesis and respiration—and the good meals at your home.'" Another original way in which he helped students was by the gift of certain secondhand books, which he kept till the right moment, when the student was ready for just that sort of inspiration.

For Professor Lambert was fated to be a teacher. Caught in a rapidly growing small college, with increasing throngs of "good students, poor students and pre-medics." there was little chance for research, but an ever-increasing burden of lectures, quizzes and examinations. And he rose nobly to these obligations. He never wrote out his lectures, but varied them from year to year, watching the reactions and interests of his classes. He was stimulating, interesting, amusing, popular in the right sense of the word, and he laid a good foundation for further work in his science, as those of his students who have gone on to graduate work have discovered.

His first qualification for successful teaching was an abiding and ever-increasing love of his subject. Although he had taught the elementary facts of botany and biology to class after class he never lost his zeal and interest in presenting them to new groups of young people. The secret of his perpetual zest in the personal enjoyment of his subject lay in his strong sense of the dramatic. All the processes of nature were to him each day a wonderful new performance, the like of which had never been imagined or seen before. He studied constantly to perfect his teaching technique, to make his material vivid and comprehensible, for each student was to him as much of a marvel as a plant or any other organism, and was therefore deserving of his best energies.

Another outstanding qualification was his ability to draw. He was rather skeptical about the pedagogical value of lantern slides, but blackboard drawings were his specialty. As one of his recent assistants, Mr. Kendall W. Foster, has written me, "Whenever he wished to drive home an important yet complicated life history he always used colored chalk. Never pausing in his talk he would draw step by step clear-cut diagrams to illustrate the important structures, magnifying certain parts, and drawing and showing by guide-lines and pointing hands how each diagram was related to the preceding one. All the parts of these drawings he labelled beautifully with printing which all his students emulated but never excelled. The homologous structures were shaded in like colors, and at the end of the lecture the whole story was before the student on the blackboards. Beautifully executed colored charts pertinent to the subject hung in profusion not only in the lecture room but in the laboratory, and were mute witnesses to days of painstaking labor on the part of the professor."

Dr. Lambert's interest in the laboratory was another index of success. He always planned to be present during the laboratory period himself, no matter how many assistants he had. Here also he emphasized correct drawing as the best way to ensure accurate painstaking observation. If a student saw the thing correctly, he would draw it correctly and remember it afterward, in its right relations. He insisted on proper focussing of the microscope as the prime essential before observations were made. His presence in the laboratory made it possible for him to supervise the work, as well as to exert a wonderful personal influence on the students themselves. In his class record-book was written this quotation from Emerson, "I am impressed with the fact that the greatest thing a human soul ever does in this world is to see something and tell what it saw, in a plain way. Hundreds of people can talk for one who can think, but thousands can think for one who can see. To see clearly is poetry, philosophy and religion in one."

We might speak of Dr. Lambert as dynamic, but he was more than that—he was a living human dynamo. This is shown especially in the apt analogies he selected to make difficult points vivid. To quote again from Mr. Foster, "When the students were studying the plant cell they were given among other material the inner epidermis of the onion bulb scale. These cells show but slight differences in the indices of refraction of their parts, and require careful study on the part of the elementary student if he is to visualize correctly the proportions and relations of their parts. Dr. Lambert, in order to emphasize the thinness of the layer of cytoplasm, would compare the cell to the laboratory room; the brick wall, ceiling and floor representing the walls of a cell, the air within the room representing the contents of the cell vacuole, and the coat of paint on the wall representing the cytoplasm. His descriptions were always acted out while he was talking. He would dip an imaginary brush in an imaginary bucket of paint and wave it over the walls as he talked about the paint on the walls being comparable in relative thickness to the layer of streaming cytoplasm in the onion cell. In studying the root of the radish seedling, the relation of the root-hair to the epidermal cell of the root seems hard for the average student to grasp. At the proper time Dr. Lambert would ask the class to rest their eyes for a moment, and then would tell them that the root-hair and epidermal cell were related to one another much as the laboratory room was related to the long corridor which opened into one side of it. While talking he would walk around the room and tell them he was in the vacuole of the epidermal cell and could pass out into the corridor without obstruction just as any portion of the cell sap of the epidermal cell could pass out into the root-hair. He would often tell the class that when he was studying a plant cell under the microscope he always imagined himself inside of it, feeling of the cytoplasm, grasping hold of the nucleus, and pulling at the cytoplasm to see if it would stretch."

With such unusual and effective ways of presenting his subject matter, it is not strange that his examinations and tests were also unique. Mere learning and reciting did not satisfy the Professor unless the student grasped the underlying principles and relationships. After lecturing on the various transformations of energy involved in plant and animal physiology he would ask the question, "What relation, if any, does energy bear to the writing of this examination? Discuss." He would expect the student to get the point that sunlight furnishes the energy, etc. Another favorite question was "What is the relation between chlorophyll and chloroplast?" As each laboratory period closed with a short quiz, there was opportunity for many of these "think" questions, as Dr. Lambert called them. During the last year of his teaching one of his elementary students bewailed to the Dean that she could not excel in answering this type of question. "But," she admitted, "the Professor is always fair." More than this he was friendly, enthusiastic, inspirational, with deep human interest in his students and in his friends.

In recommending students for graduate work, Professor Lambert was not satisfied with clear seeing and correct delineation, important as he rated them in his laboratory work. He felt that the student must have imagination and the right background of inheritance to make a success in advanced biological research. He showed equal care when he was asked for advice in the choice of other vocations.

No story of his life would be complete without an account of his summers at South Harpswell, Maine. Dr. Kingsley, his senior at Tufts, was early imbued with a desire to start a biological station for research somewhere north of Woods Hole, as a means of stimulating graduate work in zoology and botany. So, in 1898, Dr. Lambert was sent out scouting for a suitable location, not too far from large towns, but close by the sea, and with fishermen living near to coöperate in bringing in marine material. Such a place was soon found at South Harpswell. Dr. Lambert won the confidence of the local people by his genial, open-hearted ways, and when the little group of biological students arrived somewhat later they were received most cordially by the villagers. The station was carried on for some years by Tufts College, but in order to get more support it seemed best to incorporate it separately and in 1921 it was moved to Mt. Desert, where it still exists as the Mt. Desert Island Biological Laboratory.

Dr. and Mrs. Lambert had formed so many ties with South Harpswell that they continued to make it their summer home. Here the genial Doctor was able to relax, wear old clothes, live in the open, build up his health and fraternize with the village people. As his friend, Mr. Charles Bullard, has written me, "Here it was that his human and democratic side could be seen to advantage. His sympathies and helpfulness were much appreciated among the fisher folk. He was friend to all of them who lived about the cove at the camp." The relationship grew to mutual advantage in the course of time, for Dr. Lambert set up a laboratory of his own, where he prepared material for his teaching, and for other institutions as well. Inexhaustible supplies of marine life were brought in by the fishermen in perfectly fresh condition for the most delicate research, and were preserved for shipment to many different laboratories. A favorite pastime with the good Doctor was to jest with the fishermen, already considerably mystified, about the purposes for which this material was intended, and about the immense profits in the business.

The first few years the camp was in tents, and meals were eaten outdoors. Then a small and comfortable cabin was built, and some time later a small laboratory, with plenty of north light, was made for microscopic work, especially for studies on the green algae. This proved a great convenience.

The greatest friendship of Dr. Lambert's life was that with Frank Shipley Collins, who came to the Laboratory at South Harpswell for the purpose of using it as a center from which to collect the marine algae of Casco Bay. Each was a man with great charm of personality; together they complemented each other, and a perfect friendship was the result. Mr. Collins interested Dr. Lambert in the green algae, and for years many happy hours were spent together in study, especially while Mr. Collins was preparing his work on the group. The drawings for this, with the exception of two by Dr. Kingsley, were prepared by Dr. Lambert. The sudden death of Mr. Collins in 1920 was a great blow, and led to many changes in the life at South Harpswell, where a visit from Mr. Collins was a regular event, as well as at the winter home, for every holiday and week-end was usually spent by the two men in the study of algae.

In 1910–1911 Dr. Lambert had leave of absence, and went to Europe with Mrs. Lambert. He went first to the University of Freiburg, where at the suggestion of Mr. Collins he studied the green algae for five months with Friedrich Oltmanns. The pride of Dr. Lambert's life was a paper "On the Structure and Development of *Prasinocladus*" prepared at the invitation of Dr. Hans Kniep, and published in 1930 in *Zeitschrift für Botanik,* Dr. Oltmanns' Festschrift number. The following five months were spent most enjoyably at the Naples Zoological Station in Italy, also in research on the green algae. It was here that he made the studies for the paper on *Prasinocladus.*

Dr. Lambert was a member of the Botanical Society of America, the American Association for the Advancement of Science, the American Academy of Arts and Sciences, the Boston Society of Natural History, and he had a lifelong interest in his college fraternity, Delta Tau Delta. In 1905 he was elected a member of the New England Botanical Club, an association which proved most congenial to him. Even after failing health caused him to give up other outside activities, he kept an active interest in this Club, and attended his last meeting the very month of his death. He served for three years as President, and held other offices, but his most conspicuous service to the Club was his twenty-four years as a member of the program committee. He looked on the Club as a sort of clearing-house for all New England botanists, and while not overlooking or undervaluing local talent, he kept a keen eye out for speakers who represented colleges and institutions outside the Boston district. He would write a most delightfully persuasive letter to some non-resident botanist, follow it up with two or three more, and almost always he secured his program speaker. He sought also to have the program well-balanced, with papers on cryptogams as well as on the flowering plants, and not neglecting plant physiology, plant pathology, ecology and other branches of botanical science. After an address, he felt out the sentiment of each meeting, to see if the committee had been wise in its choice of a topic or speaker. His rich and varied experience was a most valuable aid to this work of the Club.

When a man so full of enthusiasm, so essentially vital in every detail of his personality, is taken away, the inadequacy of words becomes manifest. Such a man was Fred Dayton Lambert, professor, scholar, man among men. He was a helper and inspirer of youth, a matchless friend among his peers.

Hingham, Massachusetts.

NOTES ON THE FLORA OF THE MATAMEK RIVER DISTRICT, "NORTH SHORE," QUEBEC, CANADA

Paul W. Bowman

The Matamek River is a comparatively small stream which empties into the Gulf of St. Lawrence about ten miles east of the mouth of the Moisie River, at a point about three hundred and fifty miles northeast of the city of Quebec. It was the writer's privilege to spend the summer of 1927 on the North Shore at this place. During that time a collection of vascular plants was made which has since been identified and deposited in the Gray Herbarium.[1]

A number of these are not included in St. John's[2] list of the plants of the North Shore and as far as we know none have been collected before from this particular location, so it seems worth while to publish this list with notes on items of particular interest.

Our party left Quebec by the Steamer "North Shore" in the morning of the fifteenth of June and landed at the Matamek in the morning of the seventeenth. We were immediately impressed with the lateness of the season. The air was cold and the vegetation was still dormant. The alders did not bloom until several days after our arrival. The conifers shed their pollen on the third and fourth of July.

Reliable data on the question of pollen distribution by wind are not easy to get so we were quite interested to find that the "dust" which covered the water of the Gulf near the north shore on the twentieth of June consisted of spruce, pine and fir pollen. No other kinds were seen. As these trees did not shed their pollen on our side

[1] A second set of these plants, not quite complete, has been deposited in the National Herbarium and the rest in the Herbarium of The George Washington University.

[2] *A Botanical Exploration of the North Shore of the Gulf of St. Lawrence Including an Annotated List of the Species of Vascular Plants* by Harold St. John. Canada Department of Mines Memoir 126, No. 4 Biological Series. Ottawa, 1922.

of the Gulf until at least twelve days later it seems that the material we collected must have been carried from the south shore, about sixty-five miles away at its nearest point, by a southeast wind which had been blowing for several days.

The season advanced with amazing rapidity. By the end of August the birch leaves had turned yellow and started to fall. It was reported that a killing frost usually occurs before the first of September, but it did not happen so that year. The days of the growing season, though few, are very long, and areas exposed to the sun get quite hot.

As one looks inland from the steamer approaching the shore a series of hills is seen which rise successively higher toward the interior. West of the Matamek there is a series of sandy terraces. The Moisie River, near its mouth, has cut a channel through sticky gray clay which is exposed in steep, slippery banks seventy-five to a hundred feet high. This same material was found as the substratum of some peat bogs east of the Matamek.

Some of the people who live along the coast keep cattle, but there is not enough grass for them and hay is brought by boat from Quebec. This, we believe, explains the presence of the common weeds from farther south which are to be found around the settlements, particularly near the stables.

We gratefully acknowledge the kindness of Mr. Copley Amory of Washington whose interest in biology led him, upon the recommendation of Dr. Paul Bartsch of the Smithsonian Institution, to take us to his estate on the Matamek River and to make it possible to botanize there for a summer. Mr. Amory provided facilities for getting about and sometimes took us himself on excursions to places which we would not otherwise have reached. The necessary equipment was provided by The George Washington University. The following collection of vascular plants represents part of our work there during that time. We wish also to acknowledge the assistance of Dr. M. L. Fernald who identified the species of sedges for us and checked our determinations of the remaining spermatophytes, and Mr. C. A. Weatherby who identified some of the pteridophytes and checked the rest.

In the list which follows the items preceded by an * were not included by St. John in his list of the vascular plants of the North Shore. In the cases where the plant in question was listed under another name a statement is made to that effect.

Woodsia ilvensis (L.) R. Br. Among rocks along the Moisie.

*Thelypteris spinulosa (O. F. Muell.) Nieuwl., var. americana (Fisch.) Weatherby. St. John lists the species, but not the variety.

Thelypteris Phegopteris (L.) Slosson.

*Athyrium angustum (Willd.) Presl. Plentiful in cold, wet ravine at Moisie portage. St. John lists the var. rubellum, but not the species.

Athyrium angustum (Willd.) Presl, var. rubellum (Gilbert) Butters.

Polypodium virginianum L. Occasional on rocks along the Matamek.

Osmunda Claytoniana L. On bank of the Matamek.

Equisetum arvense L. On clay bank of the Moisie.

Equisetum sylvaticum L., var. pauciramosum Milde. In wet places.

Equisetum limosum L. In the Matamek below second falls.

Lycopodium annotinum L.

Lycopodium annotinum L., var. pungens (LaPylaie) Desv.

Lycopodium clavatum L.

Lycopodium clavatum L., var. megastachyon Fern. & Bissell.

*Lycopodium clavatum L., var. tristachyum Hook.

Lycopodium obscurum L., var. dendroideum (Michx.) D. C. Eaton.

Lycopodium complanatum L.

*Lycopodium sabinaefolium Willd., var. sitchense (Rupr.) Fern.

Pinus Banksiana Lamb. Common on open, sandy plains.

Larix laricina (DuRoi) Koch. Occasional.

Picea mariana (Mill.) BSP. Common. This, along with Abies, formed the forest.

Abies balsamea (L.) Mill. Common.

Juniperus communis L., var. montana Ait. Common, creeping over rocks in exposed places.

Sparganium angustifolium Michx. In Matamek below second falls.

*Potamogeton Oakesianus Robbins. In small pond along shore.

Potamogeton epihydrus Raf. In Matamek.

Zostera marina L., var. angustifolia Hornem. In brackish water at head of small bay.

Scheuchzeria palustris L., var. americana Fern. In shallow pond near the shore. St. John lists the species. Fernald (Rhodora **25**: 178. 1923) classifies the American as var. *americana*.

Hierochloë odorata (L.) Wahlenb., var. fragrans (Willd.) Richter. Along edge of brackish marsh.

Phleum pratense L. In clearing near stable.

*Agrostis hyemalis (Walt.) BSP. In clearing along Moisie beach. St. John lists only the var. geminata.

Agrostis hyemalis (Walt.) BSP., var. geminata (Trin.) Hitchc. On open hillside.

Calamagrostis canadensis (Michx.) Beauv., var. acuminata Vasey. Common on sandy shore and open hillside.

*Trisetum spicatum (L.) Richter, var. molle (Michx.) Beal. On exposed hillside and along rocky shore. St. John lists two other varieties.

Deschampsia flexuosa (L.) Trin. In clearing along Moisie beach.

Poa eminens J. S. Presl. On small island near shore.

Poa palustris L. In clearing near house.

Poa pratensis L. Along rocky shore and on small island.

Puccinellia paupercula (Holm) Fern. & Weathb., var. alaskana (Scrib. & Merr.) Fern. & Weathb. On sandy shore.

Festuca rubra L. Near mouth of Matamek.

Bromus ciliatus L. On sandy shore.

Elymus arenarius L., var. villosus E. Mey. On sandy shore.

Scirpus rubrotinctus Fernald. On clay bank along Moisie.

*Scirpus caespitosus L., var. callosus Bigel. Over sphagnum bog. St. John's record of the species doubtless belongs to the variety.

Eriophorum spissum Fernald. Over sphagnum bog. This is the plant called *E. callitrix* in Gray's manual.

Eriophorum virginicum L. Over sphagnum bog.

Rhynchospora alba (L.) Vahl. In scattered patches over sphagnum bog.

Carex canescens L. Tufts in sand near mouth of Matamek and around sphagnum bog. St. John says of this: "Recorded from St. Paul by W. A. Stearns (S^1) probably is one of the following varieties," and then lists var. *subloliacea* Laestad. and var. *disjuncta* Fern.

*Carex brunnescens Poir., var. sphaerostachya (Tuck.) Kükenthal. Near mouth of Matamek. St. John lists the species but not the variety.

Carex glareosa Wahl., var. amphigena Fern.

Carex stipata Muhl. Clay bank along Moisie.

Carex paupercula Michx. Along rocky shore.

Carex rariflora Sm. In brackish swamp.

*Carex rostrata Stokes. In shallow pond near coast. St. John lists var. *utriculata* (Boott) Bailey, but not the species.

Carex aenea Fernald.

Calla palustris L. In small pond surrounded by sphagnum.

Juncus balticus Willd., var. littoralis Engelm. Common around brackish marshes.

Juncus brevicaudatus (Engelm.) Fern. In wet place.

*Veratrum viride Ait. This was seen only in a moist, shady location along the Moisie.

Clintonia borealis (Ait.) Raf. A common plant of the moist woods.

Smilacina stellata (L.) Desf. Occasional along sandy shore.

Smilacina trifolia (L.) Desf. Found in wet sphagnum along the edge of a small bog.

Streptopus roseus Michx. Occasional in moist woods.

Iris versicolor L.

Iris setosa Pall., var. canadensis Foster. Some clumps of these were seen growing side by side on the sandy shore just behind the high-tide line. Some sterile plants of *I. versicolor* with leaves four to five feet tall were found in a wet place along the Matamek.

Habenaria dilatata (Pursh) Gray. A fine stand of this was found in a wet place at the foot of a slope.

Habenaria obtusata (Pursh) Richards. Occasional in woods.

Spiranthes Romanzoffiana Cham. Occasional in moist, open places.

Epipactis repens (L.) Crantz, var. ophioides (Fern.) A. A. Eaton. Occasional in moist woods.

Listera cordata (L.) R. Br. Scarce in moist woods.

Salix lucida Muhl. On river banks, Matamek and Moisie.

Salix humilis Marsh. Along Matamek.

Salix pellita Anderss. Along Matamek and on sand bar in Moisie.

Populus tremuloides Michx. A common tree of open sandy places.

Myrica Gale L. Occasional in rocky places.

Betula papyrifera Marsh., var. cordifolia (Regel) Fern. Common. St. John lists this as *B. alba* L., var. *cordifolia* (Regel) Fern.

Alnus crispa (Ait.) Pursh, var. mollis Fern. In open, wet places.

Geocaulon lividum (Rich.) Fern. Found once, among scattered trees on plain. St. John lists this as *Comandra livida* Rich.

Rumex occidentalis Wats. Occasional near shore.

Rumex Acetosella L. Common near houses.

Sagina nodosa (L.) Fenzl. Common on rocky shores.

Arenaria lateriflora L., var. angustifolia (Regel) St. John. In open sandy places.

*Stellaria graminea L. In clearing near stable.

Nymphozanthus variegatus (Engelm.) Fern. In the Matamek.

Ranunculus Cymbalaria Pursh. Common on wet, sandy banks around small bays where water is brackish.

Ranunculus pennsylvanicus L. f. One specimen found on east bank of Moisie.

Ranunculus acris L. Collected in clearings.

Thalictrum polygamum Muhl. Found along rivers.

Caltha palustris L. Wet place at foot of slope near springs.

Coptis trifolia (L.) Salisb. Common in moist woods.

Corydalis sempervirens (L.) Pers. Single plant collected from rocks along Matamek.

Capsella Bursa-pastoris (L.) Medic. Grows abundantly in sand near stable.

Brassica arvensis (L.) Ktze. Collected near stable.

*Erysimum cheiranthoides L. On bank of Matamek near houses.

Barbarea orthoceras Ledeb. In little meadow along shore.

Sarracenia purpurea L. Common in sphagnum bogs.

Drosera anglica Huds. Common in sphagnum bogs.

Drosera longifolia L. Common in sphagnum bogs.

Sedum roseum (L.) Scop. Occasional among rocks along shore.

Mitella nuda L. Common in moist woods along the Moisie.

Ribes hirtellum Michx. Occasional along rocky shore. Berries up to 15 mm. in diameter and of a good flavor.

Ribes lacustre (Pers.) Poir. Occasional in wet woods inland. Berries good, up to 8 mm. in diameter.

Ribes prostratum L'Her. Occasional on rocky shore and along Matamek.

Spiraea latifolia Borkh., var. septentrionalis Fern. Occasional in rocky places.

Pyrus americana (Marsh.) DC. Occasional in open woods.

Amelanchier Bartramiana (Tausch) Roem. Common in open woods. The fruits become mushy and sweet when ripe and are eaten.

Fragaria virginiana Duchesne, var. terrae-novae (Rydb.) Fern. & Wieg. This plant was very well established in an open, sandy place and produced fine berries in abundance.

Potentilla monspeliensis L. One plant collected in clearing near house.

Potentilla palustris (L.) Scop. Common in marsh.

Potentilla tridentata Ait. Very common on rocky shore.

Potentilla pacifica Howell. Common on brackish shores.

Rubus idaeus L., var. canadensis Rich. Occasional along Matamek.

Rubus Chamaemorus L. Common on sphagnum bogs. The fruits are known locally as Margot berries and are gathered in quantity for food. When ripe they are sweet and insipid, but if gathered while still hard they can be made into preserves with a fine spicy flavor.

Sanguisorba canadensis L. Common along rivers.

Prunus pennsylvanica L. f. Occasional in open woods.

Trifolium repens L. In clearing near house.

*Trifolium agrarium L. In clearing near stable.

Vicia Cracca L. In clearing near village.

Lathyrus maritimus (L.) Bigel. Common on sandy shore.

Lathyrus palustris L., var. pilosus (Cham.) Ledeb. Occasional on sandy shore.

Oxalis montana Raf. Found once, in moist woods.

Callitriche palustris L. Occasional in shallow pools.

Empetrum nigrum L. Very common in open places.

Nemopanthus mucronata (L.) Trel.

Acer spicatum Lam. Occasional in moist woods.

Viola pallens (Banks) Brainerd. Common in moist open places.

Viola incognita Brainerd. In moist woods.

Epilobium angustifolium L. Common on open hillsides.

Epilobium palustre L., var. longirameum Fern. & Wieg. On small island near shore.

*Epilobium glandulosum Lehm., var. occidentale (Trel.) Fern. On bank of the Moisie. St. John lists the species but not the variety.

Epilobium Hornemanni Reich. Occasional in wet places.

*Oenothera muricata L. A single plant was found on the clay bank of the Moisie.

Circaea alpina L. In cold wet ravine along Moisie.

Aralia hispida Vent. Single plant collected on sandy plain.

Aralia nudicaulis L. Occasional in woods.

Ligusticum scothicum L. In wet place at head of small bay.

Heracleum lanatum Michx. On sandy shore at edge of woods. Plants numerous where found.

Conioselinum chinense (L.) BSP. Occasional in wet places.

Cornus canadensis L. Very common in open places.

Cornus stolonifera Michx. Occasional in woods along Matamek.

Moneses uniflora (L.) Gray. Occasional in deep woods.

Pyrola secunda L., var. obtusata Turcz. In moist woods.

*Pyrola chlorantha Sw. In woods. St. John says of the previous collections: "There is some confusion here, but the record seems likely."

Monotropa uniflora L. One clump was found in dense spruce forest.

Monotropa Hypopitys L. One clump of this was found near *M. uniflora.*

Ledum groenlandicum Oeder. Common in open places.

Rhododendron canadense (L.) BSP. Common in open places.

Kalmia angustifolia L. Common in open places.

Kalmia polifolia Wang. Common in wet places and over sphagnum bogs.

Andromeda glaucophylla Link. Common over sphagnum bogs, sometimes growing out into small pools.

Chamaedaphne calyculata (L.) Moench. Common on sphagnum bogs.

Chiogenes hispidula (L.) T. & G. Common in woods.

Vaccinium pennsylvanicum Lam. Common in open places and at edges of woods. This plant produces edible berries up to 1 cm. in diameter in great abundance.

Vaccinium uliginosum L., var. alpinum Bigel. Common in open places, sometimes flat and spreading over exposed rocks. Its ovoid berries, which usually occur singly are found up to 1 cm. in length. St. John lists this as *V. uliginosum* L.

Vaccinium Vitis-Idaea L., var. minus Lodd. Very common in open places, sometimes forming dense mats of considerable extent. The berries are produced in crowded clusters and attain a diameter of 1 cm. The berries which remain on the plants over winter get soft and sweet, and are eaten raw or made into preserves.

VACCINIUM OXYCOCCUS L. Common in moist open places, especially over sphagnum bogs. The berries are good, but are small and occur singly.

PRIMULA LAURENTIANA Fernald. Found once along shore. St. John lists this under *P. farinosa*, vars. *macropoda* and *incana*.

TRIENTALIS BOREALIS Raf. Common.

GLAUX MARITIMA L., var. OBTUSIFOLIA Fern. On brackish mud.

MERTENSIA MARITIMA (L.) S. F. Gray. On sandy shore.

MELAMPYRUM LINEARE Lam. Along rocky shore.

UTRICULARIA CORNUTA Michx. In shallow pools on sphagnum bog.

PLANTAGO JUNCOIDES Lam., var. GLAUCA (Hornem.) Fern. Common on rocky shore.

GALIUM TRIFIDUM L., var. HALOPHILUM Fern. & Wieg. Under shrubs on brackish shore.

DIERVILLA LONICERA Mill. On rocky hillside.

LONICERA VILLOSA (Michx.) R. & S. On rocky shore. Listed by St. John as *L. caerulea* L., var. *villosa* (Michx.) T. & G.

LINNAEA BOREALIS L., var. AMERICANA (Forbes) Rehder. Common in woods and shady places.

VIBURNUM PAUCIFLORUM Raf. Common at edge of woods.

*SAMBUCUS RACEMOSA L.

CAMPANULA ROTUNDIFOLIA L. Common along rocky shore.

*EUPATORIUM MACULATUM L., var. FOLIOSUM (Fern.) Wieg. On rocks along the Matamek.

SOLIDAGO LEPIDA DC., var. ELONGATA (Nutt.) Fern. Along the Moisie.

SOLIDAGO MACROPHYLLA Pursh. Among rocks along Matamek and on clay bank of the Moisie.

SOLIDAGO MACROPHYLLA Pursh, var. THYRSOIDEA (Mey.) Fern. In clearing along shore.

SOLIDAGO GRAMINIFOLIA (L.) Salisb. On clay bank of the Moisie.

ASTER NEMORALIS Ait. Along rocky shore.

ASTER FOLIACEUS Lindl. On rocky hillside.

ANAPHALIS MARGARITACEA (L.) B. & H., forma ANOCHLORA Fern. On rocky hillside and clay bank of the Moisie. Possibly included by St. John under var. *occidentalis* Greene.

ACHILLEA MILLEFOLIUM L. Common in clearings and along rocky shore.

?ACHILLEA BOREALIS Bongard. In clearing.

*CHRYSANTHEMUM LEUCANTHEMUM L., var. PINNATIFIDUM Lecoq & Lamotte. In clearing near stable.

SENECIO PSEUDO-ARNICA Less. On sandy shore near woods.

TARAXACUM OFFICINALE Weber. In clearing near house.

PRENANTHES RACEMOSA Michx. On rocks along Matamek.

HIERACIUM CANADENSE Michx. In clearing and on open hillside.

THE GEORGE WASHINGTON UNIVERSITY,
Washington, D. C.

A Flora of Woodstock, Vermont.—For a number of years Miss Elizabeth Billings, whose family estate overlooks the village of Woodstock, Vermont, has interested herself in the flora of the region. For eight summers past, she has employed Miss E. M. Kittredge, formerly of the New York Botanical Garden, in collecting and determining specimens. The first result of these activities was an excellent local herbarium. The second now appears in the form of an uncommonly well printed and attractive little pamphlet[1] containing an annotated list of the ferns and flowering plants (grasses and sedges excepted) which occur in a circle of six-mile radius with Woodstock village as center.

In spite of minor idiosyncrasies of scientific punctuation, the list is obviously thorough, careful and conscientious. It covers part of an area of considerable botanical interest, which contains a classical station for a group of those northern calciphiles whose occasional presence distinguishes Vermont among the more southern New England states, and, in addition, more or less outlying localities for a number of other, less remarkable but still noteworthy, boreal species. The list adds several new records of this sort. If any item in it (like *Juncus debilis*, otherwise known in New England only locally in the siliceous southeast) seems doubtful, the doubt can be readily resolved, for each rests upon a specimen in Miss Billings' herbarium.

Such a painstakingly prepared list, supported by a full suite of specimens, has a two-fold value. It furnishes both ballast and propulsive power to the activities of local amateurs and it supplies useful data to students, anywhere, of the details of the distribution of plants. It is a pity, in the present case, that its value in both directions is decreased and that, as an account of a flora, it is thrown off balance, by the exclusion of the *Gramineae* and *Cyperaceae*. However florally inconspicuous—and even that feature, correlated as it is with their habit of wind-pollination, should arouse interest in any intelligent lover of plants—these two groups form a large and important element in the flora of any part of temperate North America. They include, in the Woodstock area, *Leptoloma cognatum*, one of the rarest and geographically most interesting of its species—besides being an excellent example of a tumble-weed. The writer has aided Miss Kittredge in making critical determinations enough to know that they were not neglected in the preliminary collecting and working up of the material for the list. Their final omission is the more difficult to understand; in a work which otherwise maintains a worthy scientific standard, it is an unfortunate anomaly.[2]

[1] Even the bit of quoted verse prefixed to the foreword tempts one to congratulation. It is unhackneyed and of fine quality. One could be reconciled to the poetical ornament commonly attached to works of popular botany if it were all as good as this.

[2] Kittredge, E. M. *Ferns and Flowering Plants of Woodstock, Vermont.* (With foreword by Elizabeth Billings.) The Elm Tree Press, Woodstock. 1931. 57 pp. 50 cents.

Volume 34, no. 398, including pages 21 to 40, was issued 4 February, 1932.

Farlow Bot. Lab.

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TRADESCANTIA EDWARDSIANA, NOV. SP.

B. C. THARP

SOME ten years ago, on a botanical trip to the Blanco River thirty miles southwest of Austin, Texas, a striking *Tradescantia* was discovered growing along a half-shaded gravel terrace bordering a tributary creek. The plants were robust in stature, bright green in color, with leaves relatively much broader than is usual for the genus, and with three well-developed but unequal bracts subtending a dense inflorescence of blue (occasionally pink or white) flowers each some 2.0–2.5 cm. in diameter.

An abundance of material was collected, and a description based upon careful study of fresh material was written. A year or two later the plant was found growing in a similar situation along Bull Creek, a tributary of the Colorado River a few miles above Austin. Material transplanted from the latter place and grown under observation along with other Texas species has confirmed the opinion that it represents an undescribed species. For it the name *Tradescantia edwardsiana* is proposed as appropriate in indicating the region, the Edwards Plateau, in which it is found. A description follows:

TRADESCANTIA **edwardsiana**, nov. sp., affinis *T. humili* Rose, sed differt habitu altiore et foliis latioribus. Caulis 4–7 dm. altus, inferne simplex, sursum ramosus; folia lanceolata vel lineari-lanceolata, 2.5–6.5 cm. lata; pedicelli, sepala et ovarium glanduloso-pubescentia.

Stems 4–7 dm. tall, rather stout, 1–1.2 cm. thick at base, simple below or 2 or 3 from a common base, lower stem-internodes varying from 1 cm. to more than 5 cm. long, at length widely branched above,

Fig. 1. Tradescantia edwardsiana, × 4/5. Drawn by *Eula Whitehouse*.

the primary branches frequently in turn branched, lower internodes sparsely, the upper thickly clothed with very short, simple, conic white hairs; *leaf blades* lanceolate to linear-lanceolate, 2.5–6.5 cm. wide x 2–3 dm. long, acuminate, bright green above, somewhat glaucous beneath, clothed on both upper and lower surfaces with hairs like those on the stem, the somewhat undulate edges rough with a copious supply of same; *lower sheaths* sometimes nearly 3 cm. long (hence exceptionally imbricated on stems with short internodes) upper sometimes as short as 0.5 cm., nearly glabrous except the short ciliate margins; *bracts* of the involucre 2 or 3, very unequal, similar to leaves except more crisped and also asymmetrical, not at all saccate at base, at maturity more or less reflexed; *cymes* 3–5-rayed, few to many (15–nearly 100) flowered; *mature pedicels* about 3 cm. long, ciliate with yellowish hairs which are simple at base and increasingly glandular toward the capsule in young buds but nearly all simple in mature pedicels, hairs also about twice as long (0.7 mm.) at apex as at base, each pedicel subtended by a white, lavender-margined or green, asymmetrical, abruptly acute bractlet 5 mm. long x 2.5 mm. broad which is sparsely pubescent on the lower surface especially along the midrib; *bractlets* in each ray 2-ranked, approximate in each rank, oblique (the outer edge higher, the inner lower on the axis of the ray); *sepals* lanceolate, asymmetrical, 3–4 x 8–9 mm., like the pedicels pubescent with yellowish glandular hairs; *corolla* pale blue to nearly pure white or sometimes slightly lavender, petals about 10–12 mm. long, very broadly ovate; *filaments* rather slender, about 5 mm. long, a little darker than the petals, *anthers* at first erect, the pollen-sacs separated by a very broad connective at the top but somewhat converging below, bright yellow; *ovary* copiously pubescent with short white glandular hairs; *style* (including ovary) little more than half as long as the filaments, white or pale blue, flexuous; *stigma* terminal, brush-like, composed of very short white hairs; *capsule* oblong, 4–5 mm. broad, about twice as long, obtuse at both ends, slightly constricted in the center, usually 3-celled (rarely 4-celled), pubescence about 1 mm. long, hairs reflexed, of the same character as those on calyx and upper part of pedicels; *ovules* normally six (rarely eight), 2 in each cavity; *seeds* 2 x 4 mm., grey, transversely wrinkled, with linear longitudinal ridges extending nearly the length of the seed.—Moist alluvial terraces and ravines of the Edwards Plateau. Specimens collected: Blanco River in Hayes County; Bull Creek in Travis County, Texas.

The type specimen (*Tharp* no. 7944) collected by *B. C. Tharp* on the Blanco River 7 miles northwest of Kyle, Texas, April 4, 1921, is deposited in the herbarium of the University of Texas.

University of Texas.

A LIST OF NEW ENGLAND RUSTS COLLECTED IN 1931

George H. Hepting

The following is a list of rusts collected by Dr. Perley Spaulding and the writer in the states of New Hampshire, Vermont, Massachusetts, and Connecticut, during the year 1931. The first three states are well represented, but relatively few collections were made in Connecticut. The greater part of the determinations were made by the writer, but the rusts on Carex and a few others, the identity of which were in some doubt, were named by Dr. J. C. Arthur. Those specimens identified by Dr. Arthur, and those collected by persons other than Dr. Spaulding and the writer, are so indicated. Material of each collection cited is in the herbarium of the writer.

Much thanks is due to Dr. Perley Spaulding of the Office of Forest Pathology, U. S. Department of Agriculture, for his interest, guidance, and assistance in the collecting of specimens; to Dr. Ray E. Torrey of Massachusetts State College for the identification of the host plants; and to Dr. J. C. Arthur for the naming of some of the more difficult forms.

The nomenclature adopted is essentially that used by Arthur in the North American Flora, excepting that the genera Puccinia and Uromyces are retained, and the clover rusts are separated according to Davis (Mycol. **16**: 203–219. 1924). With but few exceptions the names conform with those used by Hunt in his treatment of the New England rusts (Conn. State Geol. and Nat. Hist. Surv. Bul. 36: 1–198. 1926). In naming the host plants, Gray's Manual, 7th edition, was followed wherever possible.

The list is arranged as follows: the rusts are listed alphabetically; beneath each species is given the hosts upon which the rust was found, these also arranged alphabetically; following the host is given the state and town in which the collection was made, followed by the stages of the rust found (I, aecial, II, uredinial, III, telial). Hunt's list of New England rusts, which brings together all of the previously published rusts of the region up to 1926, is used as a basis here in reporting a rust or a host as new. None of the forms reported here as new are given either in Hunt's list or in the U. S. Plant Disease Reporter to date or the U. S. Plant Disease Reporter Supplements to date, for the states indicated.

The following is the system for indicating new hosts or rusts:

Single asterisk preceding rust	New rust for New England
Single asterisk preceding host	New host for New England
Double asterisk preceding host	New host for the rust
Single asterisk preceding state	New host for the state
Double asterisk preceding state	New rust for the state

Calyptospora columnaris (Alb. & Schw.) Kühn. *Vaccinium canadense* Kalm. N. H., Bethlehem, II.

Coleosporium delicatulum (Arth. & Kern) Hedgc. & Long. *Solidago graminifolia* (L.) Salisb. Mass., Amherst, II, III; Orleans, III; Vt., Townsend, II, III.

Coleosporium Solidaginis (Schw.) Thüm. **Aster acuminatus* Michx. Vt., Mt. Tabor, II. *Aster cordifolius* L. Conn., E. Granby, II. Coll. *H. G. Eno;* N. H., Bartlett, II; Bath, II, III; Vt., Townsend, II. *Aster macrophyllus* L. *Mass., Wood's Hole, III. *Aster novi-belgii* L. Mass., Barnstable, II. *Aster puniceus* L. Conn., E. Granby, II; N. H., Fabyans, II, III; Vt., Townsend, II. *Aster paniculatus* Lam. Mass., Barnstable, II. *Aster umbellatus* Mill. N. H., Jefferson, III. *Callistephus hortensis* Cass. Conn., E. Granby, II. *Pinus resinosa* Ait. N. H., Bethlehem, I. *Solidago bicolor* L. Mass., Sandwich, II; Vt., Brattleboro, II. *Solidago caesia* L. Conn., N. Bloomfield, II, Coll. *H. G. Eno.* *Solidago caesia* L. var. *axillaris* (Pursh) Gray. Conn., N. Bloomfield, II. Coll. *H. G. Eno;* *Vt., Mt. Tabor, II, III. *Solidago canadensis* L. Conn., E. Granby, II, Coll. *H. G. Eno;* N. H., Bethlehem, II; Vt., Groton, II, III; Brattleboro, II, III. *Solidago juncea* Ait. Conn., E. Granby, II, Coll. *H. G. Eno;* *Mass., Petersham, III; N. H., Bath, II, III; Vt., Townsend, II. *Solidago latifolia* L. Conn., N. Bloomfield, II, Coll. *H. G. Eno;* *N. H., Fabyans, II. *Solidago nemoralis* Ait. N. H., Bartlett, II. *Solidago odora* Ait. Mass., Sandwich, II, III. *Solidago rugosa* Mill. Conn., E. Granby, II, Coll. *H. G. Eno;* Mass., Petersham, III; Wellfleet, III; N. H., Bethlehem, II; Vt., Townsend, II.. *Solidago sempervirens* L. Mass., Wellfleet, II, III.

Cronartium Comptoniae Arth. *Myrica asplenifolia* L. Mass., Petersham, II, III; Truro, III; N. H., Franklin, II, III.

Cronartium ribicola Fischer. *Ribes Cynosbati* L. N. H., Bethlehem, II, III. *Ribes lacustre* (Pers.) Poir. N. H., Crawfords, II, III. *Ribes prostratum* L'Hér. N. H., Bethlehem, III. *Ribes triste* Pall. N. H., Fabyans, II, III.

Frommea obtusa (Strauss) Arth. *Potentilla canadensis* L. Conn., Salisbury III; E. Granby II, III (Det. *J. C. Arthur*); Mass., Amherst, II; N. H., Bethlehem, II; Vt., Winhall, II, III.

Gymnoconia interstitialis (Schl.) Lagerh. (The long- and the short-cycled forms are considered together.) *Rubus allegheniensis* Porter. N. H., Franconia I; Waterville, I. *Rubus canadensis* L. N. H., Bartlett, III. *Rubus villosus* Ait. Mass., Amherst, I.

Gymnosporangium cornutum (Pers.) Arth. *Pyrus americana* (Marsh.) DC. N. H., Pinkham Notch, I.

Gymnosporangium germinale (Schw.) Kern. *Crataegus sp.* Mass., Petersham, I.

Gymnosporangium globosum Farl. I. *Crataegus sp.* Conn., E. Granby, I; Mass., Petersham, I; Vt., Brattleboro, I. *Juniperus virginiana* L. Mass., Dennis, III. *Pyrus Malus* L. Conn., E. Granby, I; Mass., Dennis, I.

Gymnosporangium Juniperi-virginianae Schw. *Pyrus Malus* L. Conn., Simsbury, I; Mass., Amherst, I.

Kuehneola Uredinis (Link) Arth. *Rubus alleghaniensis* Porter. Mass., Petersham, II; Sandwich, II; Vt., Winhall, II. *Rubus sp.* Vt., Mt. Tabor, II, III (Det. *J. C. Arthur*).

Melampsora Bigelowii (Thüm.) Arth. *Salix cordata* Muhl. Vt., Mt. Holly, II, III. *Salix discolor* Muhl. N. H., Bethlehem, II. **Salix rostrata* Rich. N. H., Twin Mt., II, Bethlehem, II.

Melampsora Euphorbiae (Schub.) Cast. II. *Euphorbia Cyparissias* L. N. H., Newport, II.

Melampsora Humboldtiana Speg. *Salix cordata* Muhl. *N. H., Jefferson, II, III; Vt., Townsend, II, III. **Salix discolor* Muhl. Vt., Peru, II, III. *Salix sp.* Mass., Brewster, II (Det. *J. C. Arthur*).

Melampsora Medusae Thüm. *Larix laricina* (Du Roi) Koch. *N. H., Twin Mt. I (Det. *J. C. Arthur*). *Populus tremuloides* Michx. Conn., E. Granby, II, III, Coll. *H. G. Eno;* Mass., Petersham, II, III; Sandwich, II, III; N. H., Twin Mt., II; Vt., Groton, II, III; Townsend, II, III.

Melampsorella elatina (Alb. & Schw.) Arth. I. *Abies balsamea* (L.) Mill. N. H., Twin Mt. I.

Melampsoridium Betulae (Schum.) Arth. *Betula populifolia* Marsh. Mass., Sandwich, II.

Melampsoropsis abietina (Alb. & Schw.) Arth. *Ledum groenlandicum* Oeder. N. H., Franconia, II.

Melampsoropsis Cassandrae (Pk. & Clint.) Arth. *Chamaedaphne calyculata* (L.) Moench. N. H., Franconia, II. **Picea pungens* Engelm. N. H., Madison, I, Coll. *S. H. Boomer.*

Melampsoropsis ledicola (Pk.) Arth. *Picea mariana* (Mill.) B. S. P. N. H., Franconia, I (Det. *J. C. Arthur*).

Phragmidium americanum Diet. *Rosa humilis* Marsh. Mass., Eastham, II, III. *Rosa virginiana* Mill. **N. H., Bretton Woods, II, III (Det. *J. C. Arthur*).

Puccinia Anemones-virginianae Schw. *Anemone virginiana* L. Vt., Brattleboro, III.

Puccinia angustata Peck. *Lycopus uniflorus* Michx. *N. H., Waterville, I. *Scirpus atrocinctus* Fern. N. H., Bartlett, II, III.

Puccinia Asparagi DC. *Asparagus officinalis* L. Mass., Eastham, III.

Puccinia Asteris Duby. *Aster acuminatus* Michx. N. H., Twin Mt., III. *Aster cordifolius* L. Vt., Townsend, III. *Aster macrophyllus* L. N. H., Waterville, III; Vt., Mt. Tabor, III. *Aster puniceus* L. *Conn., E. Granby, III.

Puccinia asterum (Schw.) Kern. **Aster acuminatus* Michx. N. H., Fabyans, I. *Aster puniceus* L. N. H., Fabyans, I. *Carex scoparia* Schkuhr. *N. H., Fabyans, II, III (Det. *J. C. Arthur*). *Carex straminea* Willd. *Vt., Townsend, II, III (Det. *J. C. Arthur*). *Solidago graminifolia* (L.) Salisb. *N. H., Franconia, I; Twin Mt., I; R. I., Block Island, I. **Solidago latifolia* L. N. H., Fabyans, I; Twin Mt., I.

Puccinia bardanae Corda. *Arctium minus* Bernh. Mass., Amherst, III; Wellfleet, III; **Vt., Peru, III.

Puccinia Circaeae Pers. *Circaea alpina* L. N. H., Franconia, III; Vt., Brattleboro, III.

Puccinia Clematidis (DC.) Lagerh. *Agropyron repens* (L.) Beauv. N. H., Franconia, II (Det. *J. C. Arthur*). ***Cinna latifolia* L. N. H., Fabyans, II (Det. *J. C. Arthur*). *Clematis virginiana* L. N. H., Fabyans, I. *Thalictrum polygamum* Muhl. *N. H., Fabyans, I.

Puccinia coronata Corda. ***Ammophila breviligulata* Fern. Mass., Provincetown, II, III. *Calamagrostis canadensis* (Michx.) Beauv. *N. H., Jefferson, III.

Puccinia Cyani (Schleich.) Pass. *Centaurea Cyanus* L. Mass., Amherst, III.

Puccinia dispersa Erics. *Secale cereale* L. Mass., Sandwich, II, III.

Puccinia Eriophori Thüm. *Senecio Robbinsii* Oakes. N. H., Waterville, I.

Puccinia graminis Pers. *Agropyron repens* (L.) Beauv. Mass., Amherst, III. *Agrostis alba* L. Mass., Chatham, III; N. H., Bath, III; Vt., Winhall, III; *Berberis vulgaris* L. Mass., Amherst, I. *Phleum pratense* L. Mass., Amherst, II; N. H., Jefferson, II; Vt., Winhall, II.

Puccinia Grossulariae (Schum.) Lagerh. *Carex arctata* Boott. *Vt., Mt. Tabor, II, III (Det. *J. C. Arthur*). *Carex crinita* Lam. N. H., Jefferson, II, III (Det. *J. C. Arthur*); Fabyans, II (Det. *J. C. Arthur*); Vt., Winhall, II, III (Det. *J. C. Arthur*). *Carex debilis* Michx. *N. H., Franconia, II; Fabyans, II (Det. *J. C. Arthur*). *Carex intumescens* Rudge. N. H., Franconia, II (Det. *J. C. Arthur*). **Carex scabrata* Schw. N. H., Fabyans, II (Det. *J. C. Arthur*). *Ribes prostratum* L'Hér. N. H., Bethlehem, I.

Puccinia Helianthi Schw. *Helianthus annuus* L. *N. H., Newport, III; Vt., Winhall, III. *Helianthus decapetalus* L. Conn., N. Bloomfield, III, Coll. *H. G. Eno;* Vt., Townsend, III. *Helianthus tuberosus* L. Conn., E. Granby, II, Coll. *H. G. Eno*; Vt., Townsend, III.

Puccinia Heucherae (Schw.) Diet. *Tiarella cordifolia* L. N. H., Bethlehem, III.

Puccinia Hieracii (Schum.) Mart. *Taraxacum officinale* Weber. Mass., Amherst, II; Falmouth, III; N. H., Crawfords, II, III; Vt., Mt. Tabor, III.

*Puccinia Lobeliae W. Gerard. *Lobelia siphilitica* L. Conn., Salisbury, III.

Puccinia malvacearum Bert. *Althaea rosea* Cav. Conn., E. Granby, III, Coll. *H. G. Eno;* Mass., Amherst, III; Falmouth, III; N. H., Bartlett, III; Vt., Peru, III. *Malva rotundifolia* L. Mass., Eastham, III; N. H., Bartlett, III.

Puccinia mesomajalis B. & C. *Clintonia borealis* (Ait.) Raf. N. H., Fabyans, III.

Puccinia Orbicula Pk. & Clint. *Prenanthes altissima* L. N. H., Fabyans, II, III.

Puccinia Pimpinellae (Str.) Mart. *Osmorrhiza Claytoni* (Michx.) Clarke. *N. H., Fabyans, II, III.

Puccinia Polygoni-amphibii Pers. *Polygonum virginianum* L. Conn., E. Granby, II, III, Coll. *H. G. Eno.*

Puccinia punctata Link. *Galium asprellum* Michx. N. H., Twin Mt., I.

Puccinia recedens Sydow. ***Senecio Robbinsii* Oakes. N. H., Bethlehem, III.

Puccinia Sambuci (Schw.) Kern. *Carex lurida* Wahlenb. *Vt., Townsend, II, III (Det. *J. C. Arthur*).

Puccinia Seymouriana Arth. *Spartina Michauxiana* Hitchc. Mass., Barnstable, III.

Puccinia suaveolens (Pers.) Rostr. III. *Cirsium arvense* (L.) Scop. Vt., Mt. Tabor, III.

Puccinia Violae (Schum.) DC. *Viola pallens* (Banks) Brainerd. *N. H., Franconia, I. *Viola sp.* Mass., Falmouth, III; N. H., Franconia, II, III; Crawford, I, II; Hanover, III; Vt., Mt. Tabor, III.

*Puccinia Waldsteiniae M. A. Curtis. *Waldsteinia fragarioides* (Michx.) Tratt. Vt., Mt. Holly, III.

Pucciniastrum Agrimoniae (Schw.) Tranz. *Agrimonia gryposepala* Wallr. Conn., Bloomfield, II; Vt., Mt. Tabor, II.

Pucciniastrum americanum (Farl.) Arth. *Rubus idaeus* L. var. *aculeatissimus* (C. A. Mey.) R. & T. N. H., Twin Mt., II; Fabyans, II; **Vt., Townsend, II.

Pucciniastrum arcticum (Lagerh.) Tranz. *Rubus triflorus* Richards. N. H., Fabyans, II; Bartlett, II; **Vt., Peru, II.

Pucciniastrum Myrtilli (Schum.) Arth. *Gaylussacia baccata* (Wang.) C. Koch. Mass., Wellfleet, II; *Vt., Mt. Tabor, II. *Rhododendron canadense* (L.) B. S. P. N. H., Jefferson, II, III. ***Rhododendron roseum* (Loisel.) Rehder. *Vt., Mt. Tabor, II. *Vaccinium pennsylvanicum* Lam. N. H., Fabyans, II. ***Vaccinium Vitis-idaea* L. N. H., Franconia, II (Det. *J. C. Arthur*).

Pucciniastrum Potentillae Kom. *Potentilla tridentata* Ait. N. H., Bartlett, II.

Pucciniastrum pustulatum (Pers.) Diet. *Epilobium angustifolium* L. N. H., Bethlehem, II, III; Vt., Mt. Tabor, II, III. **Epilobium hirsutum* L. Mass., Wellfleet, II.

Uredinopsis mirabilis (Pk.) Magn. I. *Abies balsamea* (L.) Mill. N. H., Bethlehem, I. *Onoclea sensibilis* L. Mass., Petersham, II, III; N. H., Bethlehem, II; Vt., Winhall, II.

Uredinopsis Osmundae Magn. *Abies balsamea* (L.) Mill. N. H., Bethlehem, I. *Osmunda cinnamomea* L. Mass., Petersham, II, III; N. H., Bethlehem, II, III; *Vt., Townsend, III. *Osmunda Claytoniana* L. N. H., Fabyans, II.

Uromyces appendiculatus (Pers.) Lèv. *Phaseolus vulgaris* L. N. H., Bartlett, II, III.

Uromyces Caladii (Schw.) Farl. *Arisaema triphyllum* (L.) Schott. Vt., Bethel, I.

*Uromyces Dactylidis Otth. *Dactylis glomerata L.* Mass., Brewster, II, III. (Det. *J. C. Arthur*).

Uromyces Fabae (Pers.) DeBary. *Vicia Cracca* L. Vt., Mt. Tabor, II, III.

Uromyces houstoniatus (Schw.) Sheld. *Houstonia caerulea* L. Conn., E. Granby, I; N. H., Twin Mt., I.

Uromyces hybridi Davis. *Trifolium hybridum* L. N. H., Twin Mt., II; Franconia, III; Vt., Bethel, III.

Uromyces Hyperici-frondosi (Schw.) Arth. *Hypericum ellipticum* Hook. N. H., Pinkham Notch, I, II, III.

Uromyces Lespedezae-procumbentis (Schw.) Curt. *Lespedeza hirta* (L.) Horn. Mass., Sandwich, III.

Uromyces Polygoni (Pers.) Fckl. *Polygonum aviculare* L. Mass., Amherst, II, III; Brewster, II, III.

Uromyces Trifolii (Hedw. f.) Lèv. *Trifolium pratense* L. Mass., Amherst, II; Yarmouth, II, III; N. H., Bartlett, II; Vt., Townsend, II, III.

Uromyces Trifolii-repentis (Cast.) Liro. *Trifolium repens* L. Mass., Sandwich, III; N. H., Twin Mt., II; Vt., Townsend, III.

Department of Plant Pathology,
Cornell University.

Two Contemporary Evaluations of the Colonization by Sir Walter Raleigh. For several years I have had the title Fisher Professor of Natural History; consequently I very regularly receive announcements and circulars of historical and governmental institutions and publications, addressed to me at the "Department of History." Since I can scarcely hope to justify such a gratuitous distinction by original studies, I may perhaps be pardoned, as a natural "historian," for drawing out of practical oblivion the following illuminating passages. The first, written by John Gerard and published in 1597, accompanied an account of *Asclepias* or Milkweed:

There groweth in that part of Virginia, or Norembega, where our English men dwelled (intending there to erect a Colony) a kind of *Asclepias*, or Swallow woort, which the Sauages call *Wisanck:* . . . . .

It groweth, as before is rehearsed, in the countries of Norembega, and now called Virginia by the H. sir *Walter Raleigh*, who hath bestowed great summes of monie in the discouerie therof, where are dwelling at this present English men, if neither vntimely death by murdering, or pestilence, corrupt aire, bloodie flixes, or some other mortall sicknes hath not destroied them.[1]

Before 1633, when Thomas Johnson's edition of Gerard was published, Raleigh's venture had justified itself. The pessimism expressed by Gerard had disappeared. The second passage in Gerard, with Sir Walter spoken of with a degree more of respect, was thus abbreviated in Johnson's edition:

It groweth, as before is rehearsed, in the countries of Norembega, now called Virginia by the honourable Knight Sir *Walter Raleigh*, who hath bestowed great summes of money in the discouerie thereof; where are dwelling at this present English men.[2]—M. L. Fernald.

Some Interesting Plants from the North Shore of the St. Lawrence.—While on a motor-trip last June, I took the drive from Quebec to Baie St. Paul, along the north shore of the St. Lawrence. At St. Tite des Caps, where the road winds over a table-land about 1500 feet above sea-level, the swampy hollows were filled with a conspicuous purple-flowered plant. This proved to be *Pedicularis palustris* L., new to me but already well-known from the lower St. Lawrence. In one of the swampy fields, the moss was covered with a mat of *Montia lamprosperma* Cham. It seemed strange to me to find this little plant so high above sea-level.

At Baie St. Paul, the cliffs facing the St. Lawrence proved to be of a calcareous nature, covered with *Draba arabisans* Michx., *Symphoricarpos racemosus* Michx., *Shepherdia canadensis* (L.) Nutt. and *Clematis verticillaris* DC., with such calciphiles as *Cryptogramma Stelleri* (Gmel.) Prantl and *Carex eburnea* Boott in the wet places; but nothing unusual was found. On the next day, I explored a bluff near the Rivière du Gouffre, about five miles above Baie St. Paul. Its dry, rocky slopes harbored *Shepherdia*, *Potentilla arguta* Pursh, *Carex Deweyana* Schwein. and *Thelypteris fragrans*, var. *Hookeriana* Fernald, as well as such acid-soil plants as *Pinus resinosa* Ait. and *Arctostaphy-*

[1] Gerard (or Gerarde), John. The Herball, 752 (1597).
[2] Gerard, Herball, ed. Johnson, 900 (1633).

los Uva-ursi (L.) Spreng. On this gravelly slope was an abundance of my most interesting "find," *Arabis Holboellii* Hornem. This is the third station for this species in Quebec. The other two stations, at Bic, and at Cap Rosier at the tip of Gaspé, are both much farther north and in areas which escaped the Wisconsin glaciation. It is, consequently, interesting that, in his study of Pleistocene deposits about Baie St. Paul, Coleman should have found that "The proofs of Wisconsin glaciation are confined to the valley and do not extend to the mountains which rise above it to the east and west."[1]

This region would, no doubt, well repay further botanical investigation, as there are a number of other bluffs along the same river-valley, and several interesting-looking cliffs along the shore between St. Paul and Murray Bay which I did not have time to explore.—G. Ledyard Stebbins, Jr., Colgate University, Hamilton, N. Y.

A New Salix Hybrid.—**Salix glaucops × petrophila**, hybr. nov., *S. glaucopi* similis sed late diffusa vel reptans, ramulis juvenilibus tenuibus, non tomentosis villosis vel glabriusculis; foliis tenuioribus, modice villosis pagina superiore glabriusculis obovatis vel oblongo-oblanceolatis, apice acutis; amentis femineis laxis suberectis stylis 1.5–2.5 mm. longis.—Wyoming: Head of Big Goose Creek, Big Horn Mountains, July 15 to 24, 1893, *Tweedy 19* (U. S. Nat. Herb.); Trail up Medicine Bow Peak, alt. 10,000 ft., July 22, 1931, *Kelso 2223;* Towner Lake, Medicine Bow Natl. Forest, alt. 9,400 ft., July 21, 1931, *Kelso 2220;* July 5, 1930, *Kelso 2201* (type, in my collection).

Low creeping specimens of willow with the aspect of *S. glaucops* seem to have been considered the alpine form of that species. However considerable field observation shows that true *S. glaucops* does not assume a creeping habit in the alpine or depauperate state, but becomes smaller in all its parts, retaining the usual foliage characters. The type material was collected in a patch of *S. petrophila* on the east shore of the lake, with tall trees and typical *S. glaucops* growing nearby. Therefore the creeping habit could not be due to environment. The specimens from Medicine Bow Peak were also found near the two parent plants.—Leon Kelso, U. S. Biological Survey, Washington, D. C.

[1] Coleman, *Glacial and Interglacial Periods in Eastern Canada*, Journ. Geol. xxxv. 396 (1927).

International Address Book of Botanists.[1]—The International Address Book, the preparation of which was announced in an early number of the last volume of Rhodora, is now on the market. Sponsored by the Fifth International Botanical Congress, the work has been most efficiently prepared by the Committee; and, exquisitely printed on a thin paper, it gets its more than 600 pages into a thin and compact volume. Such a directory is indispensable to every botanist who cares for exchange relations, and the true botanist who does not desire further contacts is difficult to imagine. As continuous reading matter the Address Book must rank with the City Directory and the Telephone Directory, works which it is most difficult to do without. The term "botanist" has been construed in the light of Professor Seward's presidential preface to the *Report of Proceedings of the Fifth International Botanical Congress:* "All that Botany now embraces is, as Alice in Wonderland said in another connexion, 'a great deal to make one word mean.'" Not only were all botanists invited to enter their addresses and special interests in the work; all botanical institutions, university departments and societies are included. Every up-to-date botanist needs the book on his reference shelf.—M. L. F.

Volume 34, no. 399, including pages 41 to 56 and one portrait, was issued 7 March, 1932.

[1] International Address Book of Botanists. 605 and xv. pp. Baillière, Tindall & Cox, 7 & 8 Henrietta Street, Covent Garden, London. Price 12s, 6d, net.

A
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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. XCIX

BOTANICAL EVIDENCE OF A POST-PLEISTOCENE MARINE CONNECTION BETWEEN HUDSON BAY AND THE ST. LAWRENCE BASIN

David Potter

Introduction

Floristic studies about the region of Hudson Bay have suggested an interesting phytogeographical problem. Among the many species of plants reported from this area are several of maritime occurrence. The nearest representatives of these plants are found along the Atlantic seaboard, about the region of the Gulf of Lawrence. Such cases of discontinuous distribution are fairly common, but the agencies responsible for these phenomena are not always the same.

It is the purpose of this paper to examine the various environmental agencies which might effect the distribution of these maritime plants and to determine, if possible, or at least to suggest, which factor has been most important. The writer wishes to express his sincere appreciation of the never-failing kindness and assistance of all members of the staff of the Gray Herbarium. Particular thanks are due, also, to Mr. C. M. Pomerat for his help in the field-work. Above all is the writer indebted to Professor M. L. Fernald, whose inspiration and guidance have made this work possible.

The Distribution of Certain Halophytic Plants of the Hudson Bay Region

Of the numerous plants collected by the writer around the southern region of Hudson Bay, during the summer of 1929, the following species were found representing this peculiar distribution: *Zannichellia palustris* L. var. *major* (Boenn.) Koch; *Glaux maritima* L. var. *obtusifolia* Fernald; *Juncus Gerardi* Loisel.; *Carex maritima* O. F. Mueller; *Carex norvegica* Willd.; *Carex glareosa* Wahlenb. var. *amphigena* Fernald; *Plantago juncoides* Lam. var. *decipiens* (Barneoud) Fernald; *Poa eminens* J. S. Presl and *Scirpus rufus* (Hudson) Schrad.

Associated with these plants were found the following indifferent halophytes, whose occurrence in this region may or may not have been brought about by the same agencies as effected the distribution of the above-mentioned halophytes: *Potamogeton filiformis* Pers.; *Triglochin maritima* L.; *Triglochin palustris* L.; *Scirpus americanus* Pers.; *Juncus balticus* Willd. var. *littoralis* Engelm.; *Potentilla Anserina* L.; *Myriophyllum exalbescens* Fernald; *Lathyrus maritimus* (L.) Bigel.; *Arenaria peploides* L. and *Mertensia maritima* (L.) S. F. Gray. To the above list should be added *Bidens hyperborea* Greene, an estuarian species, and *Zostera marina* L., a plant confined strictly to salt water. Maps 1–6 give the geographic ranges[1] of the strict

[1] The geographic ranges are based upon specimens in the Gray Herbarium and in the Herbarium of the New England Botanical Club, and upon the following publications:

Alcock, F. J., List of Plants Collected Along the Churchill River between Missi Falls and the Mouth of the Little Churchill River. Geol. Surv. Can., Summ. Rep. for 1915, p. 136.

Bell, John, On the Plants of Manitoulin Island. Geol. Surv. Can., Rep. of Prog., 1866–1869.

Bell, Robert, Report on Exploration of the Churchill and Nelson Rivers and around God's and Island Lakes. Geol. Surv. Can., Rep. for 1878–79, pp. 1–72 C.

Bell, Robert, List of Plants Collected in 1880. Geol. Surv. Can., Rep. for 1879–80, p. 59 C.

Bell, Robert, List of Plants Collected in Hudson Straits. Geol. Surv. Can., Ann. Rept. xi. 1898, pp. 34–37 M.

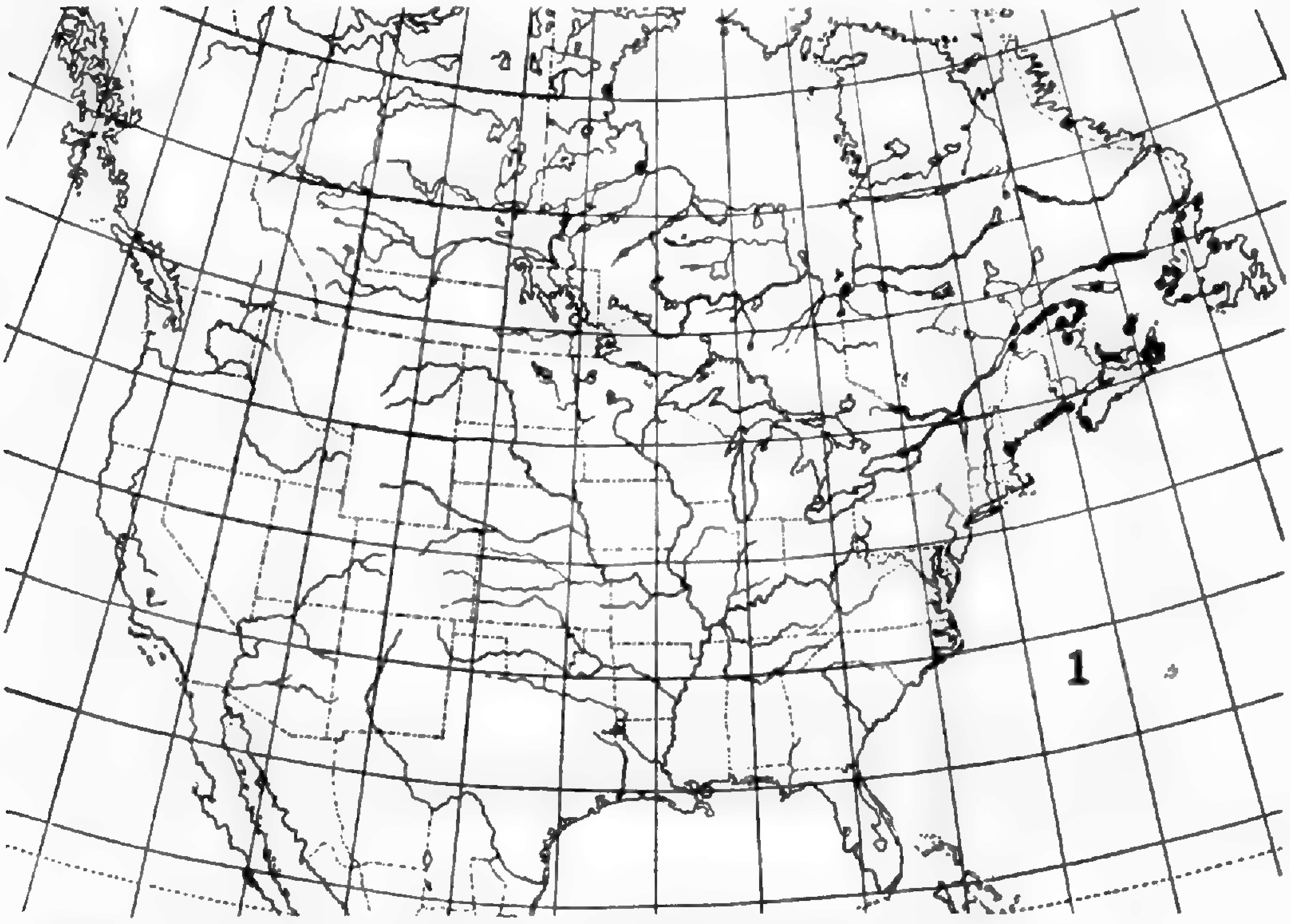
Dowling, D. B., List of Plants Collected at the Mouth of the Ekwan and Albany Rivers. Geol. Surv. Can., Ann. Rep. xiv. pt. F, p. 60.

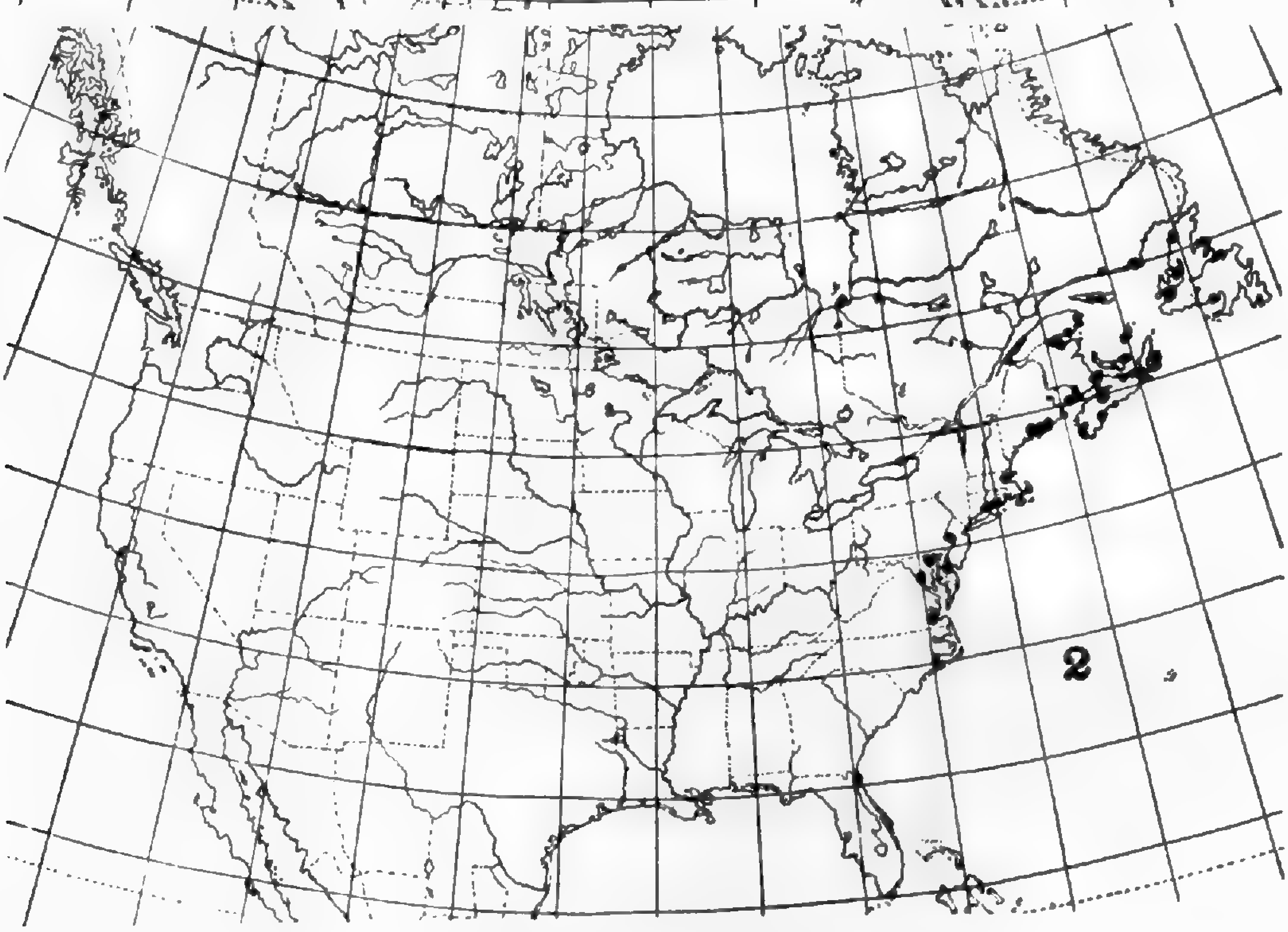
Drummond, A. T., The Distribution of Plants in Canada in Some of its Relations to Physical and Past Geological Conditions. Can. Nat., n. s. iii. (1869) pp. 161–177.

Drummond, A. T., The Distribution of Some Canadian Plants, an Argument for the Marine Origin of the Erie Clays. Can. Nat., n. s. vii. (1874) pp. 217–223.

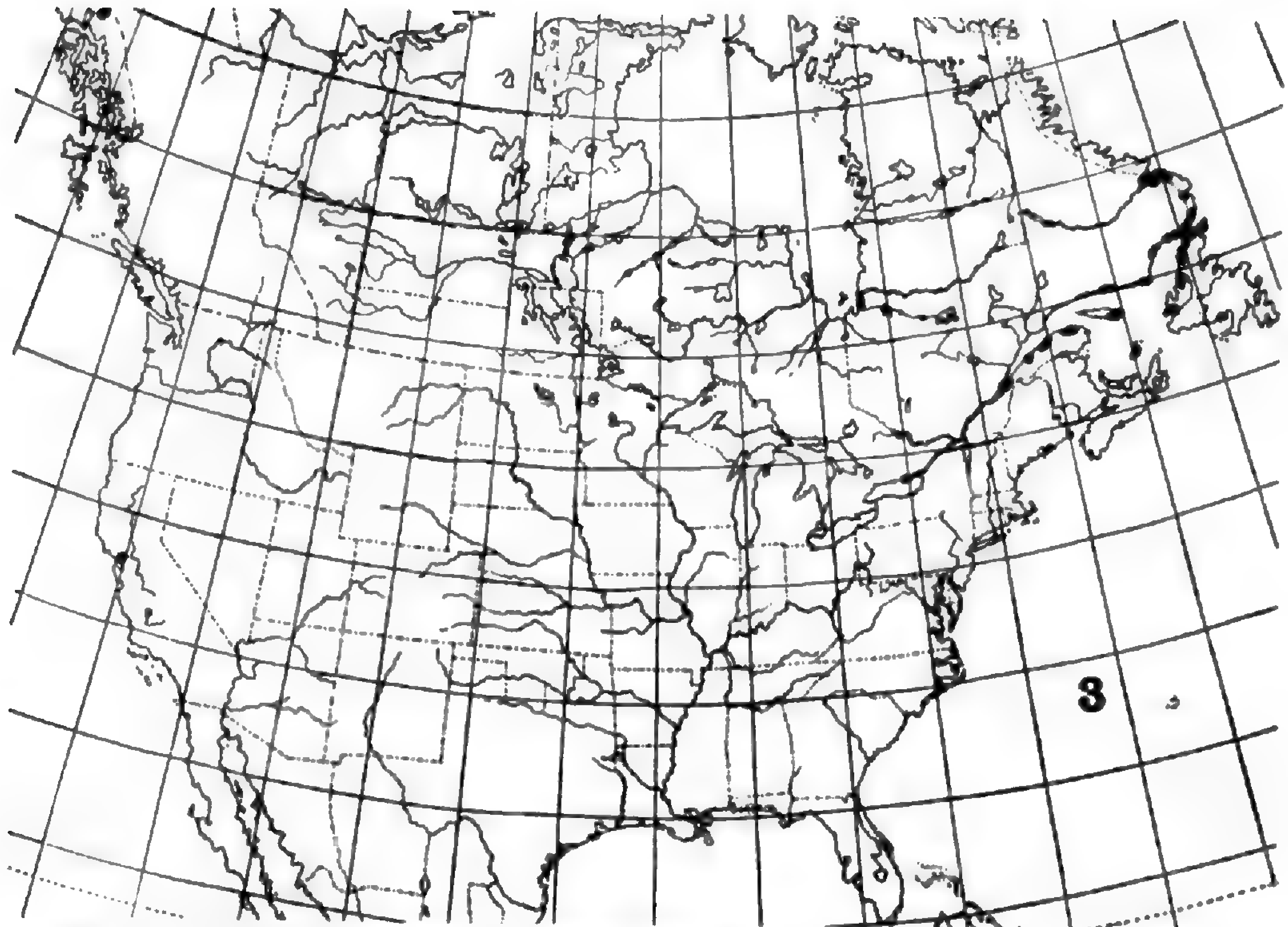
Fernald, M. L., The Botanical Evidence of Marine Conditions in Hamilton Inlet, Labrador. In the Privy Council, In the Matter of the Boundry Between the Dominion of Canada and the Colony of Newfoundland in the Labrador Peninsula. Report of the Lords of the Judicial Committee of the Privy Council, delivered the 1st March, 1927, London.

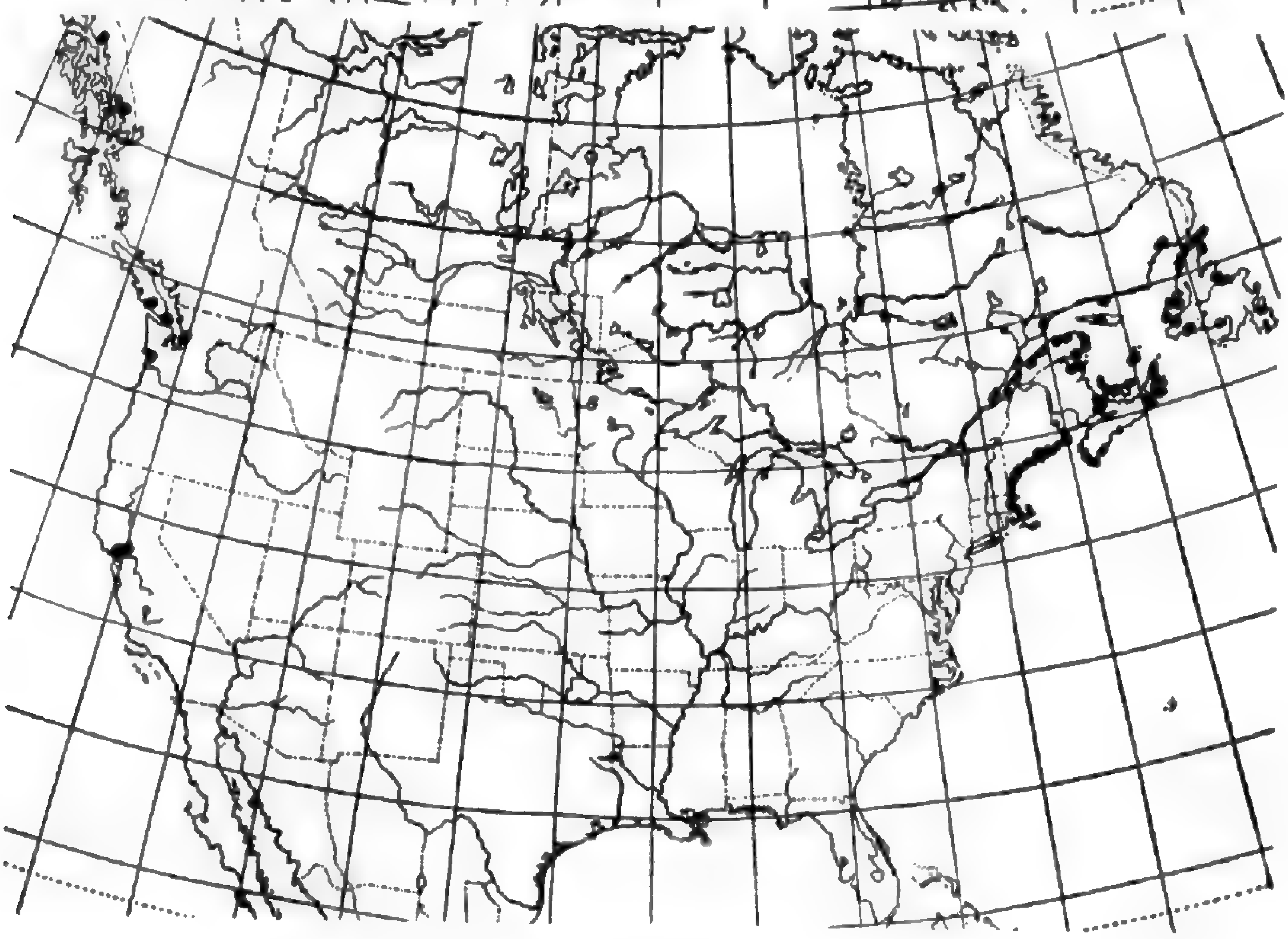
Henderson, A., Agricultural Resources of Abitibi. Rept. Bur. Mines, Ont., xiv. pt. 1, p. 241.



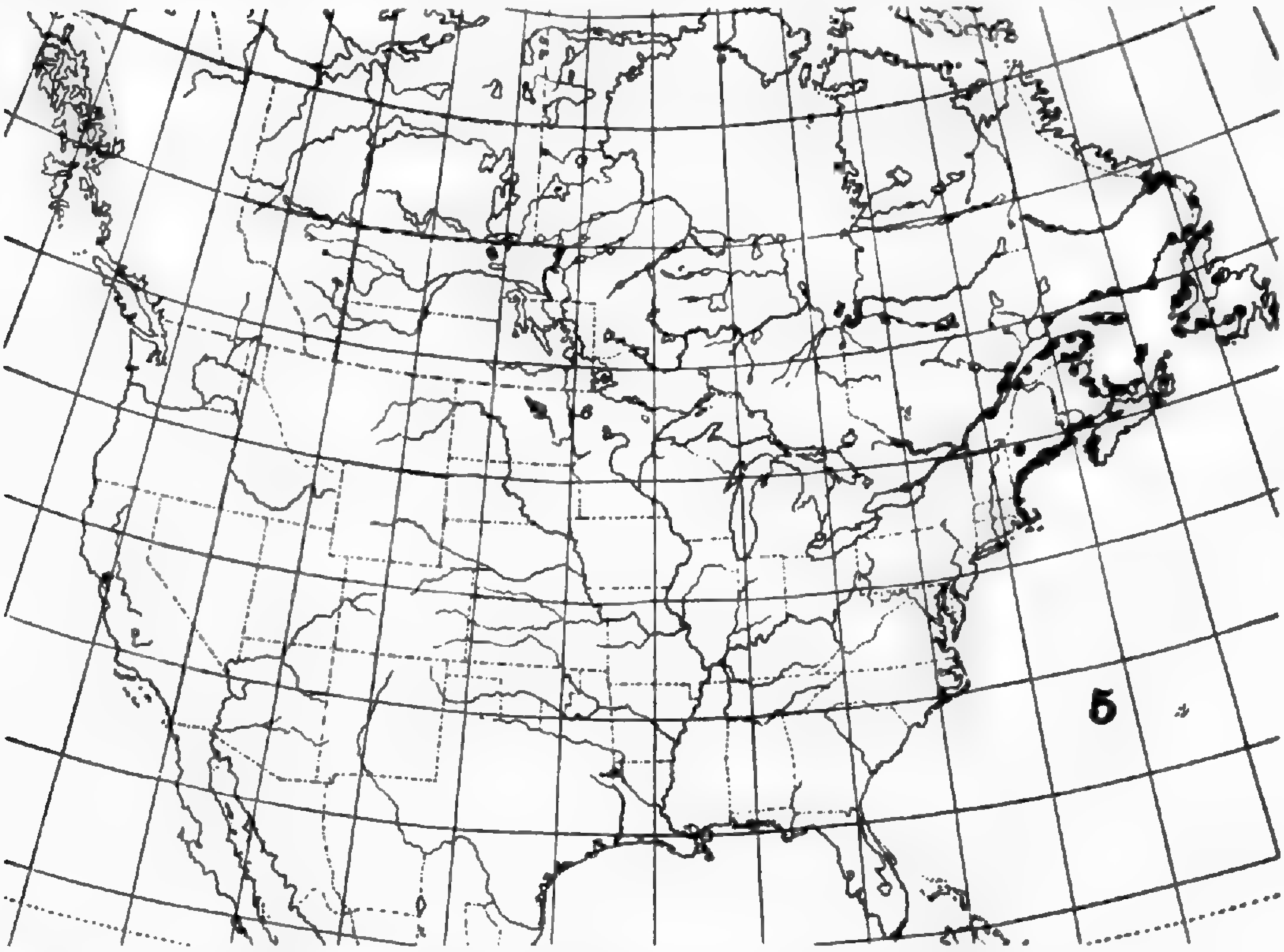


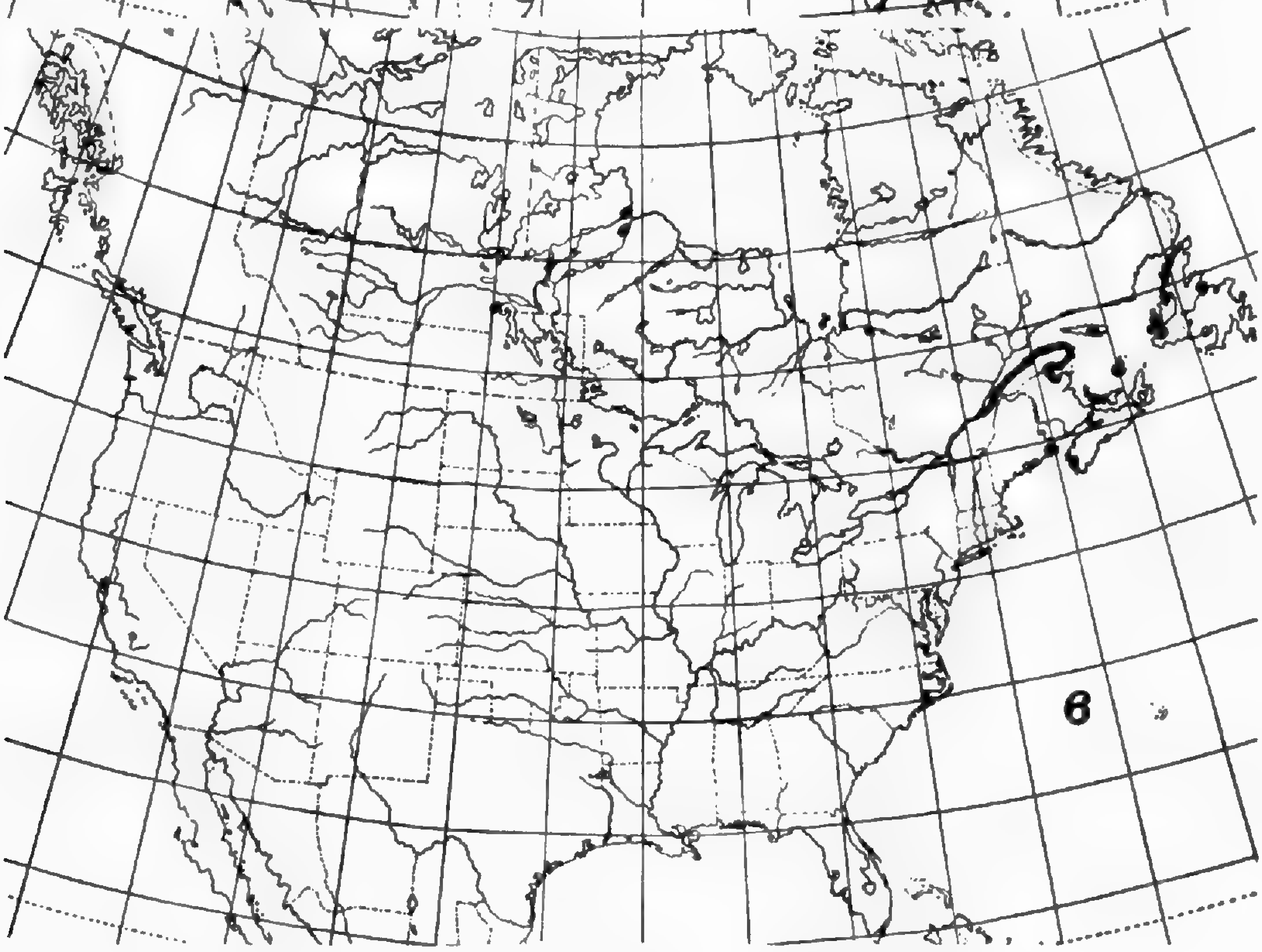
Map 1, Geographic Range of *Carex norvegica;*
2, of *Zannichellia palustris,* var. *major.*





Map 3, Geographic Range of *Poa eminens;*
4 (lower), of *Glaux maritima*, var. *obtusifolia.*





Map 5, Geographic Range of *Carex maritima;*
6, of *Scirpus rufus.*

halophytes listed above. In addition to their occurrence in the Hudson Bay region, it will be noted that in the cases of *Carex norvegica* (MAP 1) and *Zannichellia palustris* var. *major* (MAP 2) they are restricted to the Atlantic seaboard, extending at least from southern Labrador south along the New England coast, and in the case of *Zannichellia palustris* var. *major* south to Florida. *Poa eminens* (MAP 3) and *Glaux maritima* var. *obtusifolia* (MAP 4) have northeastern ranges somewhat similar to those mentioned above, but they appear also on the Pacific coast. The distribution of *Carex maritima* (MAP 5), *Scirpus rufus* (MAP 6) and *Juncus Gerardi* (MAP 7) varies from the strictly maritime, in that the two former species occur in the region just north and west of Lake Winnipeg, while the latter has been reported from the Finger Lakes district of New York and at the southern tip of Lake Michigan, as well as from the Pacific coast.

In the cases of *Plantago juncoides* var. *decipiens* (MAP 8) and *Carex glareosa* var. *amphigena* (MAP 9), both found farther north along the Labrador coast, they occur also on the southwestern coast of Greenland. *Zostera marina* (MAP 10) occurs from Labrador and the lower St. Lawrence south to North Carolina, in James Bay, along the north Pacific coast and on the southwestern coast of Greenland.

Bidens hyperborea (MAP 11), an estuarian species, has been studied by Fassett (29) and Fernald (31) and the data regarding its distribution are taken from their papers. It is interesting to note that this plant occurs exclusively on fresh tidal mud in estuaries from eastern Massachusetts to Quebec, then jumps to Rupert River, James Bay.

Macoun, J., Catalogue of Canadian Plants. Geol. and Nat. Hist. Surv. Can., 1883–1884, pts. 1–4.

Macoun, J., Comparison of Plant Distribution. Geol. Surv. Can., Rept. of Prog. 1875–1876.

Macoun, J. M., List of Plants in Low's Report of the Mistassini Expedition. Geol. and Nat. Hist. Surv. Can., Ann. Rept., 1885, pt. D.

Macoun, J. M., List of Plants in Low's Report on Exploration in James Bay and Country East of Hudson Bay. Geol. Surv. Can., Ann. Rept., iii. (1887) pt. J.

Macoun, J. M., List of Plants in Low's Report on Labrador. Geol. Surv. Can., Rept. of Prog. 1895, App. vi.

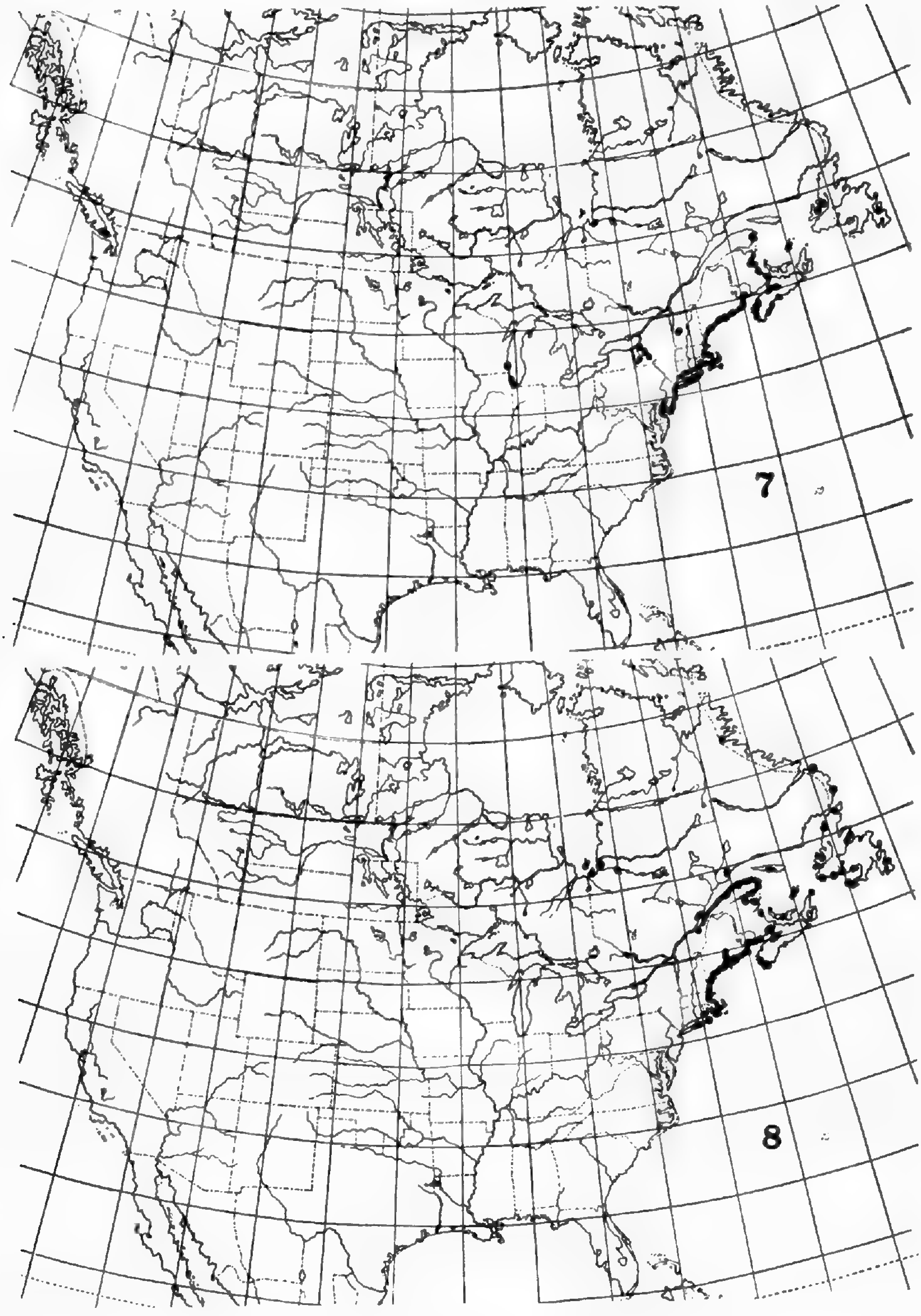
Richardson, Jas., Report on the Country North of Lake St. John. Geol. Surv. Can., Rept. of Prog., 1870–71, pp. 306–308.

St. John, H., A Botanical Exploration of the North Shore of the Gulf of St. Lawrence. Can. Dept. Mines, Mem. No. 126, 1922.

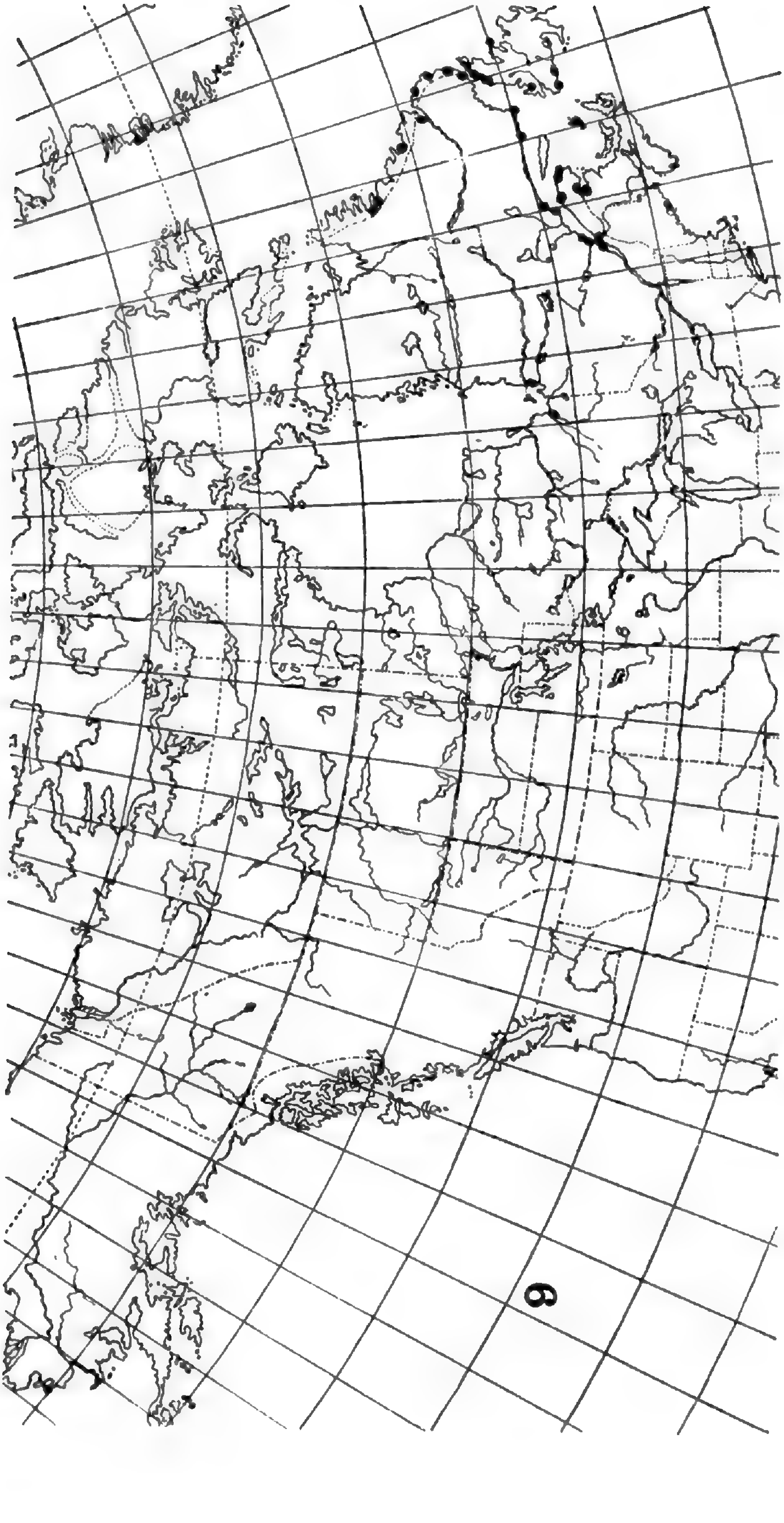
Svenson, H. K., Studies on Interior Distribution of Maritime Plants. I. Rhodora xxix. pp. 41–48; 57–72; 87–93; 105–116.

Tyrell, J. B., Plants Collected Between Lake Athabasca and the West Coast of Hudson Bay, north shore of Hudson Straits and Fort Churchill. Geol. Surv. Can., Ann. Rept. ix. (1896) p. 205 F.

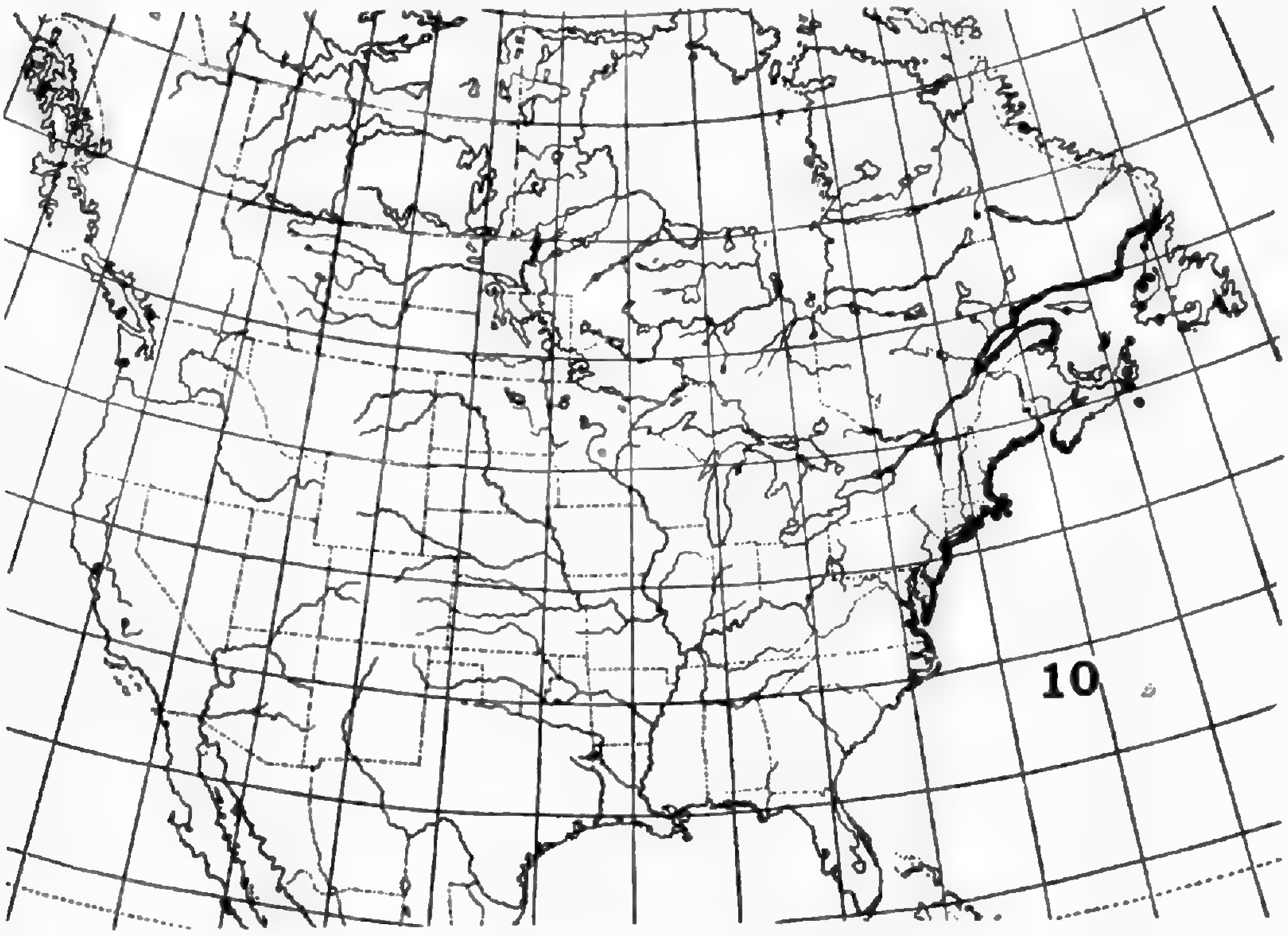
Upham, Warren, Geographic Limits of Species of Plants in the Basin of the Red River of the North. Proc. Boston Soc. Nat. Hist. xxv. (1890) pp. 140–172.

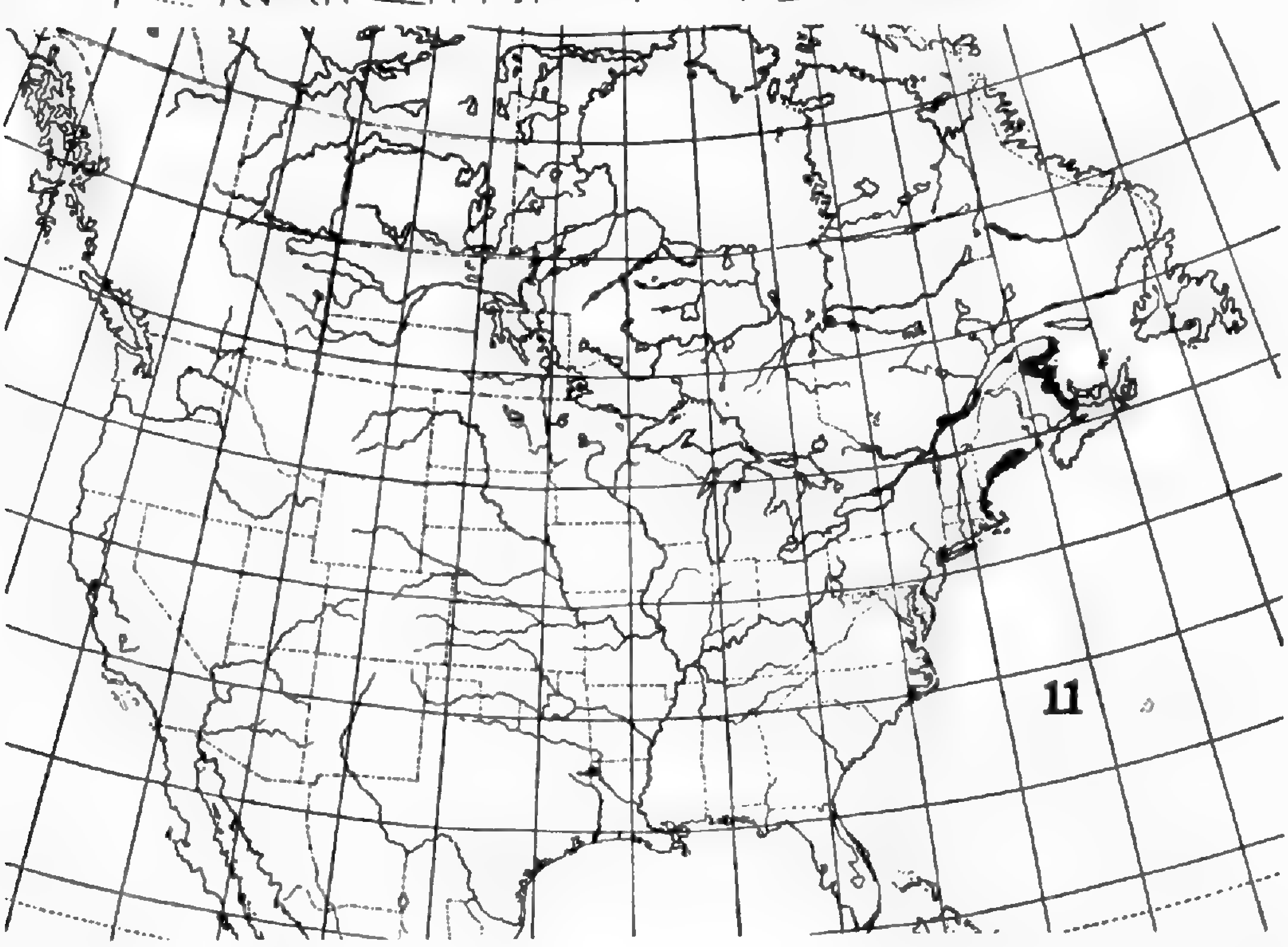


Map 7, Geographic Range of *Juncus Gerardi;*
8, of *Plantago juncoides*, var. *decipiens*.



Map 9, Geographic Range of *Carex glareosa*, var. *amphigena*.





Map 10, Geographic Range of *Zostera marina;*
11, of *Bidens hyperborea.*

In no case have these plants been reported as growing along the shores of Hudson Straits or along the northernmost Labrador coast. Four of them have been rarely found north of Hamilton Inlet; two reach their northern limits in Hamilton Inlet; and five are not known north of the Straits of Belle Isle.

Several expeditions[1] have recently gone to Labrador and, as each expedition has had among its members a trained botanist, whose work was to collect and study the flora at points touched, it is reasonable to assume that, since most of these plants have not been reported from far north on the coast, they do not usually occur north of the southern corner of Labrador (except as above stated); and their appearance along the shores of Hudson and James Bays has not been due to a migration along the outer coast of Labrador, thence by way of Hudson Straits to James Bay. Again, in no case have these plants been reported from the region between James Bay and the St. Lawrence River, the most inland point for any of them (*Bidens hyperborea*) along the St. Lawrence being northeast of Montreal. The absence of these plants from inland areas is to be expected, since they are strictly or primarily maritime, and it indicates that the edaphic conditions of the land lying between the St. Lawrence Basin and James Bay are at this time such as not to favor the presence of halophytic species. It is true, however, that much of the country lying north and northwest of the St. Lawrence River has not been carefully botanized and future exploration in this area may possibly reveal the existence of some of these species. If such should prove to be the case, the present problem would be more easily solved as will be later pointed out.

Possible Causes of this Discontinuous Distribution

The agencies which might have brought about this peculiar distribution are as follows:

[1] The reports from some of the recent expeditions referred to are as follows:

Fernald, M. L., A Botanical Expedition to Newfoundland and Southern Labrador. Rhodora, xiii. pp. 109–157 (1911).

Fernald, M. L. and Sornborger, J. D., Some Recent Additions to the Labrador Flora. Ottawa Naturalist, xiii. pp. 89–107 (1899).

Bishop, Harlow, List of Plants Collected on the Austin Labrador Expedition, 1928. Unpublished list at the Gray Herbarium.

Delabarre, E. B., Botanical Report of the Brown-Harvard Expedition to Nachvak, Labrador. Bull. Geog. Soc. Phila. iii. pp. 167–201 (1902).

Wetmore, R. H., Plants of the Hamilton Inlet and Lake Melville Region, Labrador, Rhodora, xxv. pp. 4–12 (1923).

Woodworth, R. H., List of Plants Collected on the Iselin Expedition to Northern Labrador, 1926. Unpublished list at the Gray Herbarium.

1. Driftless areas which may have harbored these plants during the Wisconsin glaciation.

2. Dispersal of these plants since the recession of the last ice sheet:

   a. by means of wind.

   b. by means of animals, other than birds.

   c. by means of birds.

   d. by means of water.

3. Migration of these plants along the shores of a marine connection between the St. Lawrence Basin and James Bay.

These agencies will now be considered in detail.

1. *Driftless Areas.* That driftless areas within the broad region invaded by Pleistocene ice occur is acknowledged by most geologists. The possibility of these areas harboring plants during the period of glaciation is unquestionable, for not only is an analagous condition now prevailing in the case of Greenland with its continental glacier, but, in addition, Fernald (30), in his remarkable studies upon the flora of Newfoundland and the Gaspé Peninsula, has definitely proved that in these regions such was the case. This fact is conceded by the great Canadian Pleistocene geologist, A. P. Coleman (19).

Many explorations have been made by geologists of the Canadian Government in the Northeastern part of Canada and the findings of such men as Bell, Low, Chalmers, Coleman, Tyrell and others largely agree concerning the glaciation of this area. Nowhere along the coasts or on the islands of either James Bay or southern Hudson Bay have areas been discovered which escaped the ruthless work of the Wisconsin ice sheet. The writer visited the region of James Bay during the summer of 1929 and found evidence of glaciation at every point touched: all along the rivers entering James Bay and along the southern and eastern coasts of the Bay itself. The same conditions were found on Charlton Island as also on a number of smaller islands which were explored. Mr. A. E. Porsild, one of the botanists for the Canadian Government, visited a number of the islands in James Bay, including Agamaski, the Twins and one large island off the coast at Fort George, and reported verbally to the writer that all these islands had been severely scoured by ice. In discussing Strutton and Trodely islands, Low (41) speaks of many large boulders strewn over the land.

Thus, the evidence is quite conclusive that driftless areas do not exist in the neighborhood of James Bay, and some other explanation must be sought to account for the presence of the southern halophytic plants on the shores of this great inland sea.

2 a. *Wind.* Wind plays an important role in the dissemination of plants and plant parts. Seeds, or even plants, are often caught up by winds and carried varying distances before they are dropped or before they strike some obstacle which impedes their progress. Warming (64) claims that relatively heavy fruits may be carried by wind up to distances of at least sixteen miles. Many plants have their seeds modified for dispersal by this means and in the case of the dandelion, Small (51) claims " . . . that so long as the relative humidity of the air remains above 0.77 and so long as the fruit does not encounter an obstacle, a horizontal wind of 1.97 m.p.h. is sufficient for its dispersal to any distance." It is quite conceivable that a seed having once been dropped can again be picked up by wind and this process be repeated over and over again until long distances have been traversed. Again it is possible that a seed falling upon favorable soil might germinate and in succeeding years its seeds be blown to a new region and this process continue until long distances be crossed. There are, however, many elements of chance in such a hazardous mode of transportation, and the mortality in terms of successful germination and maturity, would of necessity be tremendous. In the case of plants establishing intermediate stations between two points it is difficult to apply this method of migration to halophytes over areas not favorable to salt-loving plants.

Fernald (30), in his studies upon the flora of Newfoundland, has furnished us a most striking example in point. To quote Professor Fernald, speaking of the absence from southwestern Newfoundland of many wind-dispersed species of Cape Breton: " . . . the distance across Cabot Strait, the shortest route from the southwestern mainland to Newfoundland is fully 70 miles, and, although this does not seem a forbidding gap, the fact remains that very many common Canadian species with fine spores or with the seeds plumose, feathery or otherwise adapted for wind-transportation, have failed to cross from Cape Breton to southwestern Newfoundland." Svenson (56), in his studies upon the interior distribution of halophytes, reached the conclusion that wind was not a predominant factor in seed-dispersal. Thus, the influence of wind as a primary factor in seed-dissemination (especially in the case of halophytes) over long distances has, perhaps, been overestimated and a more plausible cause for the occurrence of these plants in the Hudson Bay region must be sought.

2b. *Animals (exclusive of birds).* Animals other than birds are responsible for local dissemination of plants and plant-parts. Those animals with which we need to concern ourselves are restricted to the mammals, for probably fish, amphibia, and reptiles play a very minor part in carrying seeds or plant-parts over such distances as are concerned in the present problem. Many plants have their seeds or fruits so modified as to allow them to cling to the fur of mammals and thus be carried along. In the species of plants under consideration no such modifications are present and the possibility of the seeds of such plants as *Glaux maritima* var. *obtusifolia* and *Zannichellia palustris* var. *major* being transported in this manner is very slight. Human travel has not been great between these two regions and we can scarcely look to this source as the means of introduction. Had these plants any food value or other economic significance, human migrations would of necessity have to be investigated.

2c. *Birds.* With birds, as with wind, there is no question but that they effect seed-dispersal locally. Concerning the distribution of plants or plant parts over long distances by birds, the question is highly debatable. Warming (63) sums up this matter in referring to Knud Anderson's work, supplemented by the conclusions of Winge, as follows: "For a number of consecutive years, thousands of birds, picked up dead at the Danish lighthouses have been sent to the Zoological Museum at Copenhagen, and notes on these dead birds have for many years been published annually by H. Winge. . . . This eminent zoologist writes to me," continues Warming, "as follows: 'In one of the first years, the contents of the stomachs were systematically examined, later on only occasionally, but the stomach has always proved to be empty. . . . Though I have had thousands of dead migratory birds between my hands and have made a habit of examining every single one, I have not as yet found any seeds adhering to the feathers, beaks, or feet.' "

Commenting upon the above observations, Warming continues: "As the above observations are made by so careful and eminent an investigator, I must consequently believe that birds at least very seldom carry seeds and other larger reproductive organs, and small plants, across great distances, and the indisputable evidences of birds carrying seeds either in them or adhering to them mentioned in books evidently apply to birds shot at or not far from, their daily haunts, and not to such as have just made a long journey." This conclusion seems to be wholly sound and again forces us to seek a better explanation.

2d. *Water.* If the plants in question spread from the Gulf of St. Lawrence after the land to the north and northwest became freed from its burden of ice, only two now existing avenues of water were open for dispersal of seeds; namely, either the marine water along the coast of Labrador and thence through Hudson Straits, or the fresh water ponds and streams lying to the northwest of the St. Lawrence. As to the route via the North Atlantic and Hudson Straits, it seems wholly improbable that the dispersal took place by this route, for Guppy (34) has shown that only a few seeds have sufficient buoyancy to keep afloat in ocean-drift for more than a few days and that in the cooler regions of the globe, seed-drift is usually very scanty. Had seeds been carried short distances along the coast by this agency and in favorable spots established themselves, and had their progeny been transported in the same manner a short distance farther north, there establishing themselves and so on until the goal had been reached, it would be expected that more traces of the parent stock would be found along the outer coast of Labrador. As has been pointed out, no trace of some of these plants has ever been found north of the Straits of Belle Isle, while others are unknown north of Hamilton Inlet; and the few northern stations of the remaining species are exceeding localized.

Separating the St. Lawrence Basin and James Bay there is a divide which results in a double drainage system for this interior region. A large portion of this area drains to the south into the St. Lawrence River, while the remainder is drained to the north. After the recession of the Wisconsin ice-sheet, all the territory in northeastern America stood at a much lower level than at present; yet it is possible that the divide existed in approximately the same relative proportions as at present, and if so, it is difficult to understand how water flowing south could be of assistance in the dispersal of seeds towards the north. If this intermediate water was fresh, migration for any great distance along its shores for strictly halophytic plants would be improbable. On the other hand, if the divide separating these two regions was much lower in proportion to the two adjacent areas, our problem would be simplified, for, as is soon to be pointed out, such a low basin would allow a marine connection between the two areas and thus permit migration of the plants in question along the shores of this inland sea.

Since the factors of driftless areas, dispersal by means of wind, animals, and water do not solve the present problem of seed dispersal, it is necessary to consider one more agency which, if proved to have existed, will help us out of the present dilemma. This last is the possibility of migration along the shores of a marine connection between the St. Lawrence Basin and James Bay.

The Champlain Submergence

After the recession of the last ice sheet, as just noted, the northeastern portion of the North American Continent lay at a much lower level than is the case at present. In support of this statement Taylor (61) says that: " . . . nothing within the realm of Pleistocene geology is more clearly established than the depression of land during the growth of the Wisconsin ice sheet in the region of the Great Lakes. . . . " This lowering of the Continental land mass resulted in the drowning of the St. Lawrence and Ottawa valleys. Chalmers, Dyer, Kindle, Bell, Low, Keele, Coleman, Taylor, Dowling, Tyrell and others all agree that such a submergence took place. Additional evidence of a marine invasion is supplied by the presence in these formerly submerged areas of large deposits of marine clays, many of which bear numerous fossils, such as: *Mya arenaria* Linn., *Mya truncata* Linn., *Saxicava arctica* Linn., *Macoma calcarea* Gmel., *Macoma balthica* Linn., var. *groenlandica* Beck., *Mytilus edulis* Linn., *Serripes groenlandicus* Gmel., *Leda pernula* Müll.

Many localities have been reported for these marine shells and the following Table 1 gives a selected list, including only those which show the highest elevation. The localities listed in Table 1 have been plotted on the accompanying map and are indicated by solid black circles, together with the elevation in feet above sea level. These points have been connected and the enclosed area filled in by vertical lines. Thus, a clearer conception may be gained of the extent of this so-called Champlain Submergence as based upon the actual finding of marine fossils.

An interesting point to note in this connection is that these fossils are not evenly distributed throughout the known region of submergence. Many areas occur at much lower altitudes than those given in the above list, which are barren as concerns fossil shells. Chalmers (14) has pointed out that no marine shells have been found

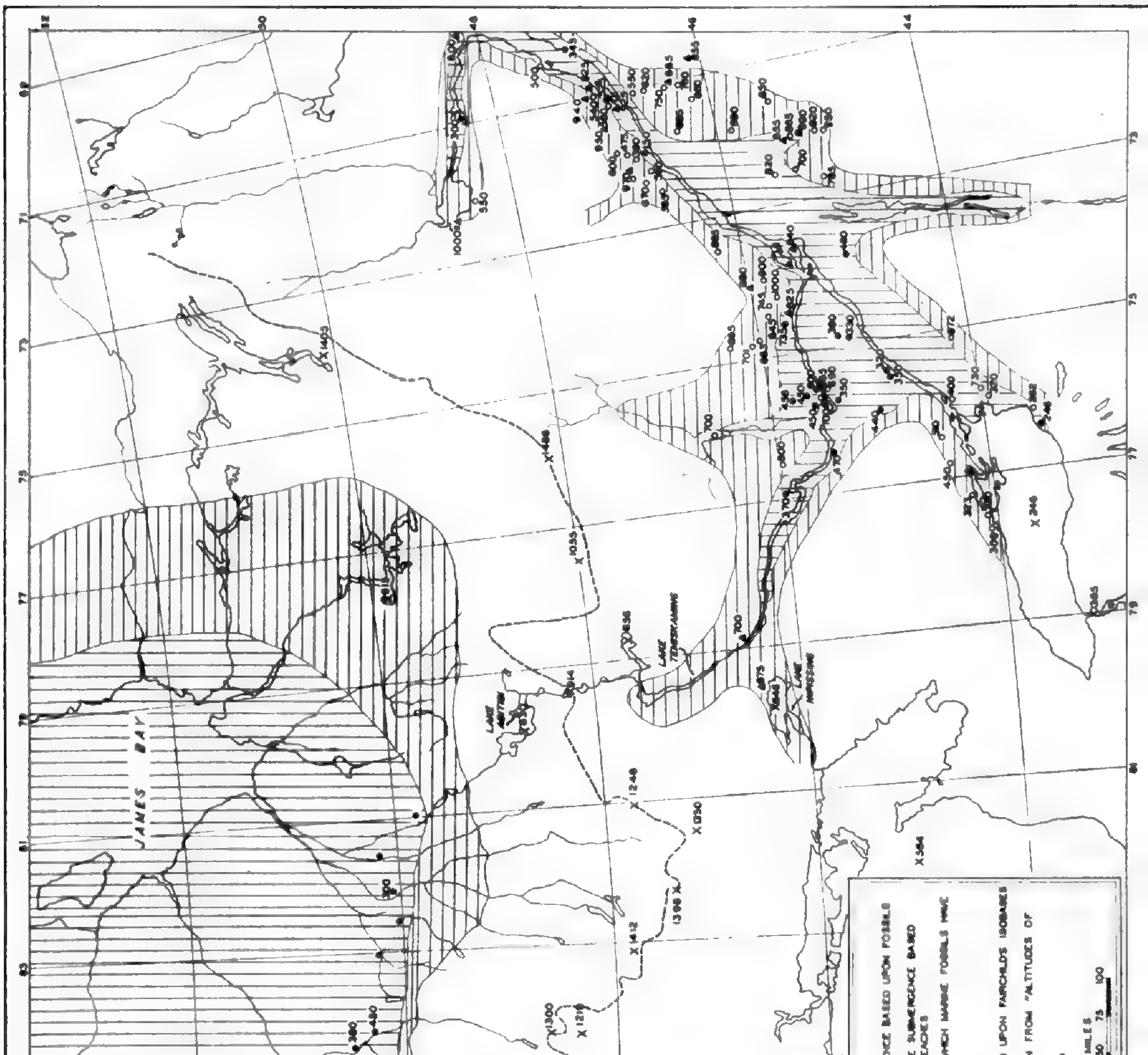

JAMES BAY
LAKE TEMISKAMING
LAKE ABITIBI
LAKE NIPISSING
MARINE SUBMERGENCE BASED UPON FOSSILS
PROBABLE MARINE SUBMERGENCE BASED UPON RAISED BEACHES
LOCATIONS AT WHICH MARINE FOSSILS HAVE BEEN FOUND
RAISED BEACHES
ALTITUDES BASED UPON FAIRCHILD'S ISOBASES
ALTITUDES TAKEN FROM "ALTITUDES OF CANADA"
HEIGHT OF LAND
SCALE OF MILES

Table 1

MARINE DEPOSITS

Location	Approx. Latitude	Approx. Longitude	Height in feet above sea level		Authority
North Gower	45° 10′	75° 45′		marine shells	Reinecke (48)
Prescott	44° 40′	75° 30′	320–350	marine shells	Coleman(20)
Welch's Siding	45° 0′	76° 0′	440	whale remains	Taylor (57)
Oswego	43° 30′	76° 30′	246	very probable	Taylor (57)
Covey Hill	45° 0′	73° 45′	460	very probable	Fairchild (28)
Chelsea	45° 30′	75° 40′	450	marine shells	Ells (23, 24)
Cantley	45° 30′	75° 40′	450	marine shells	Ells (24)
McGregor Lake	45° 30′	75° 40′	450	marine shells	Ells (24)
					Low (40)
Arnprior	45° 30′	76° 50′	470	marine shells	Ells (24)
Glengary County, Ont.			350	marine shells	Chalmers (17)
Calumet Island, Que.			200–500	marine shells	Chalmers (17)
Lake St. John			200–300	marine shells	Richardson (49)
Grenville Dist.	45° 30′	74° 30′	735	marine shells	Ells (23)
Buckingham Map Area	45° 30′	75° 30′	600	marine shells	Wilson (68)
Neapean township (6 miles up Rideau River from Ottawa	45° 30′	75° 45′	350	marine shells	Coleman (20)
Brockville	44° 45′	75° 30′		marine shells	Chalmers (17)
4 miles above Ha Ha Bay on River Onabonchbagame	48° 20′	71° 0′	300	marine shells	Richardson (49)
Portneuf	46° 45′	71° 50′	150	marine shells	Richardson (50)
Rivière du Loup	47° 15′	70° 15′	345	marine shells	Chalmers (15)
St. Amboise	47° 0′	71° 0′	515	marine shells	Low (42)
Beauport	47° 0′	71° 30′	265	marine shells	Low (42)
Little Magog	45° 15′	72° 0′	690	marine shells	Chalmers (14)

in the beds representing Leda clays and Saxicava sands of New Brunswick. He goes on to say that only a few localities on the west coast of Prince Edward Island have Pleistocene marine fossils: " . . . though a large area now forming dry land must have been under the sea, which was doubtless then, as at present, inhabited by marine animals."

Again Ells (24), in speaking of the lower Ottawa and St. Lawrence valleys, says: " . . . throughout the district there are great expanses of marine clays which show no trace of organisms, while very often the overlying sands and gravels hold great quantities of marine fossils." Thus it may be safely concluded that the absence of marine fossils does not necessarily mean the absence of marine waters.

The extent of this post-pleistocene marine submergence has never been definitely shown and at present there is much disagreement among geologists concerning the matter. The presence of marine fossils is reliable evidence as to depth of submergence, but, in addition to this, many raised beaches have been discovered and described. Whether these are of marine or lacustrine origin is still a moot question.

Table 2 gives a list of some of these raised beaches together with their approximate location and their altitudes.

TABLE 2

RAISED BEACHES—PROBABLY MARINE

Location	Approx. Latitude	Approx. Longitude	Height in feet above sea level	Authority
Texas	43° 40′	75° 15′	262	Fairchild (28)
Henderson	43° 50′	76° 10′	320	Fairchild (28)
Clayton	44° 15′	76° 0′	400	Fairchild (28)
Yarker	44° 25′	76° 50′	450	Mather (44)
Inverary	44° 25′	76° 0′	510	Mather (44)
St. Remi	46° 0′	74° 45′	701	Wilson (66)
Rockaway	46° 0′	74° 45′	663	Wilson (66)
Ottawa	45° 30′	75° 40′	690	Mather (44)
Belleville	44° 10′	77° 25′	323	Taylor (57)
Brighton	44° 0′	77° 45′	309	Taylor (57)
Trenton	44° 10′	77° 30′	320	Taylor (57)
Baie St. Paul	47° 30′	70° 30′	500	Mandsley (43)
Sweetsburg	45° 10′	73° 40′	610–700	Chalmers (13)
Frelighsburg	45° 0′	72° 50′	475–785	Chalmers (13)
Shefford Mt.	45° 25′	72° 30′	820	Chalmers (13)
St. Charles	46° 50′	71° 0′	540–550	Chalmers (12)
St. Anselm	46° 40′	71° 0′	620	Chalmers (12)
St. Henedine	46° 30′	71° 0′	750	Chalmers (12, 16)
St. Marie	46° 25′	71° 0′	760	Chalmers (12)
St. Joseph Lake	46° 10′	71° 30′	860	Chalmers (12)
St. Jule Sta.	46° 20′	71° 40′	895	Chalmers (12)
Dudswell	45° 30′	71° 30′	850	Chalmers (12)
Lake Memphremagog	45° 20′	72° 0′	865–990	Chalmers (12, 14)
La Chute	45° 40′	74° 20′	1000	Ells (24)
Lewiston, N. Y.	43° 10′	79° 0′	385	Spencer (53)
Watertown, N. Y.	44° 0′	75° 50′	730	Spencer (53)
Fine, N. Y.	44° 15′	75° 10′	972	Spencer (53)
Malone, N. Y.	44° 50′	74° 15′	1100–1200	Chalmers (11)
St. Anne de Beaupré	47° 0′	71° 0′	540	Chalmers (11)
North of Quebec	46° 50′	71° 10′	560	Chalmers (11)
Lake Maskinong	46° 20′	73° 30′	560	Chalmers (11)
St. Jerome	45° 45′	74° 0′	900	Chalmers (11)
Kingsmere Mt. (North of Ottawa)	45° 30′	75° 45′	965	Chalmers (11)
North side of Ottawa River just above Allumette Is.	46° 50′	76° 50′	800	Chalmers (11)
Brulé Rapid	46° 30′	76° 0′	700	Keele (38)
Georgeville	45° 10′	72° 0′	920	Spencer (53)
Magoon Point	45° 0′	72° 0′	950	Spencer (53)
Danville	45° 50′	72° 0′	890	Chalmers (16)

It will be noted from the list in TABLE 2 that these raised beaches range from a few feet above sea level to 1200 feet. Their localities are indicated on the accompanying map by hollow circles, with their altitudes. These points have been connected and the area included filled in by horizontal lines.

Marine fossils have not been found in the Champlain, St. Lawrence, and Ottawa regions above an altitude of approximately 735 feet.

This fact has led some geologists to search for some theory other than marine invasion to account for the non-fossiliferous raised beaches. The theory of Glacial Dams has received considerable support. In discussing the Iroquois beach as having been formed by an arm of the sea, Coleman (20) states, "This conclusion is a very natural one and tends toward simplicity by avoiding the assumption of an ice dam; but the finding of fresh water shells in the Iroquois beach near Toronto seems conclusive as to the character of the water, which could hardly remain fresh or even brackish with an opening seventy or eighty miles wide and four hundred feet deep into the inland sea formed by the enlarged Gulf of St. Lawrence." Spencer (54) is opposed to this view and he states: "As we ascend to the elevation of the higher beaches, the question of glacial dams becomes more and more difficult, for we must assume them to have been hundreds of miles long and at enormous altitudes, damming up waters which had the proportions of inland seas." He then goes on to say, "I am compelled to assume the initial plane of the Algonquin beach to be at sea level." Later in the same paper Spencer says, " . . . there is additional evidence; for crustaceans of marine species have so adapted themselves as to still live in the depths of Lake Superior (55, 52), as also maritime plants along its shores." (36)

Conceding the existence of the glacial dams, which would account for the higher beaches to the north of the Great Lakes, they would not account for the occurrence of the raised beaches found along the valley of the St. Lawrence River. As Chalmers (13) has stated, "All the shore-lines noted face the open plain of the St. Lawrence valley . . . . No barriers exist or could have existed, capable of holding in a body of fresh water at heights sufficient to allow the formation of these shore-lines; and the only reasonable theory as to their origin seems to be that they were formed along the margin of a sea which occupied the St. Lawrence valley in the Pleistocene period." Dr. Ells (24) agrees with Chalmers, for he says "The underlying clays at the higher levels up to nearly one thousand feet, and in places to a height of considerably more than this, are apparently continuous with those of undoubted marine origin to the north and east, and the inference naturally follows that all the deposits were laid down by the same agencies. The absence of marine organisms over a large part of the area is only negative evidence to the contrary, and there are certain facts that go far to establish this theory of their marine deposition." In the same article, Dr. Ells continues: "There is no break apparent in the deposition of these beds, from the nodule-bearing clays near Ottawa to the most northerly outcrops on the Gatineau and the Lièvre where the clays are, in so far as yet known, all barren."

The question might well be asked as to the relative ages of the different beaches under discussion, and so far as known they seem to be all of post-glacial origin. Taylor (58) has summed up this matter as follows: "I express again, and with increased confidence, the belief that the Iroquois beach and the highest beaches in the lower St. Lawrence, Champlain, Huron, and Ottawa valleys, and in the basins of Lakes Huron, Michigan, and Superior, and also in the valley of the Red river of the North, are all one continuous shore line of the sea."

If these conclusions of Spencer, Ells and Taylor be correct, it would follow that this marine invasion just after the recession of the last ice-sheet was much greater in extent than is indicated by the altitudes at which marine fossils have been found. The same factors which are responsible for the lack of marine fossils in areas unquestionably once covered by the sea, as was pointed out earlier in this paper, may account for the lack of fossils in these raised beaches. Chalmers (14) has suggested "That the arenaceous clays and the sand which together constitute the stratified deposits lying below the uppermost shore line of the Pleistocene submergence, contain minerals destructive to shells and tests of marine animals."

Finally, in James Bay today no living marine mollusks are to be found, except perhaps in the northern part, owing probably to the muddy and brackish nature of the water (9). A similar condition might well have existed during the Champlain Submergence in which the waters were muddy and brackish, not permitting the existence of marine life, yet allowing the existence of plants of maritime habitats along its shores.

If, then, these raised beaches owe their origin to marine water (and there seems to be considerable evidence in support of this hypothesis) the invasion by the sea would have reached the Lake Temiskaming region, involving also Lakes Ontario and Nipissing. Reference to the accompanying large map will show the area involved, which is indicated by horizontal lines.

(*To be continued*)

NOTES ON THE OCCURRENCE OF ZOSTERA AND ZANNICHELLIA IN ARCTIC NORTH AMERICA

A. E. Porsild

The geographical distribution of *Zostera marina* L. throughout its known range has recently been given by Ostenfeld[1] and in his exhaustive study of the genus Setchell[2] has added greatly to our morphological and phenological knowledge of this interesting plant.

Hultén[3] has already pointed out that to the distribution given by Ostenfeld, l. c., must be added several stations in the northern part of the Bering Sea, since on the Asiatic side the plant was reported by Mertens[4] from Koraginsk Island while on the American side *Zostera* was reported from Port Clarence by Kjellman.[5] Ostenfeld, l. c., perhaps refers to the latter record when he observes: "Eine Angabe aus Port Clarence bedarf der Bestätigung,"[6] although in the distribution given 25 years before by the same author[7] he cites specimens collected at Port Clarence as having been verified by himself.

Observations made by my brother, Mr. R. T. Porsild, and myself, in 1926, show that *Zostera* occurs in a number of places on the west coast of Alaska from St. Michaels to Golofnin Bay in Norton Sound (*R. T. and A. E. Porsild*, field nos. 1171 and 1410 in the National Herbarium of Canada, Ottawa), and also that, as stated by Kjellman, l. c., it occurs "sparingly and sterile at the head of Port Clarence Bay."

At Golofnin Bay, Alaska, the plant formed extensive colonies in 10–12 feet of water at low tide. At the time of our visit (Aug. 1st) no flowering specimens were observed. The temperature of the surface water, about one quarter of a mile from the shore, was 15.3° C. and, as I was informed that the water in the bay remains sufficiently warm for comfortable bathing throughout the month of August,

[1] Ostenfeld, Meeresgräser, Die Pflanzenareale, 1 Reihe, Heft 3 and 4, Karte 38–39 1927.

[2] Setchell, Morphological and Phenological Notes on *Zostera marina* L., Univ. of Cal. Publ. in Botany, Vol. XIV. No. 19, pp. 389–452, 1929.

[3] Hultén, Flora of Kamtchatka, Vol. 3, Kungl. Svenska Vet. Akad. Handl. Ser. 3, Vol. VIII. No. 1, p. 74, 1927.

[4] Mertens, Bemerk. ü. d. Flora d. Koragins Insl., Linnaea V., pp. 60–71, 1830.

[5] Fanerogamer fran Vest-Eskimåernas Land, Vega Exp. Vetensk. Iagttagelser, Vol. II. p. 53, 1883.

[6] Ostenfeld, ibid. p. 49.

[7] Ostenfeld, Flora Arctica I, p. 19, 1902.

it may perhaps be assumed that flowering and fructification takes place.[1]

Our specimens from Port Clarence were taken on Aug. 23 and were sterile. No temperature of the water was taken at this place but, on the open coast of Seward Peninsula, near Nome, two weeks earlier the surface temperature near the shore was found to be 15° C. Due to warm currents from the Pacific the sea off the Alaskan side of Bering Strait is much warmer than off the Siberian side. When crossing from Cape Prince of Wales to the Diomede Islands during the latter part of August, the writer, halfway between the Cape and the islands, over a distance of a few miles, observed a drop in the temperature of the surface water from 15.3° to 8.3° C.

In Hudson Bay, 1929, the writer found *Zostera* occurring abundantly in James Bay (*A. E. P.* field No. 4512), where its occurrence had already been suspected by M. A. Howe,[2] since fragments of *Zostera* leaves, associated with marine algae, had been collected at Charlton Island in the southern part of James Bay. Again in 1930 an isolated colony of *Zostera* was unexpectedly found by the writer at Cape Eskimo on the west coast of Hudson Bay in about latitude 61° (*A. E. P.* field no. 5607).

Further investigation will probably show that *Zostera* occurs extensively in sheltered places in the southern part of Hudson Bay.

James Bay is very shallow and a number of rivers which empty into the bay probably affect the temperature of its water considerably. The well protected strait between Akimiski Island and the west side of the bay is very shallow, especially towards the north end, and no drift ice probably ever passes through here. *Zostera* occurred here in extensive beds along the west coast of Akimiski in water 4–8 feet deep at lowest tide. The place was visited from June 27–29, shortly after the ice had disappeared.

The occurrence of *Zostera* at Cape Eskimo, so far north of its previous known range, is most surprising. No rivers empty into Hudson Bay near Cape Eskimo. The plants were found in the sheltered bay or harbour below the Hudson Bay Co. Post. The harbour is well protected from drift ice by several shoals and bars which almost block the entrance at low tide. The plants formed extensive mats parallel to the shore in from 8–12 feet of water at lowest tide. At the

[1] Compare Setchell l. c. 426.

[2] Rep. Can. Arctic Exp. 1913–18, Vol. IV. part Bot. pp. 18–30.

time of my visit the plants were from 1 to 3 feet high, showing abundant vegetative growth but no sign of approaching anthesis (July 12).

The fact that the occurrence of *Zostera* at all the above mentioned places was confined to deeper water than is normally its habit in southern waters may perhaps be attributed to the destructive action of the ice on and near the shore,[1] and may very likely account for the fact that the plant has remained undetected in Hudson Bay so long.

According to Setchell[2] "The vegetative and reproductive activities of *Zostera* are confined to a rise in water temperature from 10° C. to 20° C. The vegetative chiefly carried on in the lower half (rise from 10° C. to 15° C.) and the reproductive carried on solely in the upper half of the interval (15° C. to 20° C.)." Further, that "In the downward march of water temperature the interval below 10° C. whether long or short is a period of quiescence or cold rigor. The upward march from the lowest temperatures experienced to 10° C. is similarly characterized by cold rigor."

Our present knowledge of water temperatures in Hudson Bay is still fragmentary but we know that no warm currents are known to enter into the bay and that drift ice is known to occur in the bay in varying quantities throughout the year, except perhaps in the southern part of the bay during August and September.

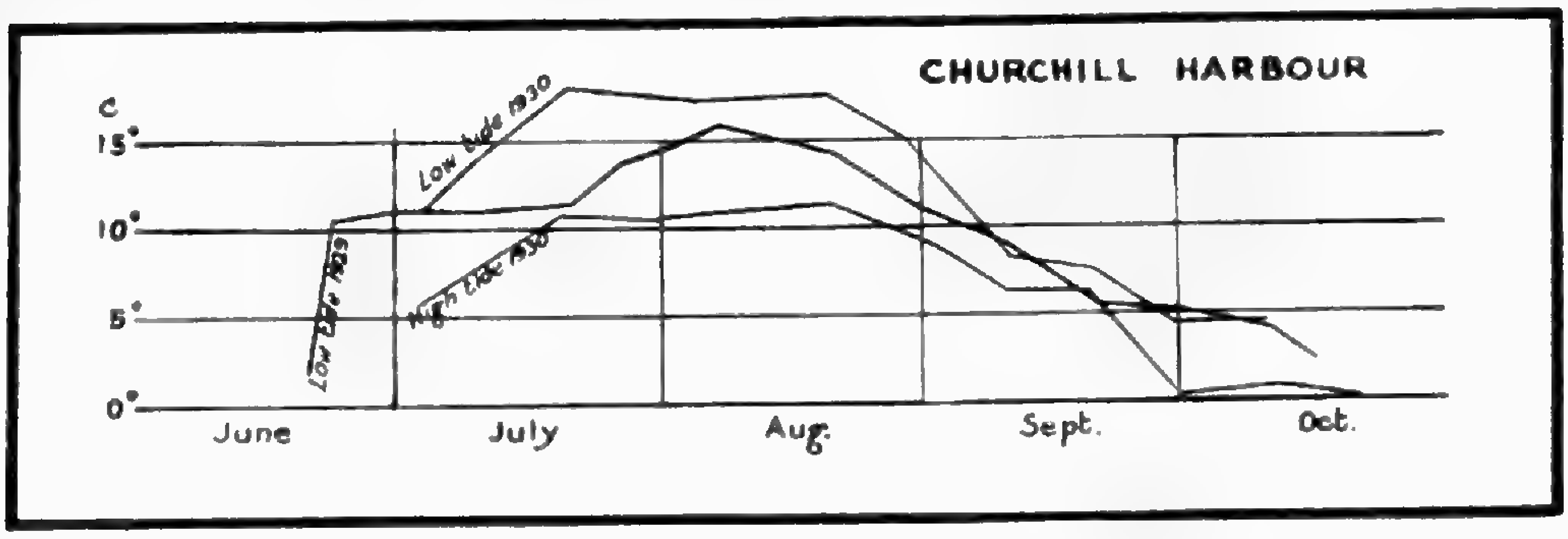
Water temperatures in Hudson Bay recorded by ships enroute to Churchill show surface temperatures ranging from 0° to 3°–4° C. during the season of navigation.

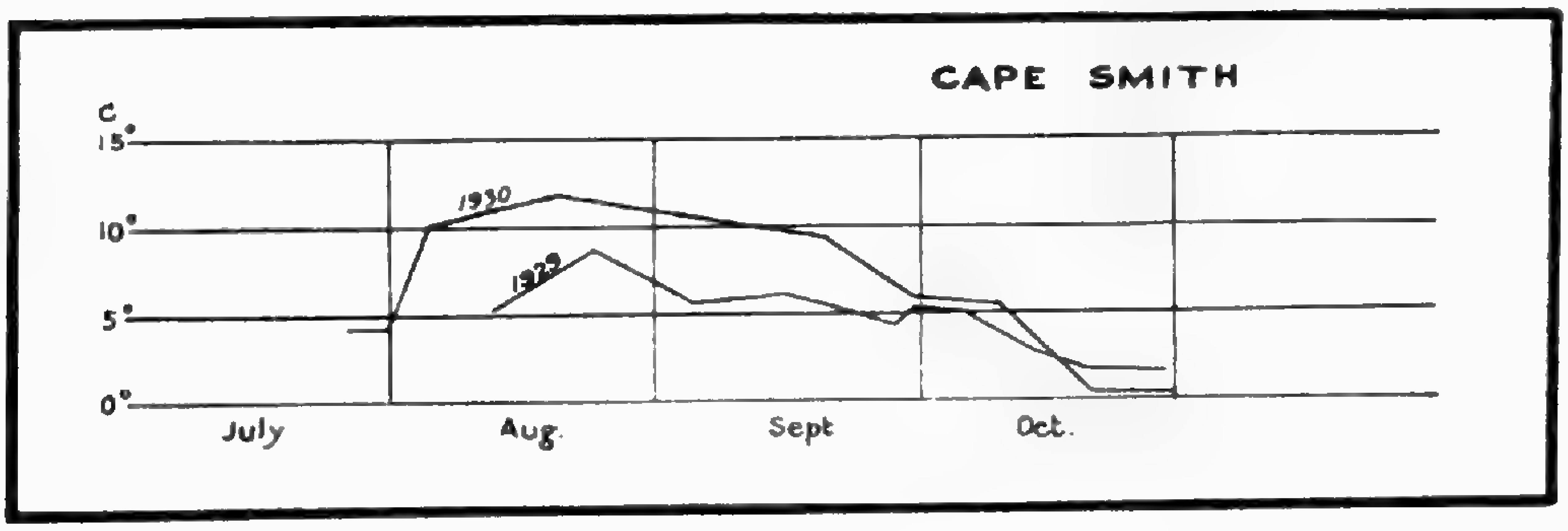
Due to the shallowness of the coastal shelf, especially on the west coast of the bay, the coastal waters are no doubt to some extent affected by insolation at low tide.

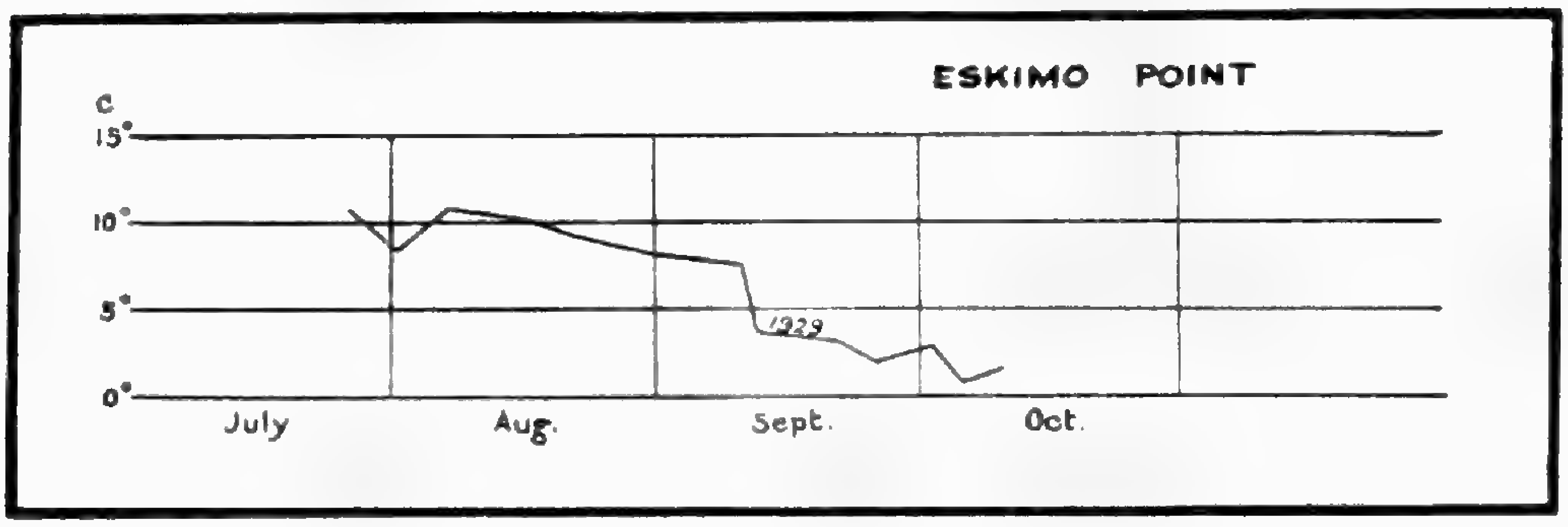
The following diagrams represent maximum temperatures during July, August and September from four places in the southern part of the bay, *i. e.* Churchill Harbour and from Cape Eskimo on the west coast of the Bay, from Charlton Island in the southern part of James Bay and from Cape Smith on the east coast of the Bay, and have been compiled from data supplied by the courtesy of the Department of Railways and Canals, Ottawa, Ont.

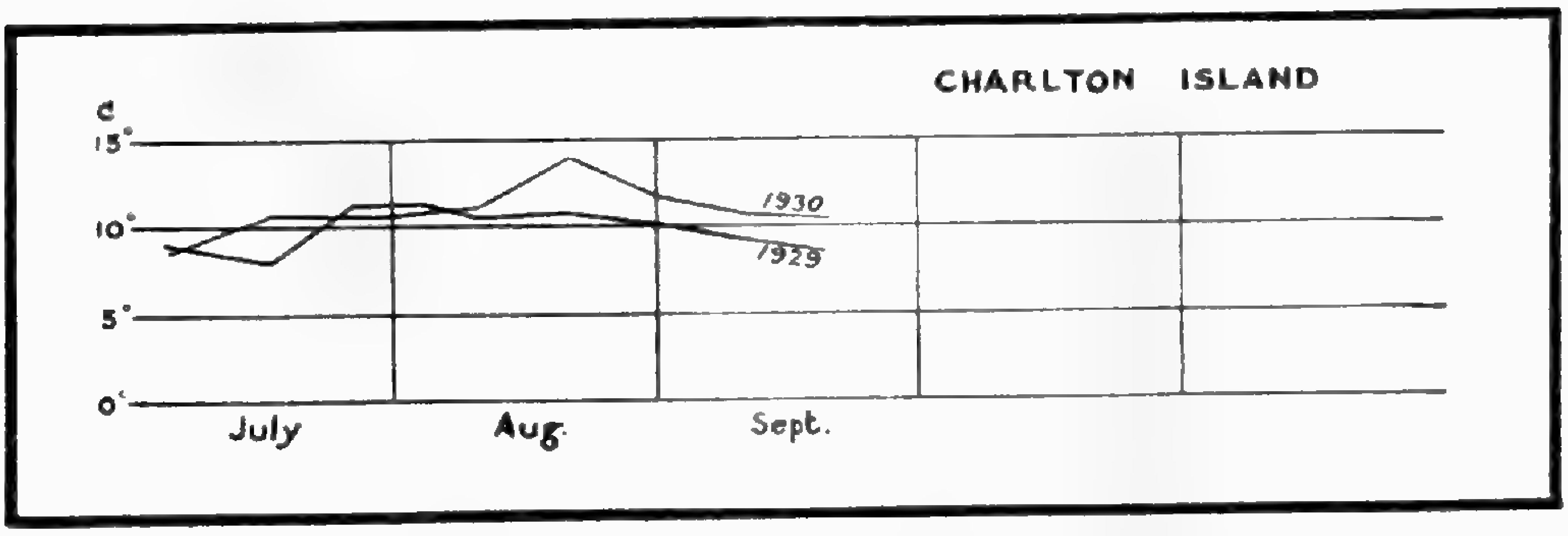
At Cape Smith, Charlton Island and at Cape Eskimo the readings were taken below the low water mark, about 10 inches below the

[1] See also H. F. Lewis, Can. Field Naturalist, Vol. XLV. No. 3, p. 61, 1931.
[2] Setchell ibid p. 448.


CHURCHILL HARBOUR
C
15°
10°
5°
0°
Low tide 1930
Low tide 1929
High tide 1930
June
July
Aug.
Sept.
Oct.


CAPE SMITH
C
15°
10°
5°
0°
1930
1929
July
Aug.
Sept
Oct.


ESKIMO POINT
C
15°
10°
5°
0°
1929
July
Aug.
Sept.
Oct.


CHARLTON ISLAND
C
15°
10°
5°
0°
1930
1929
July
Aug.
Sept.

surface, and show that maximum temperatures of the water practically remain below 10° C. throughout the season.

At Churchill temperatures above 15° C. were recorded in the harbour but, although the temperature was taken both at low and high water, it is virtually that of Churchill River.

As *Zostera* in every case was found some distance from the shore, in from 6 to 12 feet of water at lowest tide, we may safely assume that still lower temperatures prevail where the plant is growing and consequently that at least vegetative growth must take place at temperatures below 10° C.

Unfortunately, the writer was unable to revisit any of the localities later in the season in order to ascertain if reproduction occurred, but it is hoped that information regarding this question may be secured at an early date.

The occurrence of *Zostera* in Hudson Bay is rather unexpected and not easily accounted for. No currents enter the Bay except from the Arctic Ocean and from Baffin Strait and this means as a dispersing agent may perhaps be disregarded. It may be considered a relic from a milder, postglacial period, or as having been introduced by migrating water birds.

Zannichellia palustris L. to my knowledge has not previously been recorded from the Arctic.

In the National Herbarium of Canada, Ottawa, is found one sheet, no. 62,667, collected by *W. Spreadborough,* on the west coast of James Bay, Cape Henrietta Maria. The specimens were gathered August 14, 1904, and show an abundance of mature carpels.

We found *Zannichellia* but once, on the north coast of Seward Peninsula, Alaska, in the delta of Buckland River, in latitude 66° 20′, Our specimens likewise were in fruit, on September 7–10, 1926 (*R. T. and A. E. Porsild,* field no. 1499).

Hultén[1] records this plant from several places in Kamtchatka where it occurred in hot springs only, with water temperatures ranging from 25° C. to 30° C.

The above records from Alaska and James Bay are both so far north of the previously known range of this plant, which is otherwise circumpolar in its distribution, that it may perhaps be expected to occur in a number of other places north of its present known range.

Ottawa, Ontario.

[1] Hultén ibid. p. 81.

NOTES FROM THE HERBARIUM OF THE UNIVERSITY OF WISCONSIN—VIII

Norman C. Fassett

Eragrostis Frankii Steud., var. **brevipes**, n. var., spiculis 3–4 mm. longis, 5–7-floris, longioribus quam pedicelli (praeter terminales); aliter sicut apud formam typicam.—Spikelets 3–4 mm. long, 5–7-flowered, all but the terminal longer than their pedicels.—Wisconsin: mud-flats, Mississippi River bottoms, Glenhaven, September 9, 1930, *Fassett*, no. 12899 (type in Herb. Univ. of Wis.); stream bank, North Andover, September 6, 1930, *Fassett*, no. 12900; roadside, Wisconsin River bottoms opposite Bridgeport, September 5, 1930, *Fassett*, no. 12901; shore of Sinnippee Creek, Kieler, August 31, 1930, *Fassett*, no. 12902; Dane County, 1861, *T. J. Hale*. Minnesota: dry sandy shore of the Zumbro River south of Pile Lake, Kellogg, August 16, 1927, *Fassett*, no. 4184.

A sheet marked "Madison" by T. J. Hale has a stalk of typical *E. Frankii* and one of the variety. The following collections are intermediate: Wisconsin: dry sandy roadside, 235 foot terrace, Prescott, August 30, 1927, *Fassett*, no. 4163; muddy bank along small stream, Barneveld, September 7, 1931, *Fassett*, no. 12907; LaCrosse, 1861, *T. J. Hale* (sheet in the Gray Herbarium). Iowa: Vinton, *J. J. Davis*. Illinois: Mississippi bottoms near Oquawka, *Harry N. Patterson*.

E. Frankii is always described as having the spikelets 2–5-flowered (or 3–5-flowered) and 2–3 mm., or 1″–1½″, long. It is uncommon in southern and southeastern Wisconsin, and apparently more abundant in northern Illinois, to judge from the collections from that region by L. M. Umbach. Var. *brevipes*, appearing distinct with its much more compact inflorescence, occurs in the Driftless Area, toward the edge of the range of the species (but not entirely replacing it), and is difficult to place in the keys presented in most of our current manuals. It is, however, easily identified with *E. Frankii* by use of the key in Deam's "Grasses of Indiana."

Betula lutea Michx., f. **fallax** n. f., cortice brunneo haud in lamellas soluto (hoc *B. lentam* simulans); fructis foliisque *B. luteae*.—Wisconsin: tamarack swamp, Hartford, July 12, 1929, *Bernice Quandt*, no. 182 (type in Herb. Univ. of Wis.); same station, June 9, 1929, *Fassett*, no. 8404; tamarack swamp, Addison, August 17, 1929, *Quandt*, no. 192; sandstone bluff, Brodhead, May 13, 1928, *N. C. Fassett & W. C. Meyer*, no. 5664.

This tree occurs in company with typical *B. lutea*, and differs from it only in having bark closely simulating that of *B. lenta*. Such individuals probably explain numerous sheets in the University herbarium misidentified as *B. lenta*, and perhaps form the bases of reports of the cherry birch from this state.

Actaea alba Mill., f. rubrocarpa Killip, N. Y. State Mus. Bull. ccxliii.–iv. 40 (1923). Material collected by the writer in Iowa County, Wisconsin, on a wooded cliff along the Wisconsin River opposite Lone Rock, is tentatively referred here. The berries, rhachis and pedicels are pink, and the thickness of the pedicels is intermediate between that of *A. alba* and that of *A. rubra*. The characters of the plant strongly suggest that it is a hybrid between the two species.

Polymnia canadensis L., f. **radiata** (Gray) n. comb. *P. canadensis*, var. *radiata* Gray, Syn. Fl. N. Am. i. pt. 2: 238 (1884). In Wisconsin collected at Prairie du Chien, *H. H. Smith*, no. 7618, and Glenhaven, *Fassett*, no. 12641. In the field strikingly different in appearance from the common discoid form.

Madison, Wisconsin.

Corylus americana, forma missouriensis.—One of the conventional diagnostic characters of *Corylus americana* Walt. is the occurrence of long glandular trichomes on the young parts, the branchlets, petioles, involucres, etc. Very often, however, this key-character fails to work. This is due to the occurrence of a nearly or quite glandless extreme, which in all other characters is good *C. americana*, a shrub long ago set off by Alphonse de Candolle, whose variety seems to have been wholly or largely ignored by recent students. The contradiction arising through emphasis on the glands will be nullified if we recognize that there is a quite glandless form. From the limited material at hand it does not appear that the glandless shrub has a different range from the glandular one. It seems more logical, therefore, to treat it as a form rather than a variety:

Corylus americana Walt., forma **missouriensis** (A. DC.) ,comb· nov. *C. americana, β. Missouriensis* A. DC. Prodr. xvi². 132 (1864).

Specimens have been examined from Vermont, Massachusetts, Rhode Island, Connecticut, New York, West Virginia, North Carolina, Illinois, Missouri, North Dakota, South Dakota and Oklahoma.—M. L. Fernald.

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Farlow Bot. Lab.

Rhodora

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A NATURAL CYPRIPEDIUM HYBRID FROM WISCONSIN

A. M. FULLER

IN the spring of 1930, Dr. E. P. Andrews of Portage reported to the writer that he had observed cream-colored cypripediums at a station near Swan Lake. They appeared to him to be intermediate between *Cypripedium candidum* and *C. parviflorum* and he thought that they might possibly be hybrids. On June 2, 1931, the writer, accompanied by Dr. Andrews and Mr. Harold Staffeld, visited the locality where these cypripediums had been found.

The locality is adjacent to Swan Lake, about five miles east of Portage, Columbia County, Wisconsin. Swan Lake is but an enlargement of the channel of the upper Fox River. A wide margin of meadow, in many places underlain by marl, borders the lake on the west and east, while the soil of the higher land and ridges is sandy. Here, *Polygala Senega, Tradescantia reflexa, Lupinus perennis, Geum triflorum* and *Phlox pilosa* were observed.

The transitional area between the higher land and the meadow was occupied by *Cypripedium candidum, Hypoxis hirsuta* and *Valeriana edulis.* A short distance in the meadow from the transition zone, *C. parviflorum* grew very abundantly. In the *C. candidum* zone, only an occasional plant with a cream-colored lip was found. In the *C. parviflorum* zone over a hundred plants were found that had white or cream-colored lips, madder-purple petals and sepals, and spotted triangular staminodia. In the *C. parviflorum* zone there were at least three thousand typical *C. parviflorum* plants, a hundred or more plants that were intermediate and less than twenty-five typical *C. candidum* plants. The intermediate plants appeared to the writer to be hybrids.

We know that hybridization is of common occurrence in a number of plant families, and a large number of artificial or horticultural orchid hybrids are known. In Europe many natural hybrids have been described, many of which belong to the genera *Ophrys* and *Orchis*. In Europe, the habitats of the various species of orchids have not been so ruthlessly destroyed and consequently there has been an abundance of material for study. In this country, particularly where dairy farming is practiced intensively, it is a difficult matter to find undisturbed habitats which are suitable for the various species, hence the paucity of living orchid material for critical study. It is difficult, and in many cases, impossible to detect hybrids in herbarium material.

Four natural hybrids are listed in Professor Ames's Enumeration.[1] They are: × *Habenaria Andrewsii* (*H. lacera* × *H. psycodes*), × *Habenaria Canbyi* (*H. blephariglottis* × *H. cristata*), × *Habenaria Chapmanii* (*H. ciliaris* × *H. cristata*), and × *Spiranthes vernalis* (*S. cernua* × *S. gracilis*).

In regard to natural orchid hybrids, Professor Ames writes:[2] "Natural hybrids do not seem common among New England orchids, but intensive study may bring more to light. Often the characters which designate hybridity are extremely elusive, and hybrids are classed arbitrarily with the species to which they bear the closest resemblance. As a general rule orchids which hybridize freely give rise to progeny of an intermediate character, but when specific lines are closely drawn, and based on traits phylogenetically young, parental differences may not stand out with sufficient distinctness to attract special attention and so hybrids may well be overlooked."

All of the conditions which are necessary for hybridization appear to have been present at the Swan Lake locality. The two species, *C. candidum* and *C. parviflorum*, grow near each other in an open meadow, blooming at the same time. The numerous plants with intermediate characteristics give unmistakable evidence of being hybrids. The flowers of the two species are quite similar as far as shape and size are concerned and the position and shape of the stigma and anthers are also similar. As it was cloudy and even raining during the time of our visit no observations were made as to the abundance of bees which are instrumental in the transfer of pollen. It might be

[1] Ames, Oakes, "An Enumeration of the Orchids of the United States and Canada," American Orchid Society, Boston, Mass., 1924.

[2] Ames, Oakes, "Hybrids in Spiranthes and Habenaria," RHODORA, Vol. 5, p. 264. 1903.

well to mention that *C. parviflorum* has a much stronger fragrance than *C. candidum* while the hybrid has a fragrance perhaps even stronger than in *C. parviflorum.*

In Wisconsin, *C. parviflorum* has the following characteristics: plants 19–40 cm. high, 1–2 flowered; sepals and petals madder-purple; sepals ovate-lanceolate, 26–35 mm. long; petals lanceolate, 35–45 mm. long; lip orange-yellow, 20–27 mm. long, conspicuously striped on the interior with madder-purple lines, frequently with prominent splashes of madder-purple near the orifice; staminodium (Figure 1) triangular, often semi-cordate at base, 5 mm. wide, 8 mm. long, bright orange-yellow, often spotted with madder-purple near the apex; stigma roundish, 3 mm. wide, 5 mm. long.

C. parviflorum is found in meadows, bogs and thickets bordering bogs. In some places it occurs in abundance in eastern and northern Wisconsin. This species appears to be absent from the southwestern and western counties as far north as St. Croix County.

C. candidum in this region has the following characteristics: plants 16–28 cm. high, 1-flowered; sepals and petals greenish-yellow, usually striped with lines of madder-purple; sepals ovate to ovate-lanceolate, 24–30 mm. long; petals lanceolate, 25–35 mm. long; lip white, about 22 mm. long, striped on the interior with violet-purple lines; staminodium (Figure 5) oblong-linear, 3.5 mm. wide, 8 mm. long, orange-yellow, unspotted or sparingly spotted with madder-purple; stigma roundish, 3 mm. wide, 4 mm. long.

C. candidum in Wisconsin is found only in the southern counties where it grows in meadows and is frequently associated with *Valeriana edulis* and *Hypoxis hirsuta.* Fifty years ago this species grew in great abundance in numerous localities in southern Wisconsin. Today, most of these meadows are closely grazed or have been plowed and have given place to fields of cabbages, celery and onions. As far as the writer is aware, there are left at the present time in southern Wisconsin only four localities where this species occurs in any abundance at all. In each of these localities *C. parviflorum* grows either with *C. candidum* or in areas not far away. Both species appear to have a preference for neutral or alkaline soil (pH 7–8).

In reference to the occurrence of this hybrid elsewhere in Wisconsin, Mr. S. C. Wadmond of Delavan, Wisconsin writes: "On a visit to Mr. S. W. Faville, Lake Mills, Jefferson County, Wisconsin, May 31, 1931, Mr. Faville took us out into his wild flower garden and showed us a cypripedium which was then in bud and which in both its foliage and floral characters was very suggestive of *parviflorum* but the lip instead of a golden yellow was a pale or lemon yellow and dried out in press a creamy white, very much the same as *candidum* looks in the herbarium. We went out to the low peaty meadow from which this plant had come and we found very much the same conditions existing that you describe at Swan Lake. This meadow is being drained and the cypripediums were having a hard time of it but in years gone by there was an adundance of both species in proximity and probably blooming at about the same time, just as you found them at Swan Lake. Mr. Faville was inclined to favor the theory of hybridity. I was a bit skeptical and never having read of any hybrids amongst our native cypripediums, I was inclined to call it simply a color variant. On looking at the two plants in the herbarium I am entirely convinced that they are the new hybrid." On June 4, 1931, the writer also visited Mr. Faville's wild flower garden. The clump of cypripediums to which Mr. Wadmond referred, was in full flower. They were intermediate forms and were similar to plants observed and collected at Swan Lake.

It is very likely that wherever *C. candidum* and *C. parviflorum* grow in the same vicinity, hybrids will be found. Since Dr. E. P. Andrews of Portage appears to have been the first person to call attention to this hybrid, it is fitting that it should bear his name.

Staminodia (× 2) of 1, Cypripedium parviflorum from Polk County, Wisconsin, *M. P. M.* Cat. no. 70788; 2, 3, 4, × C. Andrewsii from Swan Lake, Columbia County, Wisconsin, *M. P. M.* Cat. no. 70803; 5, C. candidum, from Swan Lake, *M. P. M.* Cat. no. 70801.

× Cypripedium **Andrewsii**, hyb. nov. (*C. candidum* × *C. parviflorum*). Planta 16–40 cm. alta, 1–2-flora; foliis ovato-lanceolatis, acutis; sepalis petalisque subviridibus, valde colore fusco-purpureo suffusis; sepalis ovato-lanceolatis, 25–37 mm. longis; petalis lanceolatis, 30–40 mm. longis; labello 20–25 mm. longo, albo vel gilvo, intus manifeste violaceo-striato; staminodio 4 mm. lato, 9 mm. longo, aurantiaco, triangulare vel semitriangulare, parte apicali insigniter maculis varisque fusco-purpureis ornato; stigmate subrotundo.

× Cypripedium **Andrewsii**, hyb. nov. (*C. candidum* × *C. parviflorum*). Plants 16–40 cm. tall, 1–2 flowered; leaves oval-lanceolate, acute; sepals and petals greenish, much suffused with madder-purple; sepals ovate-lanceolate, 25–37 mm. long; petals lanceolate, 30–40 mm. long; lip 20–25 mm. long, white to cream-colored, conspicuously striped on the interior with violet; staminodium orange-yellow, triangular to semi-triangular (Figures 2, 3 & 4), 4 mm. wide and 9 mm. long, marked in the apical region with spots and blotches of purple-brown; stigma roundish. Type sheet in the herbarium of the Milwaukee Public Museum, Cat. No. 70803, sheet I. June 2, 1931, Swan Lake, Columbia County, Wisconsin. Collected by A. M. Fuller and Harold Staffeld. A co-type specimen and an autochrome photograph have been deposited in the Gray Herbarium.

Mr. Stephen Kliman of the Milwaukee Public Museum made the drawings and supplied the Latin diagnosis. The writer is also indebted to Dr. N. C. Fassett, Mr. S. C. Wadmond, Dr. Ira Edwards and Mr. Gerald Teyen for looking over the manuscript.

Milwaukee Public Museum,
Milwaukee, Wisconsin.

BOTANICAL EVIDENCE OF A POST-PLEISTOCENE MARINE CONNECTION BETWEEN HUDSON BAY AND THE ST. LAWRENCE BASIN

David Potter

(*Continued from p. 89*)

Marine Submergence in the Hudson Bay Region

Bell, Low, Wilson, Tyrell and others have conclusively proven that a post-glacial submergence occurred in the Hudson Bay region, which covered a vast territory to the east, west, and south. This area is covered by a mantle of marine clays containing many fossils which are identical with those reported from the St. Lawrence Basin.

Table 3 gives a list of some of the localities where these marine fossils have been found. The stations of table 3 have been plotted on the accompanying large map and are indicated by solid black circles. Based upon the known fossiliferous areas, the extent of the marine invasion from James Bay has been shown to reach nearly to that of the St. Lawrence Basin. The area indicated is probably not

TABLE 3

Location	Height in feet above sea level		Authority
Round Bay, 125 miles from the mouth of Moose River	300	marine shells	Bell (5)
Missinabi Lake and along Missinabi and Moose Rivers	300	marine shells	Bell (8) McLean (46)
Nelson river, 54 miles upstream	200	marine shells	Bell (3, 4)
Nelson river, above the third Limestone rapid	200	marine shells	Bell (4)
Churchill river, 60 miles from its mouth	350	marine shells	McLean (3)
Kenogami river	450–500	marine shells	Bell (6, 7)
Little Churchill river	60	marine shells	Alcock (1)
Winisk river	350	marine shells	McInnes (45)
Mammamemmatawa	380	marine silts	Williams (65)

inclusive enough to show the outer margin of submergence, for Low (41), in his work along the east coast of James Bay, discovered sediments and terraces probably of marine origin up to at least 675 feet. In discussing this situation he states: "The evidence of stratified deposits of marine sands and clays along the valleys, near the mouths of the rivers on the east side of Hudson Bay, show that a subsidence of the land over 500 feet (and probably 700) took place after the period of glaciation." Bell (8) further supports this contention, for he says: "On the islands and shores all along the Eastmain coast, the 'raised' beaches are very conspicuous at all heights up to about 300 feet immediately near the sea, but, no doubt, higher ones would be found further inland."

The problem of finding fossil-bearing clays and sands in this region and farther southward is a difficult one due to the ground-cover, which is for the most part boggy or heavily wooded, with considerable accumulation of peat. Even though much of this area has been explored by Canadian geologists, their work has been for the most part concerned with the economic aspects of geology and Pleistocene phenomena have not been thoroughly investigated. Thus, with the difficulties of exploration coupled with lack of interest, it is not surprising that relatively few localities of fossiliferous clays or sands have been reported. For the majority of places given in TABLE 3, we are indebted to the early Canadian geologist, Bell, who, in speaking of the Churchill River says (3): "As the bank continued with the same characteristics for a long distance upstream, I have no doubt that shells may be found at a greater distance inland than that at which they were observed by myself."

It would seem, therefore, justifiable to extend the southern boundary of the marine invasion from the head of Hudson Bay, at least to within a comparatively short distance from the divide. This has been done on the map representing this submergence and the area involved indicated by horizontal lines.

Discussion of the Area Across the Height of Land between James Bay and the Ottawa Valley

Reference to the accompanying map will show that the region under discussion includes the Lake Temiskaming and Lake Abitibi districts, the two areas separated by the divide, the lowest point of which is 914 feet[1] above sea level and occurs just southwest of Lake Abitibi. Examination of the superficial covering of this intermediate area has shown that the entire region up to altitudes of 1000 feet (35) is overlain by clays which were water-laid, for Coleman (21) has shown that this region was once covered by a vast body of water, which he designated as Lake Ojibway.

On the large map certain elevations are shown which are based upon Fairchild's isobases and which, according to him, are theoretical elevations of marine waters (26, 27). These localities are represented by solid black triangles. Table 4 lists the above regions together with their altitudes and approximate locations.

Table 4

Location	Approx. Latitude	Approx. Longitude	Height in feet above sea level
Lake St. John	48° 30′	72° 15′	1000
Saint Anne River	47° 0′	72° 0′	970
Jacques Cartier River	47° 0′	71° 30′	950
Saint Lawrence Valley, Quebec	46° 50′	71° 10′	925
Montmorency, River Laval	47° 0′	71° 0′	940
Chateau Richer	47° 10′	70° 50′	925
Montreal	45° 30′	73° 50′	840
North River, Sainte Marguerite	46° 0′	74° 0′	880
West River, La Chute	45° 45′	74° 30′	825
Ottawa	45° 30′	75° 50′	700
Mattawa	46° 30′	78° 50′	700
North Bay	46° 20′	79° 30′	675

The 700-foot isobase extends from the Lake Temiskaming region southeastward along the Ottawa River and passes through Ottawa city. Since marine fossils have been found in the Grenville District, Ontario, up to 735 feet above sea-level (22), it must follow, if Fair-

[1] Elevation taken from "Altitudes in Canada," James White, Commission of Conservation, Canada.

child's isobase for 700 is correct, that the marine waters extended up to and included Lake Temiskaming, since at the present time the altitude of the lake is about 590 feet above sea level. Again, the topography of the Lake Temiskaming region is such as to make this highly probable. The area lies wholly within the Laurentian Plateau and may be divided into three sections: (1), rocky uplands; (2), clay belt; and (3), linear valleys. The linear valleys have been brought about by erosion along planes of faulting, and are probably pre-glacial, for as Wilson says: " . . . they cannot possibly be of post-Glacial origin because stream dissection since the Glacial epoch has been almost insignificant and the valleys are themselves occupied by glacial drift deposited by the ice-sheets. It is also very improbable that they are the result of glacial denudation, for they have no relationship to the character of the rocks they traverse, and they trend, in some cases, at right angles to the direction of ice movement. Since the valleys are neither Glacial nor post-Glacial in their origin, it follows, *a priori*, that they are pre-glacial valleys." The depression occupied by Lake Temiskaming and the Ottawa river between the lake and the village of Mattawa has a length of about 100 miles and a depth, in places, at present only 100 feet above sea level.

The 800-foot isobase extends from the region just north of Lake Temiskaming southeastward, crossing the St. Lawrence just west of Montreal, thence to Sherbrook where the line turns northeast, passing just north of Tring Junction in the Chaudière valley. Between this line and the 900-foot isobase occur many raised beaches, of which the following may be mentioned: that lying slightly to the northeast of Allumette Island at 800 feet; that at Lake Maskinonge at 865 feet; and at St. Jerome at 900 feet. In addition, still higher beaches have been described at Kingsmere Mountain (north of Ottawa) at 965 feet, and at La Chute at 1000 feet above sea level.

The extension of the northern margin of the previously discussed Champlain Submergence toward the north would thus seem justified, if Fairchild's isobases are substantially correct and these raised beaches are of marine origin. In further support of this extension of sea-margin, Taylor says in discussing the limit of post-glacial submergence in the highlands east of Georgian Bay: " . . . the facts show clearly that the same water that filled the ancient channels in the southern highlands extended far to the north and west. It evidently covered all the lowlands of this region and, as indicated by the altitude of the shore line, made a strait over Lake Nipissing at least twenty-five miles wide and five hundred feet deep, and probably another farther north over the height of land to Hudson Bay." In a later paper Taylor says: "There can be no doubt of the recent presence of wide waters at high levels over Lake Nipissing and the headwaters of the Mattawa river. At the five places seen in the Ottawa valley, however, no clear and certain evidence of high level submergence was found, except, perhaps, the thin silts and clays overlying the drift south of Mattawa, up to about eight hundred feet. This limit for such a deposit would seem to imply a contemporary water surface at a still higher level, and it is more than probable that for a comparatively brief period such an eastward extension actually existed." One more note from Taylor's researches may not be amiss. In speaking of the history of the Great Lakes he says (60): "At their highest level, the Great Lakes had open connection with waters to the east through a broad strait at Nipissing, and it now seems possible that they had another to the northeast. It is not yet proved that these connections were with the ocean, but I believe that the evidence tends more and more strongly toward that conclusion." Coleman (21), in his discussion of Lake Ojibway, admits the possibility of this lake having been united to the sea; for he says " . . . whether any portion of the bed of Lake Ojibway was covered by the sea is uncertain."

Duration of the Submergences

Antevs (2) has estimated about 30,000 years as necessary for the retreat of the ice sheet from the terminal moraines in New York State to Cochrane, Ontario. The retreat from Stony Lake, Ontario (which on the map included in this paper would be located approximately at latitude 44° 30′, longitude 72°) to Mattawa, Ontario, required 13,000 years. According to his map (p. 164), the marine stage in the St. Lawrence Basin was inaugurated at the time the ice sheet stood at Stony Lake. He concludes his studies with the following statement: " . . . the last ice sheets had their greatest extent and began to wane about 40,000 years ago. This figure may be less than 10,000 years too large or too small . . . " If this is approximately correct it may be safely concluded that the ice disappeared from the Hudson Bay region about 35,000 years ago.

Since the retreat of ice from the terminal moraines of New York State to Stony Lake, Ontario, consumed 17,000 years, it follows that the Champlain submergence was inaugurated about 16,000 years B. C. This marine invasion was probably of considerable duration. Taylor (62) has shown in his paper entitled "New Facts on the Niagara Gorge" that the outlet at North Bay, Ontario, was closed by uplift about 3000 years ago. Mather (44) in his studies on the Champlain Sea in the Lake Ontario basin states: "That the uplift of the St. Lawrence region, in greater part at least, lagged considerably after the removal of ice." In further support of the length of life of the Champlain Submergence, Coleman says (20); "This inland sea must have existed for a long period because clay-forming sediments accumulated to a thickness of one hundred and fifty feet or more in some parts of the basin and filled up all the hollows and formed a fairly level sea-floor." Keele (38) substantiates this view, stating that the clay deposits of the St. Lawrence basin vary in thickness up to a maximum of about 200 feet.

In the Hudson Bay region marine fossils have been found up to approximately 500 feet above sea level. The evidence of raised beaches in this area further suggests that the marine waters stood about 700 feet higher than is the case at present. Uplift has thus taken place and, according to Bell (8), at the rate of five to ten feet per century. If uplift has been more or less uniform, the time consumed since this differential elevation began would be between 5000 and 14,000 years. That this land-elevation has been more or less uniform seems to be the case, for Ells (25) found that the thickness of moss and peat increased toward the south as follows: "Eight miles west of Moose Factory the moss and peat was two to three feet thick. Ten miles farther south, two to four feet, forty miles south, four and a half to five feet, sixty miles to eighty miles south, five and a half to six feet and ninety miles south, six to eight feet." It would be fairly safe to conclude, therefore, that at one time during the existence of these two marine invasions they were contemporaneous.

As pointed out earlier in this paper, the Lake Temiskaming and Lake Abitibi regions were also inundated, although perhaps for a shorter period of time than for the two submergences just discussed. Cooke (22) concludes from his studies of the Lake Temiskaming region that the waters covering this area must have existed at least 2500 years. Furthermore, the clays of the Abitibi district (Lake Ojibway) are, according to Knight, Barrows, Hopkins, and Parsons (39), about seventy feet in thickness. If there is a correlation between the depth of deposition of clay and the length of life of a body of water, it follows that the waters over the height of land existed for a considerable length of time, since as already pointed out, the length of life of the Champlain Submergence was comparatively long, with a clay deposition of about two hundred feet.

From the foregoing discussion it would seem probable that a water-connection existed for at least a short period of time between the St. Lawrence Basin and Hudson Bay.

So far no marine fossils have been found in this intermediate region, although in places diligent search has been made (10). The absence of fossils, however, may be due to the great influx of fresh waters, in this area from the lakes to the west, through the strait at Nipissing and also from the retreating ice front. This influx would have made the waters of the invasion brackish and might have so modified the salt constituents as to have forbidden the presence of marine forms, or at least have reduced their numbers. This fact, supported by the comparatively short life of the probable marine connection, the erosion and the leaching out of the deposits and the possible presence of certain chemicals, which would militate against the preservation of shells, may account for the absence of fossiliferous clays and sands. Furthermore, as already noted, no living marine mollusks have been found in James Bay even though the connection with the sea is direct and the waters of the Bay brackish (9).

From the foregoing studies, it seems evident that it is justifiable to extend the northern margin of the St. Lawrence marine invasion to at least the region of Lake Temiskaming, and the southern margin of the Hudson Bay marine submergence to a point a few miles from the present height of land. Even if the intermediate region was not covered by marine waters, the two sea-margins were close enough to allow ordinary agents of local seed-dispersal to become operative and to bridge the gap, so that plants growing along the shores of the southern waters might establish themselves in the maritime habitats of the northern invasion.

Summary

If this theory of a marine connection between the St. Lawrence Basin and James Bay is correct, a pathway was open after the recession of the Wisconsin Ice Sheet for the migration of plants of maritime requirements from the south to James Bay along the shores of these inland seas. Two sources of evidence would aid tremendously in establishing this theory: namely, the finding of marine fossils in the intermediate zone and the persistence of some maritime plants in this interior region. As stated above, no fossiliferous marine clays have been found north of Mattawa until the marine deposits are met about one hundred and twenty-five miles south of James Bay.

In only one case have any halophytes been reported from the region under discussion and in this case the identification is open to doubt (35). This lack of halophytes in the interior is more or less to be expected, for unquestionably considerable erosion and leaching of the soil has occurred since the end of the marine stage, which would have changed the edaphic conditions enough to have forced these plants to abandon the region.

Olsson-Seffer (47) has shown that each species of plant has a maximum salt requirement to which it is very accurately adapted and that this maximum cannot be overstepped without fatal results to the plant. Thus, in the case of *Glaux maritima*, 2.7 *per cent* is the maximum; with *Juncus Gerardi*, 2.2 *per cent;* with *Triglochin maritima*, 2.6 *per cent*, and with *Elymus arenarius*, 2.6 per cent. It naturally follows that there must be a minimum salt requirement for halophytes, and since the maximum in most cases is relatively slight, the leaching out of this amount after land-elevation took place would not require a very long period of time. As was noted earlier in this paper, the halophytes under discussion do not now occur in much of the region which was known to have been submerged and whose soil about the margin of the sea unquestionably supported these plants for a time after land-elevation. Svenson (56) has pointed out that the occurrence of several of these maritime plants about the Finger Lakes region of New York State is due to the presence of salt springs, rather than to salt deposits during the Champlain Submergence.

Nevertheless, the occurrence of raised beaches all along the St. Lawrence Basin at altitudes up to 1000 feet, the raised beaches along the east coast of James Bay, the isobases of Fairchild, the depth of clay-deposits and the occurrence of maritime plants in the Hudson Bay region all lend strong support to the theory that there existed after the Wisconsin glaciation a marine connection between Hudson Bay and the St. Lawrence Basin, and Guppy (34) is probably correct in saying: "The witness of the living plant is often quite as insistent as the testimony of the rocks."

Conclusion

From the above studies the following statements seem justified:

1. A marine invasion occurred in the St. Lawrence Basin after the recession of the Wisconsin Ice Sheet, which probably extended north to include the Lake Temiskaming region.

2. A similar invasion of the sea occurred in the Hudson Bay region contemporaneous with that of the St. Lawrence Basin, which extended southward to within a few miles of the height of land.

3. Evidence seems to indicate that a possible marine connection existed between these two known submergences involving the Lake Abitibi area.

4. Driftless areas have never been found in the Hudson Bay region so that it is improbable that these plants existed within the district during the Wisconsin glaciation.

5. Wind, water and animals do not seem to be the chief factors which brought about the introduction of these halophytes into the Hudson Bay area.

6. The above marine connection (if it existed) would have offered suitable conditions for the migration of halophytic plants along its shores.

7. Undoubtedly the northern margin of the Champlain Sea and the southern margin of the Hudson Bay inundation were relatively close and, even though a marine connection may have been lacking, the factors effecting local plant-distribution may have been sufficient to have bridged the slight gap and thus account for the occurrence of the plants in question in the region of Hudson Bay.

Bibliography

1. Alcock, F. J., Lower Churchill River, Manitoba. Geol. Surv. Can., Summary Rep., 1915, pp. 133–136.
2. Antevs, Ernst, The Last Glaciation. Am. Geog. Soc., Research Series, No. 17.
3. Bell, Robert, Report on Explorations of the Churchill and Nelson Rivers and around God's and Island Lakes. Geol. Surv. Can., Rep. of Prog., 1879, pp. 1–72 C.

4. Bell, Robert, Report on the Country between Lake Winnipeg and Hudson's Bay. Geol. Surv. Can., Rep. of Prog., 1878, pp. 1–31 CC.
5. Bell, Robert, Report on Exploration in 1875 between James Bay and Lakes Superior and Huron. Geol. Surv. Can., Rep. of Prog., 1875–1876, pp. 294–341.
6. Bell, Robert, Report on the Country between Lake Superior and the Albany River. Geol. Surv. Can., Rep. of Prog., 1871–1872, pp. 101–114.
7. Bell, Robert, Report on Exploration of Portions of the Attawapishkat and Albany Rivers, Lonely Lake to James Bay. Geol. Surv. Can., Ann. Rep., ii. (1886) pp. 34–38 G.
8. Bell, Robert, Report on an Exploration of the East Coast of Hudson's Bay. Geol. Surv. Can., Rep. of Prog., 1877, pp. 1–37 C.
9. Bell, Robert, Proofs of the Rising of the Land around Hudson Bay. Am. Jour. Sci. and Arts. ser. 4, i. pp. 219–228.
10. Barlow, A. E., Report on the Geology of the Area included by the Nipissing and Tamiskaming Map Sheets. Geol. Surv. Can., Ann. Rep. x. (1897) pt. 1, p. 23.
11. Chalmers, R., Pleistocene Shore-Lines of the St. Lawrence Valley. Geol. Surv. Can. Ann. Rep. x. pp. 64–74 A.
12. Chalmers, R., Report on the Surface Geology of New Brunswick and Adjacent Provinces. Geol. Surv. Can., Ann. Rep. viii. (1895) pp. 96–97 A.
13. Chalmers, R., Eastern Townships of Quebec. Geol. Surv. Can., Ann. Rep. ix. (1896) pp. 81–82 A.
14. Chalmers, R., Report on the Surface Geology and Auriferous Deposits of Southeastern Quebec. Geol. Surv. Can., Ann. Rep. x. (1897) pp. 1–69 J.
15. Chalmers, R., Report on the Surface Geology of Northern New Brunswick and Southeastern Canada. Geol. Surv. Can., Ann. Rep. ii. (1886) pp. 1–36 M.
16. Chalmers, R., Surface Geology of the Southern Part of the Province of Quebec. Geol. Surv. Can., Summary Rep., 1903, pp. 142–143 A.
17. Chalmers, R., Artesian Borings, Surface Deposits and Ancient Beaches in Ontario. Geol. Surv. Can., Ann. Rep., N. S. xv. (1902–3) pp. 270–281 A.
18. Chalmers, R., Report on the Surface Geology shown on the Fredericton and Andover Quarter-Sheet maps, New Brunswick. Geol. Surv. Can., Ann. Rep. xii. (1899) pp. 30–33 M.
19. Coleman, A. P., Ice Ages: Recent and Ancient. Macmillan (1926) p. 61.
20. Coleman, A. P., Marine and Fresh Water Beaches of Ontario. Bull. Geol. Soc. Am. xii. (1901) pp. 129–146.
21. Coleman, A. P., Lake Ojibway: Last of the Glacial Lakes. Ont. Bur. Mines, Ann. Rept. xviii. (1909).
22. Cooke, H. C., Apasatika Map Area, Temiskaming County, Quebec. Geol. Surv. Can., Summary Rep. 1922, pt. D, pp. 19–75.
23. Ells, R. W., Report on the Geology of Argenteuil, Ottawa and Part of Pontiac Counties, Province of Quebec and Portions of Caulets, Russell and Prescott Counties, Province of Ontario. Geol. Surv. Can., Ann. Rep. xii. (1899) pp. 90–94 J.
24. Ells, R. W., Sands and Clays of the Ottawa Basin. Bull. Geol. Soc. Am. ix. pp. 215–216.
25. Ells, R. W., Exploration: Cochrane to James Bay. Temiskaming and Northern Ontario Railway Commission, Toronto (1912).
26. Fairchild, H. L., Post-Glacial Continental Uplift. Science, N. S. xlvii. no. 1225 (June, 1918), pp. 615–617.
27. Fairchild, H. L., Post-Glacial Uplift of Northeastern America. Bull. Geol. Soc. Am. xxix. (1918) pp. 187–238.

28. Fairchild, H. L., Gilbert Gulf (Marine Waters in the Ontario Basin). Bull. Geol. Soc. Am. xvii. (1906) pp. 712–718.
29. Fassett, N. C., The Vegetation of the Estuaries of Northeastern North America. Proc. Boston Soc. Nat. Hist. xxxix[3]. (1928).
30. Fernald, M. L., A Botanical Expedition to Newfoundland and southern Labrador. RHODORA xiii. (1911) pp. 144–145.
31. Fernald, M. L., Some Relationships of the Floras of the Northern Hemisphere. Proc. Internat. Cong. Plant Sciences, ii. (1929) pp. 1487–1507.
32. Fernald, M. L., Persistence of Plants in Unglaciated Areas of Boreal America. Mem. Am. Acad. Arts and Sci. xv[3]. (1925) pp. 239–342.
33. Geology of Canada (1863) p. 917.
34. Guppy, H. B., Plants and Seeds, and Currents in the West Indies and Azores.
35. Henderson, Archibald, Agricultural Resources of Abitibi. Rep. Ont. Bur. of Mines, xiv[1]. p. 241.
36. Hitchcock, C. H., The Distribution of Maritime Plants in North America. Proc. A. A. A. S., 1870.
37. James, W. F. and Mandsley, J. B., La Motte and Fournière Areas. Geol. Surv. Can., Dept. of Mines, Summary Rep., 1925, pt. C, pp. 52–77.
38. Keele, J., Northern Portions of Pontiac and Ottawa Counties, Quebec. Geol. Surv. Can., Summary Rep., 1916, pp. 219–229.
39. Knight, C. W., Barrows, A. G., Hopkins, P. E. and Parsons, A. L., Abitibi Night Hawk Gold Area. Ont. Bur. Mines, Ann. Rep. xxxviii[2]. pp. 37–38.
40. Low, A. P., Report on an Exploration of Part of the South Shore of Hudson Strait and of Ungava Bay. Geol. Surv. Can., Ann. Rep. xi. (1898) p. 46 L.
41. Low, A. P., Report on Exploration in James' Bay and Country East of Hudson Bay. Geol. and Nat. Hist. Surv. Can., Ann. Rep. iii. (1887) p. 59 J.
42. Low, A. P., Report on the Geology and Economic Materials of the Southern Portion of Portneuf, Quebec, and Montmorency Counties. Geol. Surv. Can., Ann. Rep. v. (1890–91) pt. 1, pp. 54–64 L.
43. Mandsley, J. B., St. Urbain Area, Charlevoix District, Quebec. Geol. Surv. Can., Mem. No. 152, p. 40.
44. Mather, K. F., The Champlain Sea in the Lake Ontario Basin. Journ. Geol. xxv. (1917) pp. 542, 554.
45. McInnes, W., The Winisk River. Geol. Surv. Can., Summary Rep., 1903, pp. 100–108 A.
46. McLean, F. H., The Mesozoic and Pleistocene Deposits of the Lower Missinaibi, Opazatika and Mattagami Rivers, Ont. Geol. Surv. Can., Dept. of Mines, Summary Rep., 1926, pt. C., pp. 16–44.
47. Olsson-Seffer, P., Relation of Soil and Vegetation on Sandy Sea Shores. Bot. Gaz., xlvii. (1909) p. 85.
48. Reinecke, L., Road Material Surveys in 1915. Geol. Surv. Can., Mem. No. 99, pp. 8–10.
49. Richardson, James, Exploration on Lake St. John. Geol. Surv. Can., Rep. of Prog., 1857.
50. Richardson, James, Report on the North Shore of the Lower St. Lawrence. Geol. Surv. Can., Rep. of Prog., 1866–69, pp. 305–311.
51. Small, James, Origin and Development of the Compositae. New Phytologist, xvii. (1918).
52. Smith, S. I., The Crustacea of the Fresh Waters of the United States. Rept. Fish Commissioner, 1872–73, p. 643.
53. Spencer, J. W., The Iroquois Shore North of the Adirondacks. Bull. Geol. Soc. Am., ii. pp. 488–495.
54. Spencer, J. W., Deformation of the Algonquin Beach and the Birth of Lake Huron. Am. Jour. Sci., ser. 3, xii. (1891) pp. 12–21.

55. Stimpson, W., On the Deep Water Fauna of Lake Michigan. Am. Nat. iv. (1870) p. 403.
56. Svenson, H. K., Studies on Interior Distribution of Maritime Plants. Rhodora, xxix. pp. 105–116.
57. Taylor, F. B., Gilbert Gulf. U. S. Geol. Surv., Mon. No. 53 (1915) pp. 445–446.
58. Taylor, F. B., Notes on the Quarternary Geology of the Mattawa and Ottawa Valleys. Am. Geol. xviii. (1896) p. 116.
59. Taylor, F. B., The Limit of Post-Glacial Submergence in the Highlands East of Georgian Bay. Am. Geol. xiv. pp. 273–289.
60. Taylor, F. B., The Ancient Strait at Nipissing. Bull. Geol. Soc. Am. v. (1893) pp. 620–626.
61. Taylor, F. B., Evidence of Recurrent Depression and Resilience in the Region of the Great Lakes. Pap. Mich. Acad. Sci. Arts and Letters, vi. (1927) p. 135.
62. Taylor, F. B., New Facts on the Niagara Gorge. Pap. Mich. Acad. Sci. Arts and Letters, xii. (1929) pp. 251–265.
63. Warming, E., Botany of the Faeroes, ii. 676–677 (1903).
64. Warming, E., Ueber Grönlands Vegetation. Englers' Bot. Jahrbuch, x. (1888–89) p. 364.
65. Williams, M. Y., Palaeozoic Straitigraphy of Pagwachuan, Lower Kenogami, and Lower Albany Rivers. Geol. Surv. Can., Summary Rept., 1920, pt. D, pp. 18–25.
66. Wilson, M. E., Geology and Mineral Deposits of a Part of Amherst Township, Quebec. Geol. Surv. Can., Mem. No. 113 (1919) p. 17.
67. Wilson, M. E., Timiskaming County, Quebec. Geol. Surv. Can., Mem. No. 103 (1918).
68. Wilson, M. E., Southwestern Portion of the Buckingham Map Area, Quebec. Geol. Surv. Can., Summary Rept., 1915, pp. 156–162.

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Worcester, Massachusetts.

The New Hampshire Record for Rynchospora Torreyana.—In the Gray Herbarium there is a specimen received as part of the herbarium of William Boott, correctly identified as *Rynchospora Torreyana* Gray and bearing the data: "Bogs, East Washington, N. H. No. 41 *Legit C. F. Parker*, 1868." When the 7th edition of Gray's Manual was being prepared the label was accepted at its face value and the locality there recorded. *R. Torreyana* occurs as a member of the relic Coastal Plain flora in southeastern Rhode Island, on Cape Cod and on Nantucket; and since the Coastal Plain *Sclerolepis verticillata* (Walt.) BSP. had just been found[1] at its first station north of southern New Jersey, on a pond-shore in Bradford, the town adjoining East Washington on the east, the *Rynchospora* was, very naturally, interpreted as a second species of the New Jersey Pine Barrens which had persisted as a relic in south-central New Hampshire. In September, 1928, familiar with *R. Torreyana* as it grows in Washington County,

[1] F. T. Lewis, Rhodora, vii. 186 (1905).

Rhode Island and on Cape Cod, I joined Dr. H. K. Svenson in a search for the plant at Parker's reputed station in New Hampshire. Our failure was recorded in 1929.[1] Subsequently, others, especially Mr. Ludlow Griscom, with his insatiable impulse to locate rare plants, have sought for the *Rynchospora* without success; and the conviction has, naturally, developed that there was some error in the record.

Reëxamination of the material said to come from East Washington shows at once that it was not labeled by Parker himself. The specimen bears a slip with Parker's "41," but the label is wholly in the hand of Scribner on a form with the caption "Ex Herb. F. Lamson Scribner." Further study of the material of *R. Torreyana* by Mr. Griscom and myself reveals the fact that the specimen in question is quite inseparable, in the very dark basal sheaths, the degree of discoloration of the blades, the method of folding, the peculiar state of development and unusually small and very dark spikelets, from specimens labeled in Parker's own hand "Side of Railroad, Atsion, N. J., Sept. 26, '67." Our interpretation is, that Parker, collecting this material in September, 1867, sent some of it to Scribner as no. 41, and that soon thereafter, through a confusion of data, a specimen was labeled by Scribner as collected at East Washington in 1868 and passed on to William Boott. Mr. Bayard Long, who has sought at Philadelphia, where more of C. F. Parker's specimens are found, has been unable to find any East Washington material. In view of the facts here presented *Rynchospora Torreyana* should be removed from the list of Coastal Plain relics in New Hampshire.—M. L. Fernald.

British Seaweeds.[2]—The available handbooks of the Seaweeds are few and in America their number is notably limited. American algologists, whether technical students of the Marine Algae or more amateurish students of Seaweeds, will, therefore, welcome the newest work, a detailed and beautifully illustrated book of 478 pages by Dr. Lily Newton, Professor of Botany at University College, Aberystwyth. Published by the Trustees of the British Museum and thus gaining indorsement of its authoritative quality, already assured by its authorship, the book is exquisitely printed on superior paper and the figures are most satisfactorily reproduced. Analytical keys abound and the generic and specific diagnoses are clearly stated and not too long for ready understanding. With

[1] Svenson, Rhodora, xxxi. 97 (1929).

[2] A Handbook of the British Seaweeds. By Lily Newton, Ph.D., F.L.S. . . . . . With 270 Figures in the Text. London. The Trustees of the British Museum (Natural History), Cromwell Road, S.W. 7. 1931. Price 15 shillings.

Professor Newton's work as a guide, renewed study of our own marine algae should result. The marine forms of New England and of old England are sufficiently similar so that many of the names in the British handbook are familiar to those who have followed the eastern American work of Farlow, Hervey, Collins, Setchell and Holden. In the Algae, as in the Bryophytes and the Lichens, an authoritative work on British species is indispensible to all serious workers in America. The new handbook will, consequently, be needed by many American students.— M. L.F.

ON THE NOMENCLATURE OF ELODEA

C. A. Weatherby

For many years most standard works have used for the waterweeds of North and South America the name *Elodea* Michx. Fl. Bor. Am. i. 20 (1803). The one exception has been that followers of the American Code have employed Rafinesque's substitute name *Philotria*.

Under the old International Rules *Elodea* could be retained. It differed from *Elodes* Adans. (1763) by the required "one letter" "in the termination" (Art. 58); and the earlier Elodeas of Jussieu (1789) and Ventenat (1799) were variants of Adanson's name, ascribed to him, were therefore illegitimate and could be disregarded. But under the homonym rule adopted at the Cambridge Congress in 1930 illegitimacy, in cases like this, is glorified. Dogs-in-the-manger are sanctified; a name which can never be used in the sense in which it was proposed can prevent the use of the same name in another sense, even though it may have been long established and without impediment therein. Thus a large number of serviceable and familiar names, *Elodea* among them, are, unreasonably, wiped out.

Elodea, then, passes, to the accompaniment of eight new combinations. In choosing its successor, taxonomic considerations come into play. If the genus is taken in the sense of Caspary, Bentham & Hooker, Engler & Prantl and Dalla Torre & Harms, to include both dioecious and hermaphrodite species, the earliest available name applicable to any part of it is *Anacharis* Rich., proposed in a paper read before the Institute at Paris Jan. 14, 1812, and published in Part 2 of the Mémoires de la Classe des Sciences Mathematiques et Physiques for 1811, which is usually dated 1812, but according to Caspary[1] was not actually issued until 1814. *Philotria*, Rafinesque's renaming of *Elodea* Michx. because of "Elodea" Adans., did not arrive until

[1] Pringsh. Jahrb. Wiss. Bot. 425 (1858).

January, 1818; ANACHARIS, therefore, becomes the correct name for the genus.

Victorin, however, in a clearly reasoned and, as always with him, delightfully written paper (Contr. Bot. Lab. Univ. Montréal xviii (1931)) has revived Richard's division of the group (in the Memoir above mentioned) into two genera, *Elodea* (now become *Philotria*) with hermaphrodite flowers and three stamens and *Anacharis*, dioecious and with nine stamens in the male flowers. Since all the North American species are at least normally dioecious, ANACHARIS is still the correct name for them under this interpretation.

There remains, however, a question of typification. In the original publication of *Elodea*, by Richard's statement really his genus and not Michaux's, the flowers were described in detail as hermaphrodite. The one species regularly cited (though the then unpublished *E. guyannensis* is casually referred to in a note), *E. canadensis*, is dioecious. Victorin argues that the description was drawn, not from *E. canadensis*, known to Richard only from Michaux's rather fragmentary dried specimens, but from *E. guyannensis*, which Richard had seen and studied in the field in French Guiana in 1789. Victorin, therefore, takes *E. guyannensis* as typical of the genus and, as above noted, restricts the application of *Philotria* to the hermaphrodite South American species.

This interpretation has great historical probability; but there will be those who will argue against it somewhat as follows. Richard, misled by the great morphological similarity of the pistillate flowers of *E. canadensis* to the bisexual flowers of *E. guyannensis*. and by the presence of staminodia in the former, doubtless believed he was describing *E. canadensis* in his generic diagnosis. The error was the easier because he knew neither the staminate flowers of *E. canadensis* nor the pistillate flowers of *Anacharis* which was founded solely on male material of a single species. There are many instances of morphological misinterpretation in early literature which are not allowed to affect the application of names clearly placed by citation of species. In any case, definiteness is, in nomenclature, a far brighter jewel than historical probability; what an author actually did, even if mistakenly, is a much surer basis for typification than what one thinks he thought. Richard actually cited *E. canadensis* under *Elodea;* Britton designated it as the type of the taxonomically identical *Philotria;* it should remain the type.

Under this interpretation, Richard, in his second publication, unwittingly shifted the application of *Elodea.* His *Anacharis* is, in effect, a renaming of his first *Elodea.* His second *Elodea* becomes a later homonym of the first; *Philotria*, a later synonym of *Anacharis.* The South American hermaphrodite species have to take the name *Apalanthe* Planch. Ann. Sci. Nat. ser. 3, xi. 75 (1849). But ANACHARIS again steps forth as the correct appellation for the North American species!

By whichever of the three possible taxonomic approaches, then, one goes at the matter, the nomenclatural conclusion is the same—an uncommonly and unexpectedly happy result.

GRAY HERBARIUM.

ANOTHER LOCALIZED VARIETY OF BIDENS HETERODOXA.—BIDENS HETERODOXA (Fernald) Fernald & St. John, var. **atheistica**, var. nov., *B. heterodoxam* et var. *orthodoxam* Fern. & St. John valde simulans; acheneis exterioribus 4–4.8 mm. longis interioribus 5–7 mm. longis strigosis, aristis nullis vel perbrevibus antrorse barbellulatis.—QUEBEC: tidal mud and slaty gravel by the St. Lawrence, Berthier, Co. Bellechasse, September 14, 1931, *Fernald*, no. 2952; tidal mud of the St. Lawrence, Anse St. Vallier, Co. Bellechasse, September 15, 1931, *Fernald*, nos. 2955 (TYPE in Gray Herb.), 2960.

Bidens heterodoxa, originally from tidal mud on Prince Edward Island, has normally developed awns, though antrorsely barbellate; var. *orthodoxa* of the Magdalen Islands is quite similar, but with retrorsely barbed awns; var. *agnostica* Fernald, known at a single station in Connecticut, has the long awns smooth and polished, not barbed. Another variety, from the same Connecticut station, var. *monardaefolia* Fernald, has long retrorsely barbed awns and leaves much broader and less saliently toothed than in the northern varieties. Var. *atheistica*, essentially without awns, has the foliage, involucres and other characters quite as in typical *B. heterodoxa.*

The occurrence of an awnless *Bidens* on the broad and deeply flooded tidal flats of the St. Lawrence is peculiarly interesting, in view of the occurrence with it of the wholly anomalous *Epilobium ecomosum* (Fassett) Fernald, RHODORA, xxxiv. 39 (1932), an estuarine species quite lacking the coma which is found in all other species of *Epilobium.* To those who profess not to believe in *adaptations* and *survival of the fittest*, these two cases are specially commended; in the tidal flats regularly flooded twice a day by water so deep as to justify the construction of extensive fish-weirs the plumose coma and the retrorsely barbed awns are of no use in distributing the species.

Not all the species of *Bidens* in the estuary of the St. Lawrence, however, have lost their retrorsely barbed awns. *B. hyperborea* in several forms is there, though *B. frondosa* is chiefly (if not entirely) represented by the var. *anomala* Porter, with antrorsely barbellate awns. On the broad tide-covered swales at Ste. Anne de Beaupré I got perfectly characteristic *B. Eatoni* Fernald, var. *fallax* Fernald, the first station for the variety except in the estuary of the Merrimac in Massachusetts and the first for any form of the species from north of the coast of New England.

I made very extensive collections of these and several other plants of the St. Lawrence estuary, especially at Ste. Anne de Beaupré and at Anse St. Vallier. Unfortunately the packages, sent by parcel post to be finally dried at the Gray Herbarium, ran into obstructions at the United States customs and were *six weeks* between Quebec and Boston. There are few duplicates fit for distribution.—M. L. Fernald, Gray Herbarium.

Does Juncus bulbosus occur in Massachusetts?—One of the most distinctive species of *Juncus* is the widely dispersed Atlantic European and Macronesian *J. bulbosus* L. (*J. supinus* Moench, *J. uliginosus* Roth), a weak perennial with many decumbent or repent culms from the hardened base; the flowers and fruits somewhat as in *J. acuminatus* Michx., with 3 stamens, blunt petals, and blunt capsules; the glomerules, when leaning or falling into very wet places, quickly proliferous and developing plumes of many leaves. The plant was collected early in the last century in southeastern Newfoundland, by Bachelot de la Pylaie, and it was definitely listed from there in the *Monographie des Vrais Joncées* by Laharpe: "Elle habite les marais fangeux ou sablonneux, à Terre-Neuve!"[1] In 1890, however, in his *Monographia Juncacearum*, Buchenau stated that its range included only Europe, Algeria, Tunis, Madeira and the Azores, and suggested that the la Pylaie material is more probably *J. acuminatus* (which does not grow in Newfoundland): "Ob *J. supinus* in Neu-Fundland vorkommt, wo de la Pylaie ihn gesammelt haben soll,

[1] Laharpe, Mém. Soc. d'Hist. Nat. Par. iii. 135 (1827).

bedarf noch weiterer Beobachtungen (vergl. die Anmerkungen zu *J. supinus* und zu *J. acuminatus*)."[1] More recent botanists, beginning with Waghorne, have, however, collected the species and now all doubt of its American occurrence is removed; it is abundant about or in sandy or peaty pools and depressions in southeastern Newfoundland, on St. Pierre et Miquelon and on Sable Island, nearly one hundred miles off Nova Scotia.

The object of this note is to stimulate search for *Juncus bulbosus* in Massachusetts, not as a mere random proposition, but because, in the herbarium of the British Museum there is a perfectly typical specimen of it bearing the original and very characteristic label of Thomas Nuttall: "*Juncus uliginosus.* Mass." Here, indeed is a challenge. Is *J. bulbosus* another of the highly localized relics of an early migration along the continental shelf between southern New England and Newfoundland? The number of such cases known is considerable. The number of western Eurasian types also indigenous in Newfoundland is augmented by every serious exploration. Several of the latter species are also in Nova Scotia or in eastern Massachusetts, while a few are native in Nova Scotia or in eastern Massachusetts (or adjacent areas) but not yet known from Newfoundland: such species as *Potamogeton polygonifolius* Pourret (Nfld., Miq., Sable I.); *Puccinellia maritima* (Huds.) Parl. (N. S., s. Me. to R. I.); *Sieglingia decumbens* (L.) Bernh. (Nfld., N. S.); *Agropyron pungens* (Pers.) R. & S. (N. S., s. Me. to Cape Cod); *Carex Hostiana* DC. (var. *laurentiana* Fern. & Wieg.) (Nfld., Miq., Antic. I., Tewksbury, Mass.); *Juncus effusus*, var. *conglomeratus* (L.) Engelm. (Nfld., Miq., N. S., se. Conn.); *Polygonum Raii* Bab. (Nfld., Miq., N. S., etc.); *Ranunculus Flammula* L. (Nfld., Miq., N. S.,) and *Potentilla procumbens* Sibth. (Nfld., N. S.).

Although Nuttall, a century ago, may have found *Juncus bulbosus* on one of the outer sands which have subsequently disappeared, it is worth while to keep it in mind. There are plenty of sandy and peaty depressions in eastern Massachusetts where it may still linger.—M. L. Fernald.

An estuarine Variety of Mimulus ringens.—In September, 1916, Mr. Bayard Long and I collected extensively on the tidal mudflats of the Penobscot and Kennebec systems in Maine. On the tidal

[1] Buchenau in Engl. Bot. Jahrb. xii. 293 (1890).

mud at Bangor we got a very characteristic extreme of *Mimulus ringens* L., with greatly shortened internodes, unusually short leaves, and peduncles and calices much shorter than in the plant of ordinary inland shores and meadows. In September, 1931, I saw the same extreme development on several tidal shores of the St. Lawrence from above the city of Quebec to several miles below. The material, closely matching that from the Penobscot estuary, stands so clearly apart from typical *M. ringens* that I am separating it as

Mimulus ringens L., var. **colpophilus**, var. nov., simplex vel subsimplex, internodiis 1.5–2.5 cm. longis; foliis oblongis subacutis vel obtusis plerumque 2.5–5 cm. longis; pedunculis 1–1.7 cm. longis; calycibus maturis 8–10 mm. longis.—Quebec: tidal mud of the St. Lawrence below the mouth of Chaudière River, September 15, 1931, *Fernald*, no. 2543 (type in Gray Herb.); and noted in other parts of the estuary northeastward to Co. Bellechasse. Maine: tidal mud-flats of the Penobscot, Bangor, September 7, 1916, *Fernald & Long*, no. 14,501.

In typical *Mimulus ringens* L. and in the southern var. *minthodes* (Greene) Grant the internodes are usually elongate, the middle and upper ones mostly 3–7 cm. long, the principal leaves (except in obviously dwarfed individuals) 5–13 cm. long, the lowest peduncles 2–4.5 cm. long and the mature calyx 1.3–2 cm. long. Var. *colpophilus* is not to be confused with var. *congestus* Farw. Rep. Mich. Acad. Sci. xix. 249 (1917). The type-number of the latter, represented in the Gray Herbarium, has the long and remote acuminate leaves and the large calyx of typical *M. ringens,* with peduncles shorter than the average.—M. L. Fernald, Gray Herbarium.

Victorin's Les Spadiciflores du Québec.[1]—Continuing the interesting and valuable series of monographs which will one day form a complete flora of Quebec, Frère Marie-Victorin has recently published this new contribution on *Araceae* and *Lemnaceae,* grouped together as *Spadiciflores.* As in the previous monographs, the descriptions bring together not only the morphological details necessary for classification, but notes on the derivation of Latin and vernacular names, palaeobotany, distribution, bio-ecology, pathology, folklore, and other interesting facts about the plants considered. Especially interesting is the carefully worked out differentiation between *Arisaema triphyllum* and *A. Stewardsonii.* Carefully drawn plates by Frère Alexandre help much to make this clear. In fact, the illustrations are uniformly good, and the distribution maps as well. Six half-tone plates of different phases in the life of *Symplocarpus,*

[1] Les Spadiciflores du Quebec. Par Frère Marie-Victorin. 60 pages, 27 figures. 1931. $.75. (Contrib. Lab. Bot. Univ. Montréal, No. 19.)

as "*cliché*" by Frère Adrien are very pleasing. The treatment of the three species of *Lemnaceae* found in Quebec summarizes what various previous students have discovered, as well as Frère Victorin's own researches. Careful drawings by Frère Réole show all the details of these small retrograde plants. Although credit is given to other authorities, a brief bibliography of sources would prove helpful to other students continuing the study of the group.—Clarence Hinckley Knowlton, Hingham, Massachusetts.

Flora of the North Shore of the Gulf of St. Lawrence.[1]—Dr. Harrison Lewis, for several years officially engaged in ornithological work for the Department of the Interior of Canada, had an unusual opportunity to visit many of the innumerable islands which fringe the southern coast of the Labrador Peninsula. Happily, his second interest was botanical, and with an eye for novelties and for problems of local distribution, he made extensive collections upon which he now reports. As a supplement to the earlier study by St. John (1922) of the same region Lewis's paper is important. The first part discusses in a novel way the factors (decomposing molluscs, marine salts, etc.) which supply calcareous habitats for local colonies of plants in prevailingly acid areas. In the list itself 567 vascular plants are enumerated, several of them not previously reported from the North Shore, others notable range extensions, and a few decidedly thrilling discoveries: *Sparganium glomeratum*, a Lapland species heretofore of only doubtful status in America; *Salix simulans*, a local endemic; *S. paraleuca*, heretofore known only from the southern side of the Gaspé Peninsula; *Sedum villosum*, discovered by St. John at its first known American stations south of Greenland, now found to extend for 42 miles along the coast. A number of nomenclatural transfers are made, so that those who do not have access to the Annotated List as it appeared serially will need the reprint. Others, who wish merely to keep track of botanical exploration in northeastern America will also want the reprint. Its modest price makes it available to all.—M. L. F.

[1] Lewis, Harrison F. *An Annotated List of Vascular Plants collected on the North Shore of the Gulf of St. Lawrence, 1927–1930* by Harrison F. Lewis. Reprinted from Canadian Field-Naturalist, vol. xlv. Reprint issued by H. C. Miller, 175 Nepean St., Ottawa, Ont. *Price* 45c.

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Fernald

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NOTES ON THE CLADONIAE OF CONNECTICUT[1]

ALEXANDER W. EVANS

THE writer's report on the Cladoniae of Connecticut,[2] published in 1930, was based on collections made in various parts of the State down to the close of 1928. In the preparation of this report valuable help was obtained from Mr. C. A. Robbins, of Onset, Massachusetts, who determined most of the material and made observations on many of the more critical specimens. Since 1928 the exploration for Cladoniae in Connecticut has been continued, and the present paper, which represents a supplement to the earlier report, summarizes the results of these explorations down to the close of 1931.

Since the death of Mr. Robbins in 1930 the writer has been fortunate in securing the kind coöperation of Dr. Heinrich Sandstede, of Bad Zwischenahn, Oldenburg, the leading authority on the genus Cladonia. Dr. Sandstede has not only determined a number of puzzling specimens but has also given his opinion on several problematical species and forms. The writer would here express to Dr. Sandstede his grateful appreciation.

Two important works on Cladonia, which have a more or less direct bearing on the Connecticut species, were published in 1931. The first of these is Sandstede's beautifully illustrated volume in the Rabenhorst Flora.[3] This gives the most recent views on the various species and forms of Europe and is especially noteworthy for the critical remarks on the specimens distributed in the author's

[1] Contribution from the Osborn Botanical Laboratory.

[2] Trans. Connecticut Acad. **30**: 357–510. 1930.

[3] Die Gattung Cladonia. In Rabenhorst, Kryptogamen-Flora von Deutschland, Oesterreich und der Schweiz **9**, Abt. 4[2]: 1–531. *pl. 1–34.* Leipzig, 1931.

Cladoniae Exsiccatae. All but 12 of the Connecticut species are figured. The second work is the paper by Robbins and Blake on the Cladoniae found in the vicinity of Washington.[4] This paper lists 36 species and gives keys for their determination. The figures include illustrations of 30 species represented in the Connecticut flora.

The writer's 1930 report listed 45 species for Connecticut, represented by 163 forms. Subsequent study has yielded 5 additional species but has eliminated *C. foliacea,* which was reported on insufficient evidence. This gives a total of 49 species for the State, and these are now represented by 200 forms. The present paper lists the additions that have been made for the State as a whole and for individual towns and also revises some of the older records. This revision involves a few incorrect or doubtful determinations but is mainly due to newer concepts regarding the definition of certain species and forms. The sequence followed is the same as in the 1930 report and all page-references, unless otherwise indicated, relate to this report. Species and forms reported for the first time from Connecticut are marked with asterisks, even where the specimens in question have been previously reported under different names. Stations listed with dates alone refer to specimens collected by the writer; all other stations are listed with both dates and collectors' names. Specimens from all the stations listed are preserved in the herbarium of Yale University.

Subgenus CLADINA

Cladonia rangiferina (L.) Web. (p. 375). Granby (*Musch & Evans,* 1930), Lyme (1930), Suffield (*Musch & Evans,* 1930), Wallingford (1931), and Winchester (1931).

Cladonia rangiferina f. crispata Coem. (p. 377). Winchester (1931, det. Sandstede).

Cladonia rangiferina f. prolifera Flot. (p. 377). Stamford (1928, det. Sandstede, not previously reported).

*Cladonia rangiferina f. tenuior (Del.) Mass. Sched. Crit. 115. 1855 (as variety); Olivier, Fl. Lich. de l'Orne, etc. 38. 1882 (as form). *Cenomyce rangiferina* var. *tenuior* Del. Lich. France *20.* 1828; in Duby, Bot. Gall. 621. 1830.

On sandy soil, North Branford (1931, det. Sandstede). First record for North America.

The colonies of *f. tenuior* are composed of low, slender, richly branched podetia and tend to be small and rounded. Sandstede

[4] Cladonia in the District of Columbia and vicinity. Rhodora 33: 145–159. *pl. 210–212.* 1931.

suggests that the form may perhaps represent a juvenile condition of normal *C. rangiferina.*

CLADONIA SYLVATICA (L.) Hoffm. (p. 378). North Branford (1931), Old Saybrook (1931), and Winchester (1931).

CLADONIA SYLVATICA f. PYGMAEA Sandst. (p. 381). Lyme (1930, det. Sandstede).

CLADONIA SYLVATICA f. PROLIFERA Sandst. (p. 381). Wilton (1931).

CLADONIA MITIS Sandst. (p. 383). Lyme (1930) and Wilton (1931).

CLADONIA MITIS f. PROLIFERA Sandst. (p. 383). Wallingford (1931).

CLADONIA TENUIS (Floerke) Harm. (p. 384). Barkhamsted (1928, det. Sandstede, listed on p. 387 as *C. impexa* f. *laxiuscula,* not new to the town), Essex (1931), Granby (*Musch & Evans,* 1930), Kent (1931), Lyme (1930), Middlebury (*Musch & Evans,* 1929), Milford (1931), Wallingford (1931), and Wilton (1931).

*CLADONIA TENUIS f. SETIGERA Sandst. in Rabenhorst, Kryptogamen-Flora **9,** Abt. 4^2: 52. 1931.

On earth in fields and open woods. Essex (1931, first collection for Connecticut), Lyme (1931), and Madison (1931), all determined by Sandstede. New to North America.

The podetia of f. *setigera* produce pale, hair-like appendages, which often become blackish with age. According to Sandstede's account they sometimes occur at the tips of branchlets bearing spermagonia and sometimes spring from the sides of the podetia.

*CLADONIA TENUIS f. PROLIFERA Sandst. in Rabenhorst, Kryptogamen-Flora **9,** Abt. 4^2: 52. 1931.

On earth in a field, Newtown (1928, det. Robbins, not previously reported). New to North America.

This form shows short, adventive outgrowths, springing from the sides of old prostrate podetia. It is analagous to the proliferous conditions of the three preceding species.

Subgenus PYCNOTHELIA

CLADONIA PAPILLARIA (Ehrh.) Hoffm. f. MOLARIFORMIS (Hoffm.) Schaer. (p. 390). East Haven (1931), Essex (1931), Hamden (1931), North Branford (1931), Old Saybrook (1931), and Wallingford (1931).

CLADONIA PAPILLARIA f. STIPATA Floerke (p. 391). North Branford (1931) and Wilton (1931).

CLADONIA PAPILLARIA f. PAPILLOSA Fr. (p. 391). East Haven (1931), Essex (1931), Hamden (1931), Old Saybrook (1931), and Wallingford (1931).

*CLADONIA PAPILLARIA f. EPISTELIS Sandst. in Rabenhorst, Kryptogamen-Flora **9,** Abt. 4^2: 88. 1931.

On sandy soil, Wilton (1931, det. Sandstede). New to North America.

In this form, which was based on specimens collected in Baden by Braun, the apothecia arise directly from the sides of the podetia, instead of being borne on the tips of definite branchlets.

*Cladonia papillaria f. prolifera (Wallr.) Schaer. Enum. Crit. Lich. Europ. 265. 1850. *Patellaria coccinea* b. *molariformis β. prolifer* Wallr. Naturg. Säulch. Flecht. 172. 1829.

On sandy soil, North Haven (1931). Not before reported from North America.

This form is analagous to the proliferous states found in the subgenus Cladina. It is characterized by the presence of adventive branches springing from the sides of the podetia and may arise when normal development is disturbed by mechanical or other factors. The adventive branches are sometimes simple and papilliform and sometimes sparingly subdivided.

Subgenus CENOMYCE

Section Cocciferae

Subsection Subglaucescentes

Cladonia Floerkeana (Fr.) Floerke var. intermedia Hepp (p. 393). Lyme (1931), North Branford (1931), Wallingford (1931), and Winchester (1931).

Cladonia Floerkeana var. carcata (Ach.) Vainio (p. 394). Essex (1931), Greenwich (1931), Lyme (1931), North Branford (1931), Old Lyme (1930), and Wilton (1931).

Cladonia Floerkeana var. carcata f. squamosissima (Th. Fr.) Vainio (p. 394). Essex (1931), North Branford (1931), and Wilton (1931).

Cladonia bacillaris (Ach.) Nyl. (p. 395). Essex (1931), Fairfield (1931), Lyme (1931), Milford (1931), Old Lyme (1930), Suffield (*Musch & Evans*, 1930), Wallingford (1931), and Wilton (1931).

Cladonia bacillaris f. clavata (Ach.) Vainio (p. 397). North Branford (1931), North Haven (1931), Old Lyme (1930), and Old Saybrook (1931).

Cladonia bacillaris f. peritheta (Wallr.) Arn. (p. 397). Old Lyme (1930).

Cladonia bacillaris f. reagens Evans (p. 397). Cornwall (1931), North Haven (1931), and Old Saybrook (1931).

*Cladonia bacillaris f. abbreviata (Vainio) Harm. Lich. France 336. 1907. *C. bacillaris* var. *abbreviata* Parrique, Actes Soc. Linn. Bordeaux **59**: 115. 1904. *C. bacillaris* m. *abbreviata* Vainio in Parrique *l. c.* (as synonym).

On tree bases. Guilford (1926, not previously reported) and Old Saybrook (1931, det. Sandstede). New to North America.

According to Harmand f. *abbreviata* is distinguished by its very short, strongly sorediose podetia and by its small, incised-crenulate primary squamules, which are likewise sorediose, sometimes so strongly so that they become transformed into soredia and give the thallus a powdery appearance.

*Cladonia bacillaris f. sorediata Sandst. in Rabenhorst, Kryptogamen-Flora **9**, Abt. 4^2: 106. 1931.

On an old log, Old Saybrook (1931, det. Sandstede). The first record for North America.

In the present form the development of soredia is unusually exuberant, so that more or less elevated masses are sometimes formed. These are usually situated on the primary squamules but may be on the podetia.

Cladonia macilenta Hoffm. f. styracella (Ach.) Vainio (p. 399). Essex (1931), North Branford (1931), North Haven (1931), Wallingford (1931), and Winchester (1931).

Cladonia macilenta f. granulosa Aigret (p. 400). Wallingford (1931).

*Cladonia macilenta f. squamigera Vainio, Acta F. et Fl. Fennica **4**: 109. 1887 (as *C. macilenta* **β. squamigera*); Harmand, Bull. Soc. Sci. Nancy II. **14**: 341. 1895 (as variety).

On an old stump, Wallingford (1931). Not before recorded from North America.

The podetia of f. *squamigera* are sorediose, much as in f. *styracella*, but are distinguished by being more or less squamulose throughout, even in close proximity to the apothecia.

*Cladonia didyma (Fée) Vainio, Acta Soc. F. et Fl. Fennica **4**: 137. 1887. *Scyphophorus didymus* Fée, Ess. Crypt. Ecorc. Exot. Off. xcviii, *pl. 3, f. 13.* 1824. *Cladonia pulchella* (Schwein.) Fr. Lich. Eur. Ref. 232. 1831 (*nomen nudum*); Tuckerman, Am. Jour. Sci. Arts **25**: 427. 1858.

On logs, stumps, rocks, and soil rich in humus, sometimes growing with mosses.

The species has a wide distribution, especially in tropical regions. It has been reported from various parts of South America, extending from Colombia to Chile; from several islands of the Pacific; from Australia; from Java and Ceylon; and from the Comoro Islands and Réunion in the Indian Ocean. In North America it is known from Mexico and the West Indies northward in the eastern United States as far as Massachusetts, where Willey found it in the vicinity of New Bedford.[5] In 1927 the writer reported it from Connecticut[6]

[5] See Vainio, Acta Soc. F. et Fl. Fennica **10**: 444. 1894.
[6] Rhodora **29**: 100. 1927.

but afterwards showed (p. 397) that this record was based on specimens of *C. bacillaris*. The specimens listed below, therefore, represent the first authentic reports for the State.

In certain respects *C. didyma* is related to *C. Floerkeana, C. bacillaris,* and *C. macilenta*. All four species are characterized by well-developed primary squamules, which show no indication of stramineous coloration, and by cupless podetia tipped with red apothecia; in most cases the podetia are simple or sparingly branched, although more copiously branched forms are occasionally developed.

Both the primary squamules and the podetia, however, yield distinctions of importance. In *C. didyma* the squamules, which are narrow and relatively thin, do not produce soredia and are deeply laciniate, incised, or crenate. In the other three species the squamules are broader and thicker, their marginal indentations are shallower, and they usually produce soredia in greater or less abundance, even if squamules without soredia occasionally occur. The differences in the podetia are still more striking. In *C. didyma* the podetial surface is at first covered over with scattered or crowded squamules, verruculae, or granules, sometimes interspersed with fine soredia. These structures, however, which represent the outer medullary layer (and in most cases the cortex as well), tend to disappear more or less completely and leave the well-developed cartilaginous layer of the medulla exposed. This layer presents a translucent appearance, whitish at first but usually turning yellowish or brownish with age. In the other three species the podetial surface is usually densely sorediose, either wholly or in part, and when green tissues are present they form flat green areas rather than verruculae or granules. After the disappearance of the soredia the denuded surface appears opaque, white, and more or less rough or even arachnoid, owing to the persistence of the loosely interwoven hyphae of the outer medullary layer. It is only in very old and weathered specimens that the cartilaginous layer is exposed.

There is perhaps a slight danger of confusing *C. didyma* with *C. cristatella*, especially with forms in which a stramineous tinge is scarcely apparent. In *C. cristatella*, however, the podetial surface is neither granular nor sorediose, and the portions not covered over with the green outer layer are white and opaque. The closely related *C. incrassata* agrees with *C. didyma* in showing translucent and often darkened areas on old podetia, but this species is at once distinguished by its yellowish primary squamules, which usually produce soredia in abundance.

Vainio recognized two varieties of *C. didyma:* var. *muscigena* (Eschw.) Vainio, which is negative with KOH, thus agreeing with *C. Floerkeana* and *C. bacillaris;* and var. *vulcanica* (Zolling.) Vainio, which gives a yellow reaction with KOH, thus agreeing with *C. macilenta.* Shortly before his death Mr. Robbins expressed the opinion that the second variety, which is unknown in Connecticut, ought to be recognized as a valid species under the name *C. vulcanica* Zolling., and this seems to be a reasonable course to follow. The var. *muscigena* could then be considered a simple synonym of *C. didyma* or else be given formal rank. The Connecticut specimens of the species are referable to the following forms:

*Cladonia didyma f. subulata Sandst. Clad. Exsic. *1685.* 1927 (as modification).

On logs and stumps. Lyme (1931, first collection for the State), Madison (1931), and North Branford (1931). The specimens were determined by Sandstede.

The original specimens of f. *subulata* were collected by S. Rapp at Sanford, Florida, and agree in all essential respects with the Connecticut specimens. In his description of the form, Sandstede calls attention to the pointed, translucent, and decorticate podetia, which are almost always sterile.

*Cladonia didyma f. **squamulosa** Robbins, f. nova, podetia in omnibus partibus squamulosa.

On logs and stumps. Lyme (1931, first collection for Connecticut) and North Branford.

Robbins applied the name "*squamulosa*" to various specimens from the South; these are mostly a little more robust than the Connecticut specimens but are otherwise in agreement. The squamules present, which vary considerably in number and in size, are very much like the primary squamules.

Subsection Stramineo-flavidae

Cladonia pleurota (Floerke) Schaer. (p. 400). Middlebury (*Musch & Evans,* 1929), North Branford (1931), Old Saybrook (1931), Suffield (*Musch & Evans,* 1930), Wilton (1931), and Winchester (1931).

Cladonia pleurota f. decorata Vainio (p. 402). Essex (1931) and Old Saybrook (1931).

*Cladonia pleurota f. cerina (Nagel) Oliv. Mém. Soc. Sci. Nat. Math. Cherbourg **36**: 119. 1907 (as variety); Sandstede in Rabenhorst, Kryptogamen-Flora **9**, Abt. 4^2: 147 (as form). *C. cerina* Nagel in

Rabenhorst, Lich. Eur. Exsic. *303*. 1857; Ohlert, Schr. Königl. Physikal.-Oeconom. Ges. Königsberg. **4**: 16. 1863. *C. coccifera* *ε. *cerina* Vainio, Acta Soc. F. et Fl. Fennica **4**: 172. 1887; Zahlbruckner, Cat. Lich. Univ. **4**: 465. 1926 (as variety). *C. pleurota* f. *pallescens* Evans, Trans. Connecticut Acad. **30**: 402. 1930.

On earth, usually in old fields or over rocks. East Haven (1931), Essex (1931), Lyme (1931), Old Saybrook (1931), and Wallingford (1931). Other stations have been reported under f. *pallescens* (p. 403).

The writer's f. *pallescens* was based on specimens with small yellowish bodies borne on the margins of the cups. These bodies were interpreted as aborted apothecia. Sandstede, however, expressed the opinion (*in. litt.*) that they were conidial conceptacles or spermagonia instead and that f. *pallescens* was really the spermagonial state of f. *cerina*. In most of the plants examined the bodies in question failed to show definite reproductive structures, but a few were clearly spermagonial in character. Sandstede's view that the plants should be referred to f. *cerina* is supported by Vainio's statements regarding the similarity in color between the apothecia and spermagonia in the Cocciferae.[7] When the apothecia show the characteristic red color, according to his account, the same color appears in the spermagonia, although it may be restricted to the parts surrounding the orifice; when, on the contrary, the apothecia are pale, the spermagonia also are pale, at least in part. The apothecial state of f. *cerina* has been found in Maryland by Blake.[8]

Cladonia pleurota var. frondescens (Nyl.) Oliv. (p. 403). North Branford (1931).

*Cladonia pleurota f. albida Vainio, Acta Soc. F. et Fl. Fennica **53**[1]: 38. 1922.

On rock in pasture, North Branford (1931, det. Sandstede). New to North America.

The podetia of f. *albida* are more whitish than in the usual forms of the species and sometimes show a vague bluish tint. When KOH is added a distinct yellowish reaction is obtained. The soredia are often coarsely granular. The form was described from specimens collected in Finland, but Sandstede cites it also from Czechoslovakia and Germany.

Cladonia cristatella Tuck. (p. 403). Bethany (1931) and Wilton (1931). Not definite as to form.

Cladonia cristatella f. Beauvoisii (Del.) Vainio (p. 405). Essex (1931), Lyme (1931), Old Lyme (1930), Old Saybrook (1931), and Suffield (*Musch & Evans*, 1930).

[7] Acta Soc. F. et Fl. Fennica **14**[1]: 79. 1897.
[8] See Rhodora **33**: 154. 1931.

Cladonia cristatella f. vestita Tuck. (p. 407). Bethany (1931), Granby (*Musch & Evans,* 1930), Lyme (1931), Old Lyme (1931), and Old Saybrook (1931).

Cladonia cristatella f. squamosissima Robbins (p. 408). Madison (1931) and North Branford (1931).

Cladonia cristatella f. pleurocarpa Robbins (p. 408). Essex (1931), Lyme (1931), New Haven (1931), and North Branford (1931).

Cladonia cristatella f. squamulosa Robbins (p. 410). New Haven (1931) and North Haven (1931).

*Cladonia incrassata Floerke, Clad. Comm. 21. 1828. *C. cristatella* var. *paludicola* Tuck. Syn. N. Am. Lich. **1**: 255. 1882. *C. paludicola* Merrill, Bryologist **27**: 23. 1924.

On decaying wood or peaty soil. Bethany (1931), Lyme (1931), Madison (1931), North Branford (1931), North Haven (1931), and Wallingford (1931). Previously reported (p. 410, under *C. paludicola*) from Canterbury, Chester, East Hampton, Ledyard, and Stafford.

Although the validity of *C. paludicola* is recognized in the writer's report (p. 410), its close relationship to *C. incrassata* is suggested. Some of the specimens listed above, especially those from Bethany, are unusually luxuriant and give a better idea of *C. paludicola* than the material previously examined. These specimens have been carefully compared with the representative series of *C. incrassata* in Sandstede's Cladoniae Exsiccatae and fail to bring out any essential differences between them. According to the published descriptions the podetial cortex of *C. incrassata* is sometimes more or less sorediose, while nothing is said about sorediose podetia in the descriptions of *C. paludicola.* This seems to be the most important distinction indicated, but it is not constant. Whitish sorediose areas on the podetia can occasionally be demonstrated in North American specimens of *C. paludicola,* even if their occurrence is less frequent than in European specimens of *C. incrassata.* It therefore becomes necessary to reduce *C. paludicola* to synonymy. The known range of the species in Europe extends from Sweden and the British Isles to Austria and Italy. It has been found also in Kamchatka.[9]

*Cladonia incrassata f. **squamulosa** (Robbins) comb. nov. *C. paludicola* f. *squamulosa* Robbins in Evans, Trans. Connecticut Acad. **30**: 412. 1930. *C. incrassata* m. *phyllocephala* Sandst. in Rabenhorst, Kryptogamen-Flora **9,** Abt. 4^2: 150. 1931.

On decaying wood. Bethany (1931) and North Haven (1931). Previously reported from Old Saybrook (p. 412, as *C. paludicola* f. *squamulosa*).

[9] See Savicz, Repert. Spec. Nov. Regni Veg. **19**: 344. 1924

Section Ochrophaeae

Subsection Unciales

Only two species of the Unciales, *C. uncialis* and *C. Boryi*, are recognized in the Cladoniae of Connecticut, but a third species, *C. caroliniana*, is well represented in the flora of the State. This species, which has not been well understood by students of the genus, occupies a position between *C. uncialis* and *C. Boryi*, and certain specimens of *C. caroliniana* are listed under one or the other of these two names in the writer's report. When Tuckerman, in 1858, first published the species he found it "difficult to indicate satisfactory characters to distinguish it from extreme, or at least possible states of *C. uncialis* var. *turgescens*, Schaer.," and yet he believed "the two to be quite distinct plants." Later on he changed his opinion about it and, in 1882, described it as a variety of *C. uncialis*. Vainio also was in doubt about the validity of *C. caroliniana* as a species and, without having seen authentic specimens, listed it in his Monograph as a subspecies under *C. uncialis*. Merrill, on the other hand, in his Lichenes Exsiccati, and Zahlbruckner, in his Catalogue, did not hesitate to give *C. caroliniana* full specific rank. From the study of abundant material the writer is convinced that the claims of the species for recognition are well founded, in spite of the fact that certain juvenile stages bear a strong resemblance to analagous stages of *C. uncialis*. The Connecticut representatives of the Unciales may be distinguished by the following key:—

Podetia firm in texture, yellowish gray to yellowish or brownish green; podetial wall continuous or with clearly defined axillary or internodal perforations; cortex distinct and continuous (or subcontinuous), the outer podetial surface tending to be smooth.

Podetia pale yellowish green to brownish green, cupless; axillary perforations more or less numerous on both sterile and fertile plants; inner medullary (or cartilaginous) layer distinct and usually continuous, the inner podetial surface uniform. . . . . *C. uncialis.*

Podetia yellowish gray to pale yellowish green, usually cupless but occasionally with shallow cups; axillary perforations lacking (or exceedingly rare) on sterile plants, present on fruiting plants; inner medullary (or cartilaginous) layer not distinct, represented by irregularly distributed strands of hyphae, the inner podetial surface showing a vague network. *C. caroliniana.*

Podetia delicate in texture, cupless or with more or less definite cups, ashy gray, sometimes faintly tinged with yellowish; podetial wall in the older parts usually irregularly perforated and sometimes reticulate; axillary perforations more of less numerous; cortex scarcely differentiated, the outer podetial surface dull but not arachnoid; inner medullary layer somewhat as in *C. caroliniana* but the strands of hyphae still more scattered, the inner podetial surface showing a looser and more distinct network. . . . . *C. Boryi.*

C. UNCIALIS (L.) Web. (p. 413). Granby (*Musch & Evans*, 1930), Lyme (1930, 1931), Old Lyme (1930), Suffield (*Musch & Evans*, 1930), Wallingford (1931), and Wilton (1930).

The stramineous tinge of *C. uncialis* is usually very distinct, the color varying from a pale yellowish green to brownish greens of different shades. Sometimes, especially in old herbarium specimens, the podetia are straw-colored, with little or no indication of green to the naked eye, but even in these the irregular green areolae become evident under the lens. These areolae, especially in actively growing plants, stand out clearly and are separated from one another by paler bands or lines. They sometimes project as low verruculae but often do not project at all. In either case the outer podetial surface presents a smooth appearance, since the cortex covers both the areolae and the spaces between. Sometimes a slight glossiness is apparent.

Although the podetia of *C. uncialis* are exceedingly irregular in their branching, especially when the various forms are taken into consideration, it is not difficult to see that they exhibit a succession of dichotomies or polytomies or both. In other words the irregularity of the branch-systems is not increased to any great extent by the appearance of short branches or outgrowths additional to the main branches. In this respect *C. uncialis* is distinguished from the more robust forms of *C. caroliniana*. Most of the descriptions of *C. uncialis* emphasize the pointed and pigmented tips of the ultimate branchlets. These are sometimes very much in evidence and perhaps represent a response to intense insolation. They are smooth or even glossy, varying in color from dark to blackish brown, and are sometimes bristle-like in appearance. In other cases deeply pigmented tips are difficult to demonstrate and may be absent altogether. Under these circumstances the tips may vary in color from whitish or yellowish to pale brown.

Axillary perforations are sometimes present in abundance and are sometimes few and far between. Vainio, in fact, described a f. *integerrima*[10] in which the axils were said to be always closed, and this form is recognized by both Anders and Sandstede. It is doubtful,

[10] Acta Soc. F. et Fl. Fennica 4: 270. 1887.

however, whether perforations are ever completely lacking in a colony of any size, and the writer has been able to demonstrate their presence in all the material of *C. uncialis* at his disposal, with the exception of a single small colony. Even the four specimens in Sandstede's Exsiccati, Nos. 155, 300, 444, and 553, which he cites somewhat provisionally under f. *integerrima*,[11] show occasional perforations. It seems justifiable, therefore, to consider the presence of axillary perforations as a definite specific character of *C. uncialis*, even if many axils remain imperforate. Axils of this type are found especially in dichotomies and are therefore most frequent in young plants or in plants which have persisted in a juvenile stage of development. In robust specimens, especially where the branching is largely polytomous in character, closed axils are relatively rare. The axillary perforations vary in size from the merest pin-points to large and distinct openings. In rare cases similar perforations are present in the internodal podetial walls.

Vainio, in his Monograph, gives a clear description of the podetial wall in *C. uncialis*. According to his account the wall, in spite of its firmness, is relatively thin, measuring only 0.1–0.2 mm. in thickness. The well-differentiated cortex consists of thick and closely united subvertical hyphae and is 30–40 μ thick. The inner medullary (or cartilaginous) layer, which is not sharply delimited from the outer layer, is 30–80 μ thick and composed of similar thick, coalesced hyphae, sometimes jelly-like in appearance, with only the lumina distinct. Between these two layers the outer medullary layer, which encloses the algal cells among its finer and more loosely interwoven hyphae, is situated. Vainio's description applies to the podetia studied by the writer, except that the line of demarcation between the two medullary layers is perhaps more definite than the description implies. It is, to be sure, a wavy irregular line as seen in cross-sections, since strands of coalesced hyphae bulge into the outer layer, but these strands are united to form a continuous layer around the central podetial cavity and apparently never bulge far enough to reach through the outer layer to the cortex. When the cartilaginous layer is examined from the inside under the lens it presents a smooth and uniform appearance, sometimes slightly pulverulent, although the inner boundary in cross-section forms a somewhat irregular line.

Five forms of *C. uncialis* are listed in the writer's report, and many

[11] In Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: 186. 1931.

others have been described in the literature. Some of these forms, as in other species of Cladonia, are based on fairly satisfactory characters, while others are based on vague, inconstant, and intergrading characters. This becomes evident from the study of published descriptions and from the examination of specimens in exsiccati assigned to definite forms. One consequence of this condition is that a given specimen can sometimes be referred to either one of two forms. Sandstede, for example, states that No. 553 of his exsiccati, which he first lists under f. *dicraea*, might be referred to f. *integerrima*, and that Nos. 155, 300, and 444, which he first lists under f. *integerrima*, might be referred to f. *setigera*. In some cases, therefore, the citation of a specimen under a definite form may be largely a matter of convenience and need not always indicate that the form in question is a definite taxonomic unit. This will apply to some of the specimens listed below.

Cladonia uncialis f. subobtusata Coem. (p. 416). Old Lyme (1930).

The distinctive features of this form are two: large axillary perforations and hair-like "rhizinae," varying in color from whitish to blackish. These features are shown clearly by the plants from Old Lyme. Most of the specimens previously listed by the writer, however, although producing rhizinae in considerable abundance, have most (if not all) of their axils imperforate. They should be referred, in fact, not to *C. uncialis* at all but to *C. caroliniana* and are listed below under that species.

Cladonia uncialis f. dicraea (Ach.) Vainio (p. 416). Lyme (1931, det. Sandstede).

Cladonia uncialis f. spinosa Oliv. (p. 417). Shelton (1928, det. Sandstede, not previously reported).

*Cladonia uncialis f. turgescens (Del.) Fr. Lich. Eur. Ref. 244. 1831 (as *C. uncialis* c. *turgescens*). *Cenomyce uncialis* η. *turgescens* Del. in Duby, Bot. Gall. 620. 1830.

On earth over rocks, Old Lyme (1930, det. Sandstede).

The podetia of f. *turgescens* are characterized by their large size and relatively sparse branching. According to Sandstede f. *biuncialis* (Hoffm.) Harm. (p. 417) should be included under f. *turgescens*.

*Cladonia uncialis f. polycraea (Floerke) Sandst. Clad. Exsic. Bericht. Uebersicht 44. 1930; Rabenhorst, Kryptogamen-Flora **9**, Abt. 4²: 185. 1931. *C. stellata* var. *polycraea* Floerke, Comm. Clad. 174. 1828.

On earth over rocks, Old Lyme (1930, det. Sandstede). Apparently the first record for North America.

This plant is not formally described by Sandstede; he simply refers several specimens which he lists under "fruchtende Pflanzen" to "polycraea Floerke." Their characteristic features are found in the ultimate branches, many of which show apical perforations surrounded by whorls of very short, brownish, radiating branchlets. These branchlets are usually simple but may be minutely branched at the tips.

*Cladonia uncialis f. setigera Anders, Mitt. Nordböhm. Ver. Heimatsforsch. und Wanderpflege **40**: 70. 1917; Hedwigia **61**: 362. 1920.

On rocks. Clinton (1927, not previously reported), Greenwich (1931), Lyme (1930), and Wilton (1931). The specimen from Clinton was determined by Robbins as "near f. *setigera;*" the other three specimens were determined by Sandstede. Not before reported from North America.

In the present form, which seems to be always sterile, the podetia scarcely advance beyond a juvenile stage of development. The slender axes are usually less than 1 mm. in diameter, the dichotomies (or trichotomies) come in close succession, and the podetial surface is usually verruculose or rugulose. The form is further distinguished by the long terminal branches, which are often variously curved and occasionally tipped with one or more blackish fibrils, or rhizinae. The plants, in their typical development, form compact and often pulvinate colonies. According to Anders the axils are perforate, but colonies sometimes occur in which imperforate axils are greatly in the majority. Such colonies, as we have seen above, have been provisionally referred to f. *integerrima* by Sandstede.

*Cladonia caroliniana (Schwein.) Tuck. Am. Jour. Sci. Arts **25**: 427. 1858. *Cenomyce caroliniana* Schwein. in Tuckerman, *l. c.* (as synonym). *Cladonia uncialis* **C. caroliniana* Nyl. Syn. Lich. 216. 1860. *C. uncialis* c. *caroliniana* Tuck. Syn. N. Am. Lich. **1**: 251. 1882.

The podetia of *C. caroliniana*, as a rule, grow in large and irregular colonies and sometimes bear a strong resemblance to those of *C. uncialis*. There are, however, a number of differences between them, and certain of these usually make it possible to distinguish between the species in the field. The differences can perhaps be brought out most clearly by comparison.

In *C. uncialis*, as has been shown, the stramineous tinge is usually very apparent; in *C. caroliniana* it tends to be much less marked, so that the color is often grayish green rather than yellowish. Even when a yellowish tint is present the color remains pale and apparently never approaches deep yellowish or brownish shades. The differences in color show as well in dry material as in moist and are especially striking when the two species grow side by side. In actively growing plants, moreover, the green areolae of *C. caroliniana* usually stand out less clearly than those of *C. uncialis* and merge more gradually into the intervening bands or lines. In most cases the areolae project very slightly or not at all, but the podetial surface although fairly uniform appears less smooth than in *C. uncialis* and is dull rather than glossy.

The branching of the podetia in *C. caroliniana* yields some of the most distinctive characters of the species. Although a dichotomous or polytomous type is more or less apparent in juvenile stages and in the larger axes of robust plants, the podetia usually show numerous small branches or short and irregular outgrowths which can be referred only with difficulty to dichotomies or polytomies. The tendency to form these irregular structures is especially marked toward the apices of well-developed podetia. In many cases the tips of the main branches are inflated and exceedingly complex, the short wart-like or rod-like branchlets diverging in all directions. They are sometimes simple and sometimes variously subdivided. Occasionally, especially in fruiting material, apical whorls of branchlets are formed. In such cases the apex of a larger branch may broaden out into a flat circular expansion, which bears at its periphery a series of short radiating branchlets, sometimes sterile and sometimes tipped with apothecia. These apical expansions, when at all regular, might be described as shallow cups. Although the tips of the branches in *C. caroliniana* are sometimes pointed, much as in *C. uncialis*, they are usually much paler and apparently never show a dark brown or blackish pigmentation. Even when the tips are pale brown in color the surface remains dull and may be covered with a vague bloom.

Although the podetia of *C. caroliniana* occasionally show a very few internodal openings, similar to those of *C. uncialis*, they apparently never form axillary perforations in their younger stages, and the absence of such perforations is emphasized by Sandstede in his remarks on the species.[12] In mature plants, however, axillary perforations are sometimes present, and this is particularly true of plants with apothecia. The perforations are most frequently present in

[12] In Rabenhorst, Kryptogamen-Flora 9, Abt. 4^2: 193. 1931. The remarks apply to No. 1471 of his exsiccati, which is labeled "Cl. uncialis (L.) Web. *Caroliniana (Schwein.) Tuck."

the cup-like apical expansions surrounded by whorls of branchlets. The species, therefore, can produce axillary perforations upon occasion. In spite of this fact the majority of specimens fail to show them and can thus be distinguished from the usual forms of *C. uncialis*.

The podetial wall in *C. caroliniana*, although a trifle less firm than in *C. uncialis*, usually measures 0.15–0.25 mm. in thickness. The cortex, as seen in cross-section, is separated from the medulla by a wavy line and presents the appearance of being more or less broken up into strands. These strands, however, are so closely contiguous that they form a subcontinuous layer, about as thick as the cortex of *C. uncialis*. The inner medullary layer is very different from that of *C. uncialis*. Its cartilaginous elements, instead of forming a definite continuous or subcontinuous layer, are grouped together in separate strands, which vary considerably in diameter. Some of these strands lie next to the podetial cavity, but others are found in various parts of the medullary layer, and it is not unusual for occasional strands to lie in contact with the cortex itself. The strands lying next to the podetial cavity are more numerous than elsewhere and are sometimes in contact, but there are always spaces not occupied by strands, and these are filled with the loosely interwoven hyphae characteristic of the outer medullary layer. When the podetial wall is examined from the inside the strands are visible as narrow or broad smooth bands, forming an irregular network, and the meshes of the network present a rough or even arachnoid appearance. This is shown particularly well when larger podetia are split open and examined dry under a lens.

The histological structure of *C. caroliniana* is very much like that of the European *C. destricta* Nyl. This species, too, was long confused with *C. uncialis*, and it is only recently that its validity has been widely recognized. In his description of the podetial wall Vainio[13] states that a definite cartilaginous layer is not differentiated in the medulla but that strands of thick-walled, agglutinated hyphae are mixed with the looser elements characteristic of the outer layer. It will be seen that this account is in essential agreement with the account given above. *C. destricta* agrees with *C. caroliniana* further in its color, which rarely shows indications of yellow, and in its axils, which are almost always imperforate.

In all probability, however, the two species are distinct. In the

[13] Acta Soc. F. et Fl. Fenn. 53^1: 45. 1922. Vainio describes the species under the name *C. Zopfii*.

usual robust forms of *C. destricta,* for example, the podetia show definite dichotomies and polytomies, and it is only in such types as f. *scyphosula* Sandst.[14] that the more complex conditions found in *C. caroliniana* are approached. The color in *C. destricta,* moreover, is usually a darker gray than in *C. caroliniana,* and Sandstede states that dry plants show a bluish tinge. He ascribes this to the presence of destrictinic acid, an indigo-blue substance isolated and described by Zopf.[15] The blackish spermagonia of *C. destricta,* where this substance is deposited in concentrated form, are often produced in abundance, but the brownish apothecia are exceedingly rare. In *C. caroliniana,* on the other hand, spermagonia are apparently rarely produced, while apothecia have been observed in specimens from widely separated localities. The chemical composition of *C. caroliniana* has not yet been investigated.

According to available information *C. caroliniana* is a species of the eastern United States, with a range extending from Maine to Florida. It grows on earth over rocks and on sandy soil, sometimes in open pine woods. The following forms may be recognized, although the lines of demarcation separating them are not always sharply defined:

Podetia without adventive outgrowths (except perhaps toward the tips).
  Podetia more or less dilated upward, sometimes irregularly inflated, usually 1–2 mm. wide but occasionally attaining a diameter of 3–4 mm. or even more.
    Branches often tipped with subcircular, cup-like expansions bordered by whorls of radiating branchlets. f. *dimorphoclada.*
    Branches variable in the upper part, with irregular rod-like or wart-like outgrowths.
      Rhizinae lacking. . . . . f. *dilatata.*
      Rhizinae more or less abundant. . . . . f. *fibrillosa.*
  Podetia more or less regularly dichotomously or polytomously branched, rarely exceeding 1 mm. in diameter and often considerably less. . . . . f. *tenuiramea.*
Podetia with more or less abundant adventive outgrowths, especially toward the base. . . . . f. *prolifera.*

*Cladonia caroliniana f. **dimorphoclada** (Robbins) comb. nov.
C. dimorphoclada Robbins in Sandstede, Clad. Exsic. *1882.* 1929.
On earth over rocks, Lyme (1931).

The original specimens of *C. dimorphoclada* were collected by the writer at Wrightsville, North Carolina, in 1928. In the short diagnosis printed on the label of No. 1882 the podetial branches are said to

[14] Abhandl. Naturw. Ver. Bremen **25**: 154. 1922.
[15] See Flechtenstoffe 331. 1907.

be minutely but manifestly cup-forming at the tips or else minutely furcate-subulate, this difference being indicated by the specific name. When Dr. Sandstede examined the specimens from Lyme he noted their resemblance to the Wrightsville specimens and wrote that they could be "die vollendete Form von *Cl. dimorphoclada* Robb." The writer feels convinced that this view is correct. At the same time the specimens from Lyme are clearly very close to some of the specimens of *C. caroliniana* noted below, where occasional branches approach a cup-like condition. It seems advisable, therefore, to include *C. dimorphoclada* among the forms of *C. caroliniana*. In the majority of cases the membranes of the cups are closed, but occasionally a central perforation can be demonstrated.

*Cladonia caroliniana f. **dilatata** f. nova, podetia parte superiore varie dilatata aut bullata, ascypha, ramulis brevibus, plerumque verruciformibus, axillis fere omnibus clausis, rarissime perviis.

In sandy soil and on earth over rocks. Branford (1921, 1928, listed as *C. Boryi*, in part as ff. *lacunosa* and *prolifera*), Clinton (1927), Essex (1931), Killingworth (*Hall*, 1874, listed as *C. uncialis* f. *subobtusata*), Madison (1927), North Branford (1931), Old Lyme (1930), Old Saybrook (*Musch & Evans*, 1928), Saybrook (*Musch & Evans*, 1928), Wallingford (1931), and Westbrook (1927). Unless otherwise indicated the specimens dated 1928 or earlier are listed in the writer's report under *C. uncialis*.

Under the present form the writer would include most of the more robust specimens of *C. caroliniana*. They are characterized not only by their greater size but by the numerous short and irregular branchlets that are given off, more especially in the apical portions. In extreme cases the tips of the main axes are conspicuously swollen, but the increase in size upward is often less marked and more gradual. In some cases the branches are more or less flattened. In fruiting material the short branchlets tipped with apothecia are either simple or sparingly subdivided. They are usually irregularly distributed but sometimes show a tendency to be arranged in more or less crowded whorls around the expanded tip of a larger branch, and under these circumstances the apical expansion is occasionally perforate. Even when whorls of branchlets are present, however, the expansions are too irregular and indefinite to be considered cups. The apothecia vary in color from pale to dark brown. The following four specimens, distributed in exsiccati, should be referred to f. *dilatata:* Merrill, Lich. Exsic. *25*, collected in 1923 by P. O. Shallert at Winston-Salem, North Carolina; Lich. Exsic. *233* (as *C. uncialis* f. *obtusata*), collected in 1911 by C. C. Plitt in Baltimore County, Maryland; Zahlbruckner, Krypt. Exsic. Mus. Vindobon. *2775*, collected by C. C. Plitt in the same region; and Sandstede, Clad. Exsic. *1471*, collected in 1924 by G. K. Merrill at Rockland, Maine.

*Cladonia caroliniana f. **fibrillosa** f. nova, podetia eis f. *dilatatae* similia, sed ramulis pro parte rhizinis albidis, cinerascentibus aut obscuratis instructis.

On earth over rocks. Bethany (*Eaton*, 1875), Branford (1921), Middletown (*Wright*, 1883), and New Haven (*Eaton*, 1855). These specimens are listed (p. 416) under *C. uncialis* f. *subobtusata;* the Middletown specimens, which include a few podetia of the true *C. uncialis* f. *subobtusata*, are listed also under *C. uncialis* (p. 413).

The rhizinae or fibrils, which characterize the present form, are sometimes abundant and sometimes very sparingly produced. In most cases they occur singly or in small clusters at the tips of subulate branchlets, and their color varies from whitish or pale gray to dark brown or blackish. Except for the presence of the rhizinae f. *fibrillosa* is essentially like f. *dilatata*.

*Cladonia caroliniana f. **tenuiramea** f. nova, podetia tenuia, subcylindrica, ascypha, dichotome aut polychotome ramosa, apicibus vulgo attenuatis, axillis clausis, ramulis adventiciis raris nullisve.

On earth over rocks and in sandy fields. Bolton (1927), Clinton (1927), Ledyard (1925), Madison (1927, 1928), New Hartford (1928), North Haven (1927), Old Lyme (1927), and Old Saybrook (*Musch & Evans* 1928; *Evans*, 1931). These specimens, except the last, are listed (p. 413) under *C. uncialis*, in part (p. 416) under f. *dicraea*.

The colonies of f. *tenuiramea*, although sometimes extensive, represent a condition in which the podetia have scarcely advanced beyond a juvenile stage of development and thus fail to show some of the most characteristic features of the species. The slender branches, for example, instead of increasing upward, tend to narrow gradually, and the distinctive wart-like or rod-like branchlets are either absent altogether or sparingly produced. In most respects the form is analogous to *C. uncialis* f. *setigera*, but the paler color and closed axils will usually serve to distinguish it. In doubtful cases a cross-section of the podetial wall will show the characteristic scattered strands of cartilaginous hyphae in the medullary layer.

*Cladonia caroliniana f. **prolifera** f. nova, podetia vulgo decumbentia, in partibus et inferioribus et superioribus ramulis adventiciis brevibus plus minusve numerosis tecta.

Beacon Falls (1928), Branford (1928), Clinton (1927), East Haven (1927), Essex (1927, 1931), Litchfield (1927), Lyme (1931), Madison

(1927, 1931), North Branford (1931), North Haven (1927, 1931), Old Lyme (*Musch & Evans*, 1926), and Wallingford (1931). Of the specimens dated 1928 or earlier, those from Beacon Falls, Branford, and Old Lyme are listed (pp. 417 and 419) under *C. Boryi*, mostly under f. *prolifera;* while those from other localities are listed under *C. uncialis* (p. 413), in one case under f. *dicraea*.

The proliferous form of *C. caroliniana* is analogous to *C. uncialis* f. *spinosa* and the proliferous conditions of the Cladinae. It represents a response to external factors, rather than a true form in the taxonomic sense, and is to be looked for in unfavorable situations where the apical growth has been inhibited in some way. In most of the specimens listed the podetia are still in a juvenile stage of development but have reached, in a few cases, a more advanced stage, comparable with f. *dilatata*.

Cladonia Boryi Tuck. (p. 417).

The colonies of *C. Boryi* are large and irregular, much as in the usual forms of *C. uncialis* and *C. caroliniana*, but the podetia present a more delicate appearance and often look as if they were badly weathered. The color is usually a dull, ashy gray, with only slight indications of yellowish or greenish tints, but may become dark gray or blackish with age. The podetia are usually larger than in the two preceding species and are often 3–4 mm. in diameter. They branch irregularly and rather sparingly, but the branching in most cases is by definite dichotomies or polytomies. In many specimens there is little or no approach to cup-formation. In well-developed material, however, the main branches are often expanded at the tip, the expanded portion being surrounded by a whorl of suberect or divergent branchlets and thus constituting a more or less definite cup. The membrane of the cup, although sometimes closed, is often irregularly perforate or cribrose; and the branchlets, which are occasionally simple, are usually subdivided and are sometimes tipped with minute cups surrounded by very tiny branchlets. The apical portions of the ultimate branchlets are usually more or less pigmented with brown. Aside from the perforations of the cups, the regular podetial axils may also be perforate, although closed axils are not infrequent. The wall bears besides occasional internodal openings, similar to those described for *C. uncialis* and *C. caroliniana*, and tends to become irregularly cribrose with age.

The podetial surface is dull but not arachnoid. In young plants it may be smooth, but it is usually verruculose, the verruculae being formed by projecting groups of algal cells. The outlines of these groups, however, can scarcely be distinguished, owing to the opacity of the outermost layer of the podetial wall. In older parts of the podetia, the tissues separating the verruculae break down more or less completely and thus give rise to the cribrose condition.

Vainio, in his description of the podetial wall, states that the cortex and the cartilaginous layer of the medulla are both lacking.[16] The wall would thus consist of the outer medullary layer only. This layer, according to his account, consists of loosely interwoven hyphae and scattered strands of united hyphae. The groups of algal cells are situated in meshes formed by the loosely interwoven hyphae and are found in the inner parts of the wall as well as in the outer. A cross-section of the wall, which is usually 0.2–0.3 mm. thick, confirms this description, except for the fact that the wall is bounded on the outside by a more or less definite layer of thick-walled hyphae. These hyphae, which are mostly 8–12 μ in diameter, are somewhat coarser than the interior hyphae, which are usually only 4–6 μ in diameter. The thick-walled hyphae extend in all directions and are closely interwoven without being compactly united. They form a protective layer, even if this layer is too loosely constructed to be described as a cortex. It should be noted also that the algal cells are most abundant just within this protective layer, the more deeply situated groups being widely scattered. The strands of agglutinated hyphae, which represent the essential elements of a cartilaginous layer, are fewer and more widely separated than in *C. caroliniana* and are usually smaller in diameter. Although scattered throughout the thickness of the wall they are more numerous in the vicinity of the podetial cavity. When the wall of a dry podetium is examined from the inside under a lens, the strands show distinctly and form an irregular, lace-like network, far more delicate than that of *C. caroliniana.*

Two forms of *C. Boryi*, f. *lacunosa* and f. *prolifera,* have been recorded for Connecticut (pp. 418 and 419), but several of the records for f. *prolifera* are transferred above to *C. caroliniana* f. *prolifera.* The specimens listed below include two additional forms of the species.

Cladonia Boryi f. lacunosa (Bory) Tuck. (p. 418). North Branford (1931).

*Cladonia Boryi f. reticulata (Russell) Merrill, Bryologist **12**: 92. 1909. *C. uncialis* var. *reticulata* Russell, Jour. Essex Nat. Hist. Soc. **1**: 100. 1839.

[16] Acta Soc. F. et Fl. Fennica **4**: 281. 1887.

In sandy soil or on earth over rocks. North Branford (1931), Old Lyme (1930), and Old Saybrook (1931).

The present form, which represents the species in its most typical development, is characterized by the presence of more or less definite cups.

*Cladonia Boryi f. **cribrosa** (Del.) comb. nov. *Cenomyce lacunosa* γ. *cribrosa* Del. in Vainio, Acta Soc. F. et Fl. Fenn. **4**: 282. 1887. *Cladonia reticulata* f. *cribrosa* Vainio, *Ibid.* **10**: 466. 1894.

On sandy soil, Old Saybrook (1931).

The specimens here listed are made up of old and prostrate, robust podetia, in which the cribrose condition shows with remarkable clearness. A few of the branchlets show small apical clusters of the rhizinae which Vainio emphasizes in his description, but these are by no means conspicuous.

(*To be continued*)

PHYMOSIA REMOTA

P. D. Strausbaugh and Earl L. Core

On the third day of August 1927, the members of the West Virginia University Botanical Expedition discovered *Phymosia remota* growing on the slopes of Peters Mountain about 1½ miles below the village of The Narrows in Giles County, Virginia. At this point the New River has cut a huge gap across the mountain completely dividing it into East River Mountain on the west and Peters Mountain on the east; therefore the station where the plants were found lies on the east side of the river and at an elevation of approximately 2000 feet, or 500 feet above the level of the stream. As this represents a most remarkable extension of the range of this species which has previously been "known only from a gravelly island in the Kankakee River, Illinois,"[1] the writers were tempted to make a thorough study of the taxonomy of the species. The available literature clearly reveals that considerable difficulty has attended the delimitation and naming of the species and therefore a brief history of the taxonomy will be given.

The genus *Sphaeralcea* was established by A. St. Hilaire[2] in 1827. Two years prior to that date, however, Desvaux[3] had created the genus

[1] Robinson, B. L., and M. L. Fernald. Gray's New Manual of Botany, 7th ed. p. 566. 1908.

[2] Flora Brasiliae Meridionalis 1: 209. 1827.

[3] Desvaux in Hamilton, Prodromus Flora Ind. Occ. 49. 1825.

Phymosia, recently treated as including a considerable number of Malvaceous plants similar to those which have been included in *Sphaeralcea.* Considerable confusion exists among botanists as to the exact limits of the two genera, certain authors having accepted the notion that they are exactly synonymous and others (as Rydberg) having attempted to set up a division of the species into groups resembling the types, as described by Desvaux and by St. Hilaire. Rydberg included under *Sphaeralcea* plants having the upper part of the carpel empty, under *Phymosia* plants in which the carpel is not differentiated into an upper and a lower portion. Irrespective of the viewpoint one may take regarding this segregation, it would seem that the plant forming the subject of this paper should be assigned to the genus *Phymosia,* since the name *Phymosia* antedates that of *Sphaeralcea* by two years, and since, also, the present species does not have the carpels differentiated into two portions.

The Illinois plant was first collected by Dr. E. J. Hill, of Chicago, June 29, 1872, on a gravelly island in the Kankakee river, near Altorf, and referred to *S. acerifolia* Nutt.[4] This specimen is preserved in the herbarium of the Field Columbian Museum (No. 68972). *S. acerifolia,* however, is a western plant, occurring in the Rocky Mountains from Colorado to British Columbia.

Greene[5] recognized that the Illinois plant, separated by such a great distance from its nearest congeners, was also specifically distinct by characters of the calyx, having long-acuminate instead of broadly acute calyx-lobes, as well as by its manner of growth, bearing its flowers in the upper axils, in addition to the terminal arrangement characteristic of *S. acerifolia* Nutt. Greene recognized likewise the carpellary situation and created for Hill's plant the new genus *Iliamna.* The species he named *I. remota* in recognition of the extreme distance separating it from its nearest relatives.

Fernald[6] in 1908 transferred the species to *Sphaeralcea,* making the combination *S. remota,* and in 1913 Britton[7] made the transfer to *Phymosia.*

Since the Illinois plant has been confused with the Western *Sphaeralcea acerifolia* Nutt. (*Phymosia acerifolia* Rydb.) and since the Virginia plant is obviously identical with the Illinois species, the writers

[4] Nutt. in Torr. & Gray, Fl. N. A. 1: 288. 1838.
[5] Leaflets 1: 206. 1906.
[6] Rhodora 10: 52. 1908.
[7] Britton & Brown, Ill. Fl. ed. 2, 2: 522 Fig. 2865. 1913.

Fig. 1. Phymosia remota; specimen in herb. Univ. West Virginia.

deemed it advisable to include a description of the Virginia plant, with complete synonomy.

PHYMOSIA REMOTA (Greene) Britton.

Sphaeralcea acerifolia Gray, Syn. Fl. **1**: 317, 1897 as to Illinois plant, not Nutt. in Torr & Gray, Fl. N. A. **1**: 228. 1838.

Iliamna remota Greene, Leaflets **1**: 206. 1906.

Sphaeralcea remota Fernald, RHODORA **10**: 52. 1908.

Phymosia remota Britton in Britt. & Brown, Ill. Fl. ed. 2. **2**: 522. 1913.

Perennial. Stem strict, 0.6–2 m. tall, or taller, with few lateral branches. Stems and foliage densely stellate-pubescent. Leaves firm, the larger 7 inches wide and as long, or somewhat longer, palmately 3–7-lobed, the lobes triangular, coarsely and irregularly toothed, acute, the middle one longest. Flowers short-pedicelled, in the upper axils and in terminal spike-like racemes. Bractlets of the involucel linear, much exceeded by the calyx-lobes. Calyx-lobes ovate-acuminate, 1–1½ cm. long in fruit, densely stellate-pubescent. Corolla light rose-pink, 2.5–5 cm. broad, the petals cuneate, emarginate. Fruits subtruncate-ovoid, with fine stellate pubescence and longer hirsute, simple hairs. Carpels without reticulation or conspicuous venation on the sides, not differentiated into an upper and a lower portion. Seeds reniform, 2–3 mm. long, densely hairy on the back, less so on the sides, 2–3 in each carpel. Flowers appearing in July and August.

Specimens consulted:

E. J. Hill, June 29, 1872, island of Kankakee river, Altorf, Ill. (Field Columbian Museum.); *Greenman* 3530, type locality (New York Botanical Garden); *Clute*, June 30, 1921, collected in type locality, flowered in garden at Joliet, Ill. (New York Botanical Garden). *West Virginia University Botanical Expedition*, Aug. 3, 1927, Peters Mt., Giles Co. Va. (West Virginia University; Private Herbarium of H. Hapeman, Minden, Nebr.; University of Virginia; Concord State Normal School, Athens, W. Va.; Gray Herbarium; New York Botanical Garden; Carnegie Museum, Pittsburgh, Pa.; Missouri Botanical Garden).

From a careful consideration of the literature and the above description, it must be concluded that the Virginia species should be called *Phymosia remota* Britton and not *Sphaeralcea remota* Fernald.

The Virginia habitat of *Phymosia remota* is on the resistant Medina sandstone of the Silurian series, which outcrops along Peters Mountain. The edges of the upstanding strata display numerous soil-filled pockets and crevices in which the plants are growing. Water drains readily from the loose soil and consequently the moisture supply throughout the growing season is very moderate. There are only a few stunted trees widely spaced so that shade is scarcely a factor in this habitat and most of the plants are exposed to full sunlight. The individual specimens grow vigorously and attain a height of 6 feet or more. As a usual thing several plants may be found growing together but these clumps are more or less scattered. Although there is an abundant supply of seeds each year, reproduction seems to be at a low ebb for there is apparently no spread of the plants and the number during the years from 1927 to 1931 has remained fairly constant, the total number at the present time being not more than 50.

According to Clute[1] the original station for *Phymosia remota* has been completely destroyed. He states that he removed the last plant found on the island to his garden. Assuming that Clute's observation is correct it must then be apparent that the Virginia station is now the only known place in the world where *Phymosia remota* is growing as a wild plant, and since there are at the present time not more than 50 plants at this station the species must be regarded as an exceedingly rare one that may soon become extinct.

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Polygonum caespitosum var. longisetum in the United States.—*Polygonum caespitosum* Blume var. *longisetum* (De Bruyn) A. N. Steward[2] has hitherto been recorded in the United States only from Greenwich, Connecticut,[3] where it was found by Dr. E. H. Eames. Specimens from that locality, collected by Dr. Eames on 3 Sept. 1929 and 18 Sept. 1930, are in the Gray Herbarium, the first from "moist shaded low spot near house," the second from "shaded moist roadside" (in both cases "large colony"). Regarding its occurrence at Greenwich, Dr. Eames writes me: "It is known to me only from an old estate where first collected 7 Oct. 1927, in what may be pioneer localities, and at several points in much disturbed property nearby—a development of recent years." Other specimens are in the Gray Herbarium collected at Garden City, Long Island, New York, 16 August 1922, by W. C. Ferguson ("common weed"); and on streets, West Chester, Pennsylvania, 10 Aug. 1927, by William Trimble. In the

[1] Clute, Willard N., The Rarest American Plant. The American Botanist **26**: 127–129. 1920.

——————— Plant Names and their meanings—XX Malvaceae. The American Botanist, **30**: 103–109. 1924.

[2] Contr. Gray Herb. **88**: 67. 1930.

[3] Harger et al., "Additions to the Flora of Connecticut," Bull. Conn. Geol. & Nat. Hist. Surv. **48**: 43. 1930, as *P. longisetum*.

summer of 1931 I found the plant in Stoughton, Massachusetts, first as a single plant in the railroad yard, again as a common weed in waste grassy places in my brother's yard and two adjoining yards on Grove St., and later in other waste places in yards, the extreme localities being perhaps half a mile apart. On 1 Nov. 1931 I found two thriving colonies of the plant in Washington, D. C., the first on the bank of a brook along Klingle Road nearly under the Connecticut Avenue bridge, the second on the summit of a little hill in the National Zoological Park near the monkey and California condor cages.

The rather wide range of the plant in the eastern United States and its apparent abundance when found make it evident that it is destined to become one of our common weeds. It is of the *P. persicaria* group and similar to it in appearance, an annual with nearly prostrate to erect stems and lanceolate to narrowly ovate unspotted leaves. It may be distinguished readily by the slender and usually basally interrupted spikes, small and always trigonous shining achenes (1.8–2 mm. long), and particularly by the long firm bristles terminating the ocreae, they being 4–8 mm. long and about equaling or often surpassing the sheath itself in length.

Polygonum caespitosum var. *longisetum* is a native of subtropical and tropical eastern Asia, and is recorded by Steward from India, China, Japan, Formosa, Philippine Islands, Java, and Sumatra. This area is not a common source for our weeds, and the explanation for the wide distribution of this plant with us is not evident. My suspicion that it might be an ingredient in commercial bird seed is not borne out by the experience of the Seed Laboratory of the U. S. Department of Agriculture, which has never found it in samples of bird seed, although *Polygonum convolvulus* does occur in them.—S. F. Blake, Bureau of Plant Industry, Washington, D. C.

An estuarine Variety of Gratiola lutea.—Some years ago Dr. S. F. Blake[1] showed that the type of *Gratiola virginiana* L. Sp. Pl. i. 17 (1753) is the southern species with very short peduncles, large, subglobose capsules and slenderly linear seeds, *G. sphaerocarpa* Ell. At that time Blake took up for the plant with long peduncles, smaller, ovoid capsule and shorter and thicker seeds, the plant long passing as *G. virginiana*, the name *G. neglecta* Torr. Cat. Pl. N. Y. 10, 89 (1819)

[1] Rhodora, xx. 65 (1918).

and in this he has been followed by Pennell, Torreya, xix. 146 (1919). There is, however, a clearly published earlier name which has been overlooked. This is *G. lutea* Raf. Med. Repos. Hex. 3, ii. 333 (1811) and Am. Mo. Mag. ii. 175 (1817). *G. lutea* was a direct renaming of *G. officinalis* Michx. Fl. Bor.-Am. i. 6 (1803), not L. In 1805, Persoon, recognizing that the Michaux plant is not the European *G. officinalis*, designated it *G. officinalis* β *caroliniensis* Pers. Syn. i. 14 (1805), but the first binomial for it seems to be that of Rafinesque.

Michaux was not merely misidentifying an American plant with a European; he gave an original description of the American plant and added the significant observation:

> *Obs.* Europaea universe minor. Caules plerumque simplices, rarius opposite ramosi. Certissime nequidem vestigia filamentorum sterilium.

Asa Gray, studying the Michaux herbarium at Paris, very early recorded in his copy of the *Flora Boreali-Americana* his identification of Michaux's *G. officinalis* as *G. virginiana* of American authors; in 1903, I made a similar memorandum, that the material in Michaux's herbarium labeled *Gratiola officinalis* β. is "our *virginiana*"; and in 1918 Blake, *l. c.* made a similar identification. There is, then, no question that the name Gratiola lutea Raf. has clear priority over *G. neglecta* Torr. The specific name given by Rafinesque is wholly appropriate. Ordinarily the corolla is straw-color or honey-color; and this typical plant of muddy shores is more or less viscid- or glandular-pubescent, especially on the younger parts, giving the plant a strong citrous odor.

On the tidal estuary of the St. Lawrence a very vigorous and intricately branching *Gratiola* abounds in the mud exposed at low tide about Anse St. Vallier. When I found this plant in full flower in September, 1931, I could not say what it was. The corollas were a clear milk-white and the plants very glabrous, quite lacking the viscid pubescence typical of *G. lutea.* In its glabrous and broad-based leaves the plant strongly suggests true *G. virginiana* (*G. sphaerocarpa*); but its slender peduncles, the internal pubescence of the corolla, the capsules and the seeds are all characteristic of *G. lutea.* If it were merely an albino form we should expect it to show some of the pubescence so characteristic of the species; but, departing in two characters and occurring in great abundance in a characteristic habitat which supports numerous endemic species and varieties, it is better distinguished as

GRATIOLA LUTEA Raf., var. **glaberrima**, var. nov., glaberrima; corollis lacteis.—QUEBEC: tidal mud of the St. Lawrence, Anse St. Vallier, September, 15, 1931, *Fernald*, no. 2539 (TYPE in Gray Herb.).—M. L. FERNALD, Gray Herbarium.

PANICUM VIRGATUM L. VAR. CUBENSE GRISEB. (OR VAR. OBTUSUM WOOD?) IN PLYMOUTH COUNTY, MASSACHUSETTS.—During an exciting day of exploration among the numerous ponds near Plymouth, Massachusetts, my encyclopedic and observant guide, Ludlow Griscom, pointed to a queer looking form of *Panicum virgatum L.* which was growing somewhat profusely in the wet gravel of Little Clear Pond. With an uncritical eye, I promptly collected a single specimen under date of August 26, 1928. Less promptly (some three and a half years later) I have examined the sheet in the light of Linder's treatment of certain varieties of *P. virgatum* to be found in eastern North America.[1] If we accept Linder's view that var. *cubense* Griseb. and var. *obtusum* Wood are identical, it appears that the Plymouth plant must be classified as var. *cubense*, and as such constitutes a not unexpected range extension northward from Dennis on Cape Cod and from Westerly, Rhode Island. Mr. C. A. Weatherby concurs, although he cautiously intimates that an adequate series from the Little Clear Pond station would be highly desirable. The pyramidical outline of the panicle, the small spikelets (2.8–3 mm. long) and the subequal palea and second glume, all conform to Linder's idea of var. *cubense*.

While examining pertinent material at the Gray Herbarium for comparison, we were much struck by the totally dissimilar aspects of Wright's Cuban material and the more northern representatives of var. *cubense*, including my Plymouth County plant. Reference to the original description of var. *obtusum* Wood and to numerous collections from Massachusetts to New Jersey suggests very definitely that var. *obtusum* should *not* be regarded as a synonym for var. *cubense*, but as a valid variety with a marked geographical idiosyncrasy. A critical discussion of this point will be deferred until more material from Little Clear Pond is secured as a basis for a well considered opinion.—RICHARD J. EATON, Boston, Massachusetts.

SOME BELATED CORRECTIONS TO MY REVISION OF VERONICA IN AMERICA.—In 1921 appeared in RHODORA (**23**: 1–22; 29–41) an account

[1] RHODORA, **24**: 11–16.

of *Veronica* and related genera in North and South America. Very soon after its issuance I noticed or had brought to my attention certain errors of statement, and these I have long been intending to correct. But action has been too easily deferred, and it is even now only the incentive of a recent collection from Baffin Land that has at last prompted these notes.

(1) Veronica alpina L. (p. 14).—The American range of this plant was given as "East Greenland," although my manuscript (fortunately preserved) had originally read "Greenland" while on its reverse I had listed the localities of Disko, Godhavn, and Nugsuak ("Noursoak") Peninsula in West Greenland and Kap Vandal in East Greenland. I do not understand the origin of my printed misstatement, but wish now to change the record of occurrence in Greenland so as to include both the eastern and the western coasts. This range is further supported by specimens at the Academy of Natural Sciences, including collections in West Greenland on Disko Island by *W. H. Burk* 49 (in 1891) and *W. E. Meehan* 54 (in 1892) and at Holstenborg by *O. Hagerup* (in 1925), and a collection in East Greenland at Angmagsalik by *Capt. Robert Bartlett* 104 (in 1931).

But another collection now at the Academy shows that the range of this European species may be extended west of Greenland, as it was found at Frobisher Bay in Baffin Land by *C. S. Sewall* in August, 1927, while on the Rawson-MacMillan Subarctic Expedition.

(2) Veronica peregrina L., (p. 18).—I owe to Professor James C. Nelson of Salem, Oregon the opportunity to correct the faulty translation of Linné's comment in the "Flora Suecica" concerning the original appearance of this plant in Sweden. He had remarked: "Habitat in cultis & terra nuda Upsaliae, rarissima apud nos hodie plana, olim forte coposior evasura." I spoke of it as a plant of 'cultivated fields and bare earth,' known from a single locality, and there 'formerly abundant but now very rare.' The first phrase was correctly rendered, but for the remainder Linné had made a much more interesting suggestion than I had realized. Misled by the usual meaning of "*olim*" as "formerly" or "once upon a time," I had not understood that the word might apply to any remote date, future as well as past. The actual meaning would seem accordingly to be that this plant, found at Upsala in cultivated ground and on bare soil, was "very rare with us at the present time" but "at some future time will perhaps be much more abundant." Thus the passage expresses a prediction of the

probable spread of this little *Veronica,* a plant to which Linné was soon to give the name of "*peregrina,*" signifying "from foreign parts."

(3) VERONICA GLANDIFERA Pennell (p. 36).—The northeastern limit of the range of this species should have been stated as Pennsylvania. On first recognizing the existence in the eastern United States of yet another glandular-pubescent water speedwell, *Veronica catenata glandulosa* (Farwell) Pennell, which I knew occurred in southeastern Pennsylvania, I too hastily transferred to it all the records from the New York and Philadelphia Local Flora that in Torreya **19**: 170. 1919 I had assigned to *V. glandifera.* But actually both plants occur in southeastern Pennsylvania, *V. glandifera* as a locally frequent species of stream-banks in alluvial soils from Lehigh County southwards, and *V. catenata glandulosa* as a rare species of stream-courses over limestone in Chester and Lancaster counties. The two do not intergrade, and further distinctions between them will be shown in the account of this genus to appear in my study of the "Scrophulariaceae of Eastern Temperate North America."—F. W. PENNELL, Academy of Natural Sciences of Philadelphia.

ANACHARIS DENSA ON LONG ISLAND.—Among some specimens of *Anacharis*[1] from the New York Botanical Garden which I have recently had the privilege of examining was one of *A. densa* (Planch.) Vict., collected at Millneck, Long Island, in 1893 by that keenly observant student of the local flora, the late W. C. Ferguson. The material is in young bud only; but the stout habit, the prominent internodes (transversely ridged in the dried specimen), the broad, loose spathe, not at all constricted at the base, and the deltoid-ovate sepals 3 mm. long, make its identity certain.

A. densa, remarkable in the genus for its large white flowers up to 2 cm. in diameter, is frequently grown in greenhouses and as an oxygenator in aquaria, often under the horticultural name *Elodea canadensis,* var. *gigantea.* Mr. Ferguson's collection is, however, the only instance known to me in which it has been found as an escape in the Gray's Manual area. Its native range is from southern Brazil to the delta of the La Plata in Argentina. It might conceivably, though hardly probably, persist on Long Island, especially if it possesses the

[1] For the name, see my note On the Nomenclature of Elodea, RHODORA, xxxiv. 114.

capacity for vegetative reproduction which *A. canadensis* has so conspicuously shown in Europe. To find out whether or not it has become established should be a matter of interest to local botanists.

It may be added that this species, with its several-flowered staminate spathe and its large, Sagittaria-like flowers, differs markedly from the other dioecious members of the genus and would seem to have as good a claim to segregation from them as they have to the segregation from the hermaphrodite species originally made by Richard and recently revived by Victorin.[1] Such segregation was made by Planchon; if he be followed, the name for this species is presumably *Egeria densa* Planch. Ann. Sci. Nat. ser. 3, xi. 80 (1849). But before taking it up finally, it will be necessary to make sure that *Egeria* Néraud, appearing in Bot. Voy. Freycinet, 28 (1826) as a *nomen nudum* only for some genus of *Rubiaceae* of the Île de France, was not validated between 1826 and 1849.—C. A. Weatherby, Gray Herbarium.

[1] Contr. Bot. Lab. Univ. Montréal, xviii (1931).

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NOTES ON THE CLADONIAE OF CONNECTICUT

Alexander W. Evans

(*Continued from p. 142*)

Subsection Chasmariae

Group Microphyllae

Cladonia furcata (Huds.) Schrad. (p. 420). Essex (1931) and Middlebury (*Musch & Evans*, 1929). These specimens are not definite as to form.

Cladonia furcata var. racemosa (Hoffm.) Floerke (p. 422). Essex (1931), Granby (*Musch & Evans*, 1930), Lyme (1930, 1931), Milford (1931), North Branford (1931), and Wallingford (1931).

Cladonia furcata var. racemosa f. furcatosubulata (Hoffm.) Vainio (p. 422). Essex (1931).

Cladonia furcata var. racemosa f. corymbosa (Ach.) Vainio (p. 423). North Canaan (1931).

*Cladonia furcata var. racemosa f. fissa (Floerke) Aigret, Bull. Soc. Roy. Bot .Belgique **40**: 109. 1901 (as *C. furcata α. racemosa* aa. *fissa*); Anders, Strauch- und Laubfl. Mitteleuropas 73. *pl. 9, f. 2.* 1928. *C. furcata* *ζ. *fissa* Floerke, Clad. Comm. 151. 1828.

On soil in open woods, North Branford (1931). Not before reported for North America.

The podetia of var. *racemosa*, especially if fertile, are often more or less split lengthwise, as indicated in the writer's report under f. *corymbosa*. In f. *fissa* the splitting affects the podetia throughout a considerable part of their entire length and gives them a very distinctive appearance.

Cladonia furcata var. racemosa f. squamulifera Sandst. in Rabenhorst, Kryptogamen-Flora **9**, Abt. 4^2: 201. *pl. 12, f. 6.* 1931.

On shaded earth, often over rocks. Bethany (1931), Brookfield (*Anna C. Murphy*, no date), Killingworth (1931), Lyme (1930, 1931), Milford (1931), North Branford (*Musch & Evans*, 1927; Evans, 1931), Seymour (*Musch & Evans*, 1928), Stamford (1928), and Winchester (1931). Several of these specimens were determined by Dr. Sandstede; those dated 1928 or earlier are listed in the writer's report (p. 424) under *C. furcata* var. *pinnata*.

Most students of the Cladoniae refer glaucescent forms of *C. furcata* to var. *racemosa*, if podetial squamules are lacking, and to var. *pinnata*, if such squamules are present. This course was followed by the writer in his report. Sandstede, however, separates these two varieties mainly on the basis of differences in the cortex. According to his account[17] the cortex of the podetia in var. *racemosa* is smooth and subcontinuous, while that of var. *pinnata* is broken up more or less, frequently by transverse splits. If this distinction is emphasized the presence of squamulose conditions of var. *racemosa* must be recognized. These constitute Sandstede's f. *squamulifera*.

Cladonia furcata var. pinnata (Floerke) Vainio f. foliolosa (Del.) Vainio (p. 424). North Branford (1931).

Cladonia furcata var. palamaea (Ach.) Vainio (p. 425). North Branford (1931), North Canaan (1931), and Old Saybrook (1931).

Cladonia scabriuscula (Del.) Leight. f. farinacea (Vainio) Sandst. (p. 427). Essex (1931, det. Sandstede), North Branford (1931), Wallingford (1931), and Winchester (1931).

Cladonia multiformis Merrill f. Finkii (Vainio) Evans (p. 429). Granby (*Musch & Evans*, 1930).

Cladonia crispata (Ach.) Flot. f. elegans (Del.) Vainio (p. 431). Madison (1931, det. Sandstede) and Old Saybrook (1931).

Cladonia squamosa (Scop.) Hoffm. (p. 432). Bethany (1931), Essex (1931), and Wilton (1931). Not definite as to form.

Cladonia squamosa f. denticollis (Hoffm.) Floerke (p. 434). Kent (1931), Killingworth (1931), and Old Lyme (1930).

Cladonia squamosa f. phyllocoma (Rabenh.) Vainio (p. 434). Bethany (1931).

Cladonia squamosa f. levicorticata Sandst. (p. 435). Bethany (1931, det. Sandstede).

Cladonia squamosa f. levicorticata Sandst. m. pseudocrispata Sandst. (p. 436). Bethany (1931).

Cladonia squamosa f. levicorticata m. rigida (Del.) Evans (p. 436). Essex (1931) and Bethany (1931).

Cladonia squamosa f. mucronata Vainio (p. 436). Suffield (*Musch & Evans*, 1931).

*Cladonia cenotea (Ach.) Schaer. Lich. Helv. Spic. 35. 1823. *Baeomyces cenoteus* Ach. Meth. Lich. 345. 1803.

The species grows in bogs and in open woods, often on decayed

[17] In Rabenhorst, Kryptogamen-Flora 9, Abt. 4²: 197–207. 1931.

stumps. It is widely distributed in the northern and mountainous parts of Europe and in the northern parts of North America and Asia. It has been reported also from Australia. Its known range in North America, according to the literature, extends from Greenland and Alaska southward to Massachusetts, Minnesota, and the Cascade Mountains.

The podetia of *C. cenotea,* which are cylindrical and erect, form narrow perforate cups, the margins of which are more or less incurved. They are further distinguished by the presence of abundant soredia, whitish gray or greenish gray in color. These are found from the apex downward, sometimes as far as the base but usually to a variable distance above the base. The portion free from soredia is usually corticate, at least when young, and may be more or less squamulose. The podetia are usually unbranched below the cups, but the margins of the cups often give off one to several erect or suberect proliferations, which are either pointed or tipped with narrow cups. The species is negative with KOH and mild to the taste. The Connecticut specimens are referable to the following form:

*Cladonia cenotea f. exaltata Nyl. in Rehm, Clad. Exsic. *312.* 1885; Vainio, Acta Soc. F. et Fl. Fennica **4**: 481. 1887 (as *β. exaltata*).

In a bog, Suffield (*Musch & Evans,* 1930, det. Sandstede).

Robust specimens of f. *exaltata,* collected by D. L. Dutton at Brandon, Vermont, have been distributed by Merrill (Lich. Exsic. *48*), and excellent figures have been published by Anders[18] and by Sandstede.[19] The podetia are usually longer and more slender than in var. *crossota* (Ach.) Nyl., which represents the species in its more typical development. They usually attain a considerable height before the primary cups with their proliferations are formed, and the total height is often 5 cm. or more, although shorter podetia are not uncommon. The diameter is usually 0.5–3 mm. The cups, although clearly perforate, are scarcely dilated, and those formed by the proliferations are little more than truncate, perforate apices. Some of the proliferations, in fact, may be pointed at the tips. Most of the proliferations are more or less squamulose at the base, and the squamules, which are variously laciniate or lobate, sometimes develop marginal soredia. Sandstede points out that f. *exaltata* is connected with *C. glauca* by intergrading forms[20] and suggests that

[18] Strauch-und Laubfl. Mitteleuropas *pl. 12, f. 4.* 1928.
[19] In Rabenhorst, Kryptogamen-Flora **9**, Abt. 4²: *pl. 21, f. 3.* 1931.
[20] *Op. cit.* 300.

it might perhaps be better included under *C. glauca* than under *C. cenotea.*

Cladonia glauca Floerke f. capreolata (Floerke) Sandst. (p. 438). Bethany (1931).

Cladonia delicata (Ehrh.) Floerke f. quercina (Pers.) Vainio (p. 439). Bethany (1931), Colebrook (1931), East Haven (1931), Lyme (1931), North Branford (1931), North Haven (1931), Old Saybrook (1931), and Wallingford (1931).

Cladonia caespiticia (Pers.) Floerke (p. 439). Middlebury (*Musch & Evans*, 1929), New Haven (1931), North Branford (1931), Old Saybrook (1931), and Wallingford (1931).

Group Megaphyllae

Cladonia apodocarpa Robbins (p. 440). Brookfield (1928), Lyme (1930), Milford (1931), Old Lyme (1927), Saybrook (*Musch & Evans*, 1928, not new to the town), and Wallingford (1931). The specimens dated 1928 or earlier are listed in the writer's report under *C. foliacea* var. *alcicornis* (p. 486), but the determinations have been corrected by Dr. Sandstede.

Subsection Clausae

Group Podostelides

Subgroup Helopodium

Cladonia mitrula Tuck. f. imbricatula (Nyl.) Vainio (p. 444). East Haven (1931), Essex (1931), Lyme (1930), North Haven (1931), and Wallingford (1931; previously collected by Barron).

Cladonia mitrula f. pallida Robbins (p. 445). North Branford (1931), North Haven (1931), and Wallingford (1931).

Cladonia clavulifera Vainio f. nudicaulis Evans (p. 447). Greenwich (1931), North Branford (1931), Old Saybrook (1931), Suffield (*Musch & Evans*, 1930), and Wallingford (1931).

Cladonia clavulifera f. subvestita Robbins (p. 447). North Branford (1931), Old Saybrook (1931), and Wilton (1931).

Cladonia *clavulifera* f. *pleurocarpa* Robbins (p. 447). North Haven (1931) and Old Saybrook (1931).

Cladonia clavulifera f. subfastigiata Robbins (p. 448). Old Saybrook (1931).

Cladonia clavulifera f. epiphylla Robbins (p. 448). Old Saybrook (1931).

Cladonia subcariosa Nyl. f. evoluta Vainio (p. 450). Bethany (1931), East Haven (1931), Fairfield (1931), Lyme (1931), Milford (1931), and Wilton (1931).

Cladonia subcariosa f. squamulosa Robbins (p. 451). Bethany (1931), Fairfield (1931), Lyme (1931), Milford (1931), and Wilton (1931).

*Cladonia brevis Sandst. Clad. Exsic. *401*. 1919; Abhandl.

Naturw. Ver. Bremen **25**: 192. 1922. *C. verticillata-cervicornis* f. *brevis* Sandst. Clad. Exsic. *234*. 1918. *C. alpicola* var. *karelica* of American authors (see p. 453).

On sandy soil, sometimes over rocks. North Haven (1931), Old Saybrook (1931), Shelton (1928, not previously reported), and Windsor (1928). The last specimen is listed as *C. alpicola* var. *karelica* (p. 453), but the specimen from Madison listed under the same name represents *C. strepsilis* var. *glabrata*, as indicated below.

After an examination of North American specimens referred to *C. alpicola* var. *karelica* Vainio the writer became convinced that they belonged in the subgroup Helopodium rather than in the subgroup Macropus. Since *C. alpicola* is clearly a member of the subgroup Macropus it became evident that these specimens ought not to be included under *C. alpicola* as a variety. This conclusion was submitted to Dr. Sandstede for his opinion. He very kindly pointed out that the var. *karelica* was still a questionable plant, that it was very similar to his *C. brevis*, and that it might perhaps be identical with it. A careful comparison of the North American specimens with the numerous specimens of *C. brevis* in his exsiccati failed to bring out any essential differences between them. These specimens, therefore, so far as the Connecticut material is concerned, are listed above under *C. brevis*.

Whether Vainio's *C. alpicola* var. *karelica* should be regarded as a simple synonym of *C. brevis* is another question. Vainio based his variety on material collected in northern Karelia and afterwards referred to it a series of specimens from Sweden, Germany, and France. These specimens have not been seen by the writer, but Vainio's full description[21] would apply in most respects to the North American material. Even if the identity between *C. brevis* and the European *C. alpicola* var. *karelica* should be established, however, the name *C. brevis* ought to be maintained, since the plant has never been described, as a species, under the name *karelica*.

The range of *C. brevis* is still incompletely known. The specimens distributed under this name by Sandstede in his exsiccati were all collected in Oldenburg, but he reports the species also from a few other European stations and from Japan. It is apparently a plant of low altitudes and, in Connecticut, seems to prefer shallow depressions in sandy regions with scattered shrubs or small pines. In such localities it often grows, sometimes in intimate admixture, with *C. clavulifera*, *C. strepsilis*, and *C. mateocyatha*. The following

[21] Acta Soc. F. et Fl. Fennica **10**: 65. 1894.

North American specimens, distributed in exsiccati, represent *C. brevis:* Merrill, Lich. Exsic. *199* (as *C. symphycarpa*), South Thomaston, Maine, collected by G. K. Merrill; and Sandstede, Clad. Exsic. *1474* (as *C. alpicola-karelica*), Wareham, Massachusetts, collected by C. A. Robbins. Aside from Merrill's figure, which has already been cited (p. 453), the fine illustration of Sandstede may be consulted.[22]

The primary thallus of *C. brevis*, according to Sandstede, consists of roundish, crenate squamules, either appressed to the substratum or ascending. They are wrinkled and olive green or brownish on the upper surface, while the lower surface is white. The spermagonia, which are subspherical and blackish, are either sessile on the squamules or else borne on isidium-like outgrowths. In the North American specimens the color of the squamules, although often olive green or brownish, is sometimes glaucescent, and the few spermagonia observed have all been sessile. Otherwise the thallus is in close agreement with Sandstede's account.

The podetia are sometimes more robust than the published descriptions indicate and may attain a height of 1.5–2 cm. and a diameter of 4 mm. just below the apothecia. Often, however, they are considerably less than 1 cm. in height. When their flat areolae are scattered the regions separating them often acquire a translucent appearance, owing to the exposure of the inner medullary layer. In old plants this layer sometimes becomes conspicuously fissured, agreeing in this respect with *C. cariosa.* The negative reaction with KOH, however, will at once distinguish *C. brevis* from *C. cariosa,* which yields a definite yellow color. Both species are mild in taste

Subgroup Macropus

*Cladonia decorticata (Floerke) Spreng. in Linnaeus, Syst. Veg. ed. 16, **4**: 271. 1827. *Capitularia decorticata* Floerke, Weber & Mohr's Beiträge **2**: 297. 1810.

On earth over rocks, Branford (1928, det. Sandstede).

The specimens grew in association with *C. nemoxyna* and are reported under that name (p. 476). Vainio gives many European stations for *C. decorticata* and records the species also from Japan, Madeira, and the White Mountains, basing the last report on specimens distributed by Tuckerman (Lich. Am. Sept. Exsic. *124.* 1854). Additional North American stations in Canada, Alaska, New York, and Minnesota are cited in the literature.

[22] In Rabenhorst's Kryptogamen-Flora 9, Abt. 4^2: *pl. 22, f. 7.* 1931.

The most important characteristics of *C. decorticata* are brought out by the writer in connection with the closely related *C. Norrlini* Vainio (p. 454). This species gives a distinct yellow with KOH, while *C. decorticata* is negative.

Group Thallostelides

Cladonia verticillata (Hoffm.) Schaer. f. evoluta (Th. Fr.) Stein (p. 459). Bethany (1931), Essex (1931), North Haven (1931), and Old Saybrook (1931).

Cladonia verticillata f. apoticta (Ach.) Vainio (p. 460). Madison (1931).

Cladonia mateocyatha Robbins f. leioscypha Evans (p. 462). Essex (1931) and Old Saybrook (1931).

Cladonia mateocyatha f. squamulata Robbins (p. 462). North Branford (1931).

Cladonia pyxidata (L.) Hoffm. var. neglecta (Floerke) Mass. (p. 463). Winchester (1931).

Cladonia pyxidata var. neglecta f. simplex (Ach.) Harm. (p. 464). Essex (1931), Lyme (1930, 1931), North Branford (1931), and North Haven (1931).

Cladonia pyxidata var. pocillum (Ach.) Flot. (p. 465). Milford (1931) and Wallingford (1931); both specimens were determined by Sandstede.

Cladonia chlorophaea (Floerke) Spreng. (p. 465). Essex (1931, det. Sandstede).

Cladonia chlorophaea var. pachyphyllina (Wallr.) Vainio (p. 472). North Branford (*Musch & Evans*, 1927, listed on p. 469 as f. *costata*, determination corrected by Sandstede).

*Cladonia Grayi Merrill in Sandstede, Clad. Exsic. *1847*. 1929; Sandstede in Rabenhorst, Kryptogamen-Flora **9**, Abt. 4^2: 426. 1931. On earth, logs, and tree-bases, often on thin soil over rocks. East Haddam (1927), Essex (1931), Fairfield (1931), Granby (*Musch & Evans*, 1930), Greenwich (1931), Killingworth (1931), Lyme (1931), Madison (1927), Milford (1931), North Branford (1931), Old Lyme (1927, 1930), Old Saybrook (1931), Suffield (*Musch & Evans*, 1930), Westbrook (1927), Wilton (1931), and Winchester (1931). The determinations were all made by Dr. Sandstede; stations dated 1927 or earlier are listed in the writer's report under *C. chlorophaea* or one of its forms. It is probable that other specimens listed under *C. chlorophaea* represent *C. Grayi* instead.

The type specimens of *C. Grayi* were collected by Fred W. Gray at Long Creek, near Charlotte, North Carolina (misprinted "N. Virg." on the label), in 1928; and the following additional specimens from Sandstede's exsiccati may be cited: No. 1468, from Brandon, Vermont, collected by D. L. Dutton in 1925; and No. 1757, from

Sweden, collected by E. P. Vrang in 1927. These two specimens were originally distributed as *C. chlorophaea.* Sandstede reports the species also from Germany, Czechoslovakia, Tirol and Russia. In North America it seems to be even commoner than in Europe and is already known from several states east of the Mississippi River.

The validity of *C. Grayi* is perhaps still open to question, since there is little to distinguish it morphologically (according to our present knowledge) from *C. chlorophaea.* The most important distinction between the two is chemical in nature and is based on the presence of fumarprotocetraric acid in *C. chlorophaea.* This species, therefore, is bitter to the taste, while *C. Grayi,* owing to the absence of fumarprotocetraric acid, is mild. It is of course possible that adequate morphological distinctions may be demonstrated in the future.

*Cladonia Grayi f. squamulosa Sandst. in Rabenhorst, Kryptogamen-Flora **9**, Abt. 4: 429. 1931.

On earth, sometimes over rocks. Branford (1928), North Branford (1931), Old Lyme (1928), Old Saybrook (1931), Shelton (1928), Stamford (1928), Wallingford (1931), and Westbrook (1927). These specimens were all determined by Dr. Sandstede, and all, except the one from Old Saybrook, are listed in the writer's report under *C. chlorophaea* or under its f. *lepidophora.*

The podetia of f. *squamulosa* are characterized by being more or less squamulose.

Cladonia conista (Ach.) Robbins f. simplex Robbins (p. 473). Colebrook (1931, determined by Sandstede as *C. fimbriata conista*) and Madison (1931).

Cladonia fimbriata (L.) Fr. (p. 473). Granby (*Musch & Evans,* 1930).

Cladonia nemoxyna (Ach.) Nyl. (p. 475). Essex (1931), Lyme (1930), New Haven (1931), and Old Saybrook (1931).

Cladonia nemoxyna f. fibula (Ach.) Vainio (p. 477). North Branford (1931).

Cladonia coniocraea (Floerke) Spreng. f. ceratodes (Floerke) Dalla Torre & Sarnth. Bethany (1931), Colebrook (1931), Lyme (1931), New Haven (1931), and Wallingford (1931).

Cladonia coniocraea f. truncata (Floerke) Dalla Torre & Sarnth. (p. 480). Lyme (1931), Madison (1931), Wallingford (1931), and Winchester (1931).

*Cladonia coniocraea f. expansa (Floerke) Sandst. Abhandl. Naturw. Ver. Bremen **25**: 228. 1922 (as modification); in Rabenhorst, Kryptogamen-Flora **9**, Abt. 4^2: 448. 1931 (as form). *C. pyxidata* *δ. *expansa* Floerke, Clad. Comm. 68. 1828.

On soil in woods, often at bases of trees. Killingworth (1931, det. Sandstede, first collection for Connecticut) and North Branford (1931). Not before reported from North America.

The primary squamules of f. *expansa* are unusually large and often assume an ascending position with the upper surface more or less concave. The lower surface is chalky white, sometimes with a faint yellowish tint, and gradually becomes pale yellow when KOH is added. The podetia are like those of f. *ceratodes*.

*Cladonia coniocraea f. robustior (Harm.) Sandst. in Rabenhorst, Kryptogamen-Fl. **9**, Abt. 4^2: 448. 1931. *C. ochrochlora* f. *ceratodes* s. f. *robustior* Harm. Bull. Soc. Sci. Nancy II. **14**: 380. 1896. *C. fimbriata* var. *ochrochlora* f. *robustior* Zahlbr. Cat. Lich. Univ. **4**: 504. 1927.
At base of tree, North Branford (1931, det. Sandstede). New to North America.

The podetia of f. *robustior* are pointed, as in f. *ceratodes*, but are stouter, the diameter in the middle being often 2.5–3 mm. The Connecticut specimens are associated with the preceding form.

*Cladonia coniocraea f. pycnotheliza (Nyl.) Vainio, Acta Soc. F. et Fl. Fennica **53^1**: 113. 1922. *C. pycnotheliza* Nyl. Flora **58**: 441. 1875. *C. fimbriata* ε^3. *pycnotheliza* Vainio, Acta Soc. F. et Fl. Fenn. **10**: 330. 1894; Zahlbruckner, Cat. Lich. Univ. **4**: 505. 1927 (as variety).
On earth over rocks and on tree-bases. North Branford (1931) and Old Saybrook (1931, det. Sandstede, first collection for Connecticut).

The f. *pycnotheliza* represents an abnormal condition in which a super-abundance of apothecia, often more or less aborted, is produced. These apothecia, which are either sessile or stalked, are sometimes borne on primary squamules and sometimes on podetia, where they are often lateral in position. The podetia are more or less sorediose but usually show corticate areas and may be squamulose in varying degrees. In many cases they are curved or otherwise distorted. The various types of apothecia found in f. *pycnotheliza* are described and figured by Bachmann.[23]

Cladonia borbonica (Del.) Nyl. f. cylindrica Evans (p. 482). Bethany (1931), Fairfield (1931), Madison (1931), North Haven (1931), Old Saybrook (1931), Wallingford (1931), and Wilton (1931).
Cladonia borbonica f. squamulosa Robbins. (p. 482). Wallingford (1931).
Cladonia pityrea (Floerke) Fr. var. Zwackhii Vainio f. epiphylla

[23] Über Pyknothelizie bei *Cladonia*. Ber. Deutsch. Bot. Ges. **41**: 103–107. *f. 1–6.* 1923.

(Sandst.) Evans (p. 484). North Branford (1931, det. Sandstede) and Old Saybrook (1931).

Cladonia pityrea var. Zwackhii f. subacuta Vainio (p. 485). Bethany (1931), Madison (1931), Middlebury (*Musch & Evans*, 1929), Milford (1931), and North Branford (1931).

Cladonia pityrea var. Zwackhii f. squamulifera Vainio (p. 485). Bethany (1931), Madison (1931), Middlebury (*Musch & Evans*, 1929), Milford (1931), North Branford (1931), Old Lyme (1930), and Wallingford (1931).

Group Foliosae

Cladonia strepsilis (Ach.) Vainio (p. 487). Branford (1928, not new to the town). Clinton (1927), Essex (1927), Granby (*Musch & Evans*, 1930), New Milford (1928), North Branford (1927, 1931), Old Saybrook (*Musch & Evans*, 1928), Portland (*Dunlap*, 1927), Westbrook (1927), and Winchester (1931). The specimens consist of the thallus only; those dated 1928 or earlier are listed by the writer (p. 486) under *C. foliacea* var. *alcicornis.*

In separating *C. foliacea* from *C. strepsilis* the writer, in his key, emphasized the difference in width of the primary squamules and the difference in chemical reaction. As a matter of fact, however, broad primary squamules, by themselves, were considered sufficient to distinguish *C. foliacea* var. *alcicornis* from *C. strepsilis,* especially if the lower surface of the squamules was cream color. The variety, in consequence, was reported from fifteen different Connecticut towns. It now appears that most of the specimens upon which these records were based give the reaction characteristic of strepsilin, and that they should therefore be referred to *C. strepsilis,* rather than to *C. foliacea.* The specimens, which do not give this reaction, have squamules with a very pale lower surface, which turns yellow with KOH. These specimens represent *C. apodocarpa,* rather than *C. foliacea.* The latter species thus disappears, at least temporarily, from the Connecticut flora.

The writer's attention was called to these errors in determination by Dr. Sandstede, who corrected several of the Connecticut specimens sent to him under the name *C. foliacea* var. *alcicornis.* The other specimens in the Yale Herbarium were then examined with the result indicated above. Some of the specimens approach f. *megaphyllina.*

The characteristic reaction for strepsilin is the verdegris green color obtained when plants are treated with $CaCl_2O_2$ in the presence of KOH. The color sometimes appears very slowly, and a hasty observation might lead to the conclusion that the reaction was negative. A good procedure is to soak the material thoroughly with water, if dried specimens are used, then to add a few drops of saturated KOH solution, and finally to apply a little fresh $CaCl_2O_2$ in solid form. The addition of water sometimes hastens the appearance of the green color.

Cladonia strepsilis f. glabrata Vainio (p. 488). Essex (1931), Lyme (1931), Madison (1927, listed on p. 453 as *C. alpicola* var. *karelica*), North Branford (1931), Old Saybrook (1931), and Wilton (1931).

Cladonia strepsilis f. coralloidea (Ach.) Vainio (p. 489). *C. foliacea* var. *alcicornis* f. *squamulosa* Evans, Trans. Connecticut Acad. **30**: 487. 1930. Hamden (1931), Lyme (1931), North Branford (1931), Old Lyme (1927, listed on p. 487 as *C. foliacea* var. *alcicornis* f. *squamulosa;* 1930), Suffield (*Musch & Evans,* 1930), and Wilton (1931). The determination of the specimens from Old Lyme was revised by Dr. Sandstede; the plants show broad primary squamules, which give the reaction for strepsilin.

*Cladonia strepsilis f. compacta Anders, Strauch-und Laubfl. Mitteleuropas 117. 1928.

On rocks, Greenwich (1931, det. Sandstede). Not before recorded from North America.

The primary squamules of f. *compacta* are small, thick, and densely crowded together, so that they form small and compact, cushion-like colonies. These grow on bare rocks exposed to the sun and are usually completely sterile.

*Cladonia strepsilis f. megaphyllina Harm. Bull. Soc. Sci. Nancy II. **14**: 386. *pl. 4, f. 7.* 1896. *C. strepsilis,* f. *subalcicornis* Anders, Hedwigia **61**: 369. 1920.

On sandy soil, North Branford (1931, det. Sandstede). This is apparently the first report for North America.

The primary squamules of this form are unusually large, sometimes attaining a length of 1.5 cm. They form extensive, rather loose, irregular colonies. The squamules tend to be suberect, so that the cream-colored lower surface stands out conspicuously, especially in dry weather. The form bears a strong resemblance to *C. foliacea* var. *alcicornis,* and the writer's remarks concerning this variety (p. 487) would apply equally well to f. *megaphyllina.*

Group Ochroleucae

Cladonia piedmontensis Merrill f. obconica Robbins (p. 491). Old Saybrook (1931).

Cladonia piedmontensis f. squamulosa Robbins (p. 491). Essex (1931), North Branford (1931), and Old Saybrook (1931).

Cladonia piedmontensis f. lepidifera (Vainio) Robbins (p. 491). Essex (1931), Granby (*Musch & Evans*, 1930), Madison (1931), North Branford (1931), and Old Saybrook (1931).

*Cladonia piedmontensis f. squamosissima Robbins, Rhodora **31**: 104. *pl. 187, f. 13.* 1929.

Among mosses in an old field, Old Saybrook (1931).

The podetia of this form are densely squamulose, with sterile or sparsely fruited tips.

Collections of Cladoniae have now been made in 99 of the Connecticut towns, leaving a residue of 70 towns still to be heard from. At the close of 1928 collections had been made in 95 towns, so that only 4 new towns have been added to the list. Most of the progress made during the past three years is, in consequence, based on the more intensive exploration of certain towns from which Cladoniae had already been recorded.

In the 1930 report (p. 498) 18 towns were listed in each of which 16 or more species had been collected; this number is now increased to 23. The town standing at the head of the list was North Canaan, with 27 species to its credit; this position is now occupied by the town of North Branford, with 35 species. The other towns, with over 20 species each to their credit, are the following: Madison, 33 species; Old Saybrook, 32; North Canaan and North Haven, 27 each; Branford, 26; East Hampton 25; Bethany and Stamford, 23 each; Beacon Falls, Essex, and Wallingford, 22 each; and Lyme, 21.

Yale University.

BARTONIA; A COMEDY OF ERRORS

M. L. Fernald and C. A. Weatherby

The little gentianaceous genus *Bartonia* was clearly and very fully described by Muhlenberg[1] in 1801, with a single species, *B. tenella* Willd. In 1803, Michaux[2] independently described the genus as *Centaurella* with two species, *C. verna* and *C. paniculata*, both clearly illustrated. It was subsequently shown that *B. tenella* Willd.[3] (1801)

[1] Muhl. in Willd. Ges. Naturf. Freunde Berlin, Neue Schrift. iii. 444 (1801).

[2] Michx. Fl. Bor.-Am. i. 97, 98, t. 12, figs. 1 and 2 (1803).

[3] The binomial *B. tenella* is often ascribed to Muhlenberg but, when he described it Willdenow, who credited the generic name to Muhlenberg, said nothing of Muhlenberg's having given the specific name as well. Willdenow said in introducing the specific diagnosis: "Es ist mir nur eine Art bekannt nemlich: BARTONIA *tenella*." It would seem that Willdenow should stand as author of the binomial.

was *Sagina virginica* L. Sp. Pl. 128 (1753) and the resulting combination *B. virginica* (L.) BSP. Prel. Cat. N. Y. 36 (1888) replaced *B. tenella*. Besides *B. virginica* two other species occur in the eastern United States: *B. verna* and *B. paniculata*. In the first volume of *Index Kewensis* the former, by some inexplicable interpretation, appears as *B.* "verna, *Muhl. ex A. Gray, in Chapm. Fl. S. U. St.* 357"; while *B. paniculata* is not cited at all. Search in Chapman's first edition (1860) fails to reveal any connection of Gray with the work, except in a general advisory capacity acknowledged in the Preface; and *B. verna*, correctly ascribed to Muhlenberg, had been in Gray's Manual, ed. 2: 347 (1857).

In 1903, Small pointed out that two quite distinct species were confused under the name *Bartonia virginica* and he separated upon characters which have proved very constant, *B. lanceolata* Small, Fl. Se. U. S. 932 (1903). Subsequently, finding that *Centaurella paniculata* Michx. (1803) is Small's plant, Robinson renamed it *B. paniculata* (Michx.) Robinson, Rhodora, x. 35 (1908). As already stated, the name *B. paniculata* is not found in the first volume of *Index Kewensis*, consequently the faith in that work, usually so thoroughly justified, has led to the perpetuation of the combination *B. paniculata* (Michx.) Robinson. Singularly enough, however, Muhlenberg made the proper combination on the same page with *B. verna* (Michx.) Muhl. Ordinarily the names in Muhlenberg's *Catalogus* are ignored as *nomina nuda* or *nomina subnuda*, but in the case of *Bartonia* there is no question as to what was meant. *Bartonia* had already been published by Muhlenberg with full description; and in his *Catalogus* (1813), p. 16, Muhlenberg gave it the generic synonym *Centaurella* Michx. and cited two species, *verna* and *paniculata*. These, of course, were *Centaurella verna* and *paniculata* of Michaux, properly transferred by Muhlenberg. Consequently, the binomials and their proper citations are

Bartonia verna (Michx.) Muhl. Cat. 16 (1813). *Centaurella verna* Michx. Fl. Bor.-Am. i. 98, t. 12, fig. 2 (1803).

B. paniculata (Michx.) Muhl. l. c. (1813). *Centaurella paniculata* Michx. l. c. fig. 1 (1803).

The gentianaceous genus *Bartonia* Muhl. (1801), dedicated to Benjamin Smith Barton, ran into opposition. As already noted, Linnaeus had included it under *Sagina!* Michaux, apparently unfamiliar with Muhlenberg's publication, had independently published the genus as *Centaurella* (1803); and Persoon, Syn. i. 137 (1805) renamed it *Centaurium* (not *Centaurium* Hill). In 1812, Sims, however, described an entirely different *Bartonia* (now merged with *Mentzelia*) and Nuttall (1817) took this up and retained *Centaurella* for *Bartonia* Muhl. Such treatment justly roused the ire of Rafinesque and of Amos Eaton.

In 1818 Rafinesque,[4] in his criticism of Pursh's Flora, discussing no. 20 of "some of the most glaring errors adopted or introduced therein," said: "He adopts the erroneous generic name of *Centaurella,* Mx. instead of Bartonia, Wil[l]d. while *Bartonia* is an anterior name. . . . while Messrs. Pursh, Nuttall and Sims have given the name *Bartonia* to another new genus. The best means of correcting those blunders, is to leave the name of *Bartonia* to the genus to which it was first applied, annulling altogether the erroneous names of *Centaurella* and *Centaurium,* and giving to the new *Bartonia* the name of *Nuttalloe* [evidently a compositor's rendering of *Nuttallia*]."[5]

In 1822, discussing *Bartonia paniculata* (Michx.) Muhl., "Screw-stem," Eaton said "It is thought best to retain this name, until the fancies of our *verbifacient* botanists shall become so nearly stationary, that one or two changes more may settle upon this little plant a permanent name."[6] In 1829 Eaton went a step further and renamed *Bartonia* "Nuttall" (i. e. Sims) *Torreya,*[7] the fourth use of this ill-fated name. In 1833 Eaton was still adamant: "I follow Muhlenberg still in the name of this elegant little plant; because it is his discovery and his name. No convention among botanists is of sufficient authority to change an established name. This plant is common where Barton and Muhlenberg earned their reputation, and it is not to the advantage of either, to drive this plant to the genus Sagina, Centaurella, or Torreya. Mr. Nuttall consented to my applying Torreya to his Bartonia, ornata and nuda, which privilege I asked at his botanical garden in Cambridge, in May, 1820, on account of the Bartonia paniculata being immoveably established. I shall make no changes at present."[8] But, in spite of his brave fight through many years, Eaton weakened in his old age and in his seventh edition (1836)

[4] Raf. Am. Mo. Mag. ii. 175 (Jan. 1818).

[5] Further to complicate matters, *Nuttallia* Raf. (1818), a substitute name for *Bartonia* Sims (not Muhl.) of the *Loasaceae,* appears in *Index Kewensis* (as *Nuttalla*) and in Dalla Torre & Harms in the generic synonymy of *Bartonia* Muhl. of the *Gentianaceae!* Incidentally, *B. pubescens* Raf., appearing in *Index Kewensis* as probably equivalent to the gentianaceous *B. verna,* is a *Mentzelia.*

[6] Eaton, Man. Bot. ed. 3: 202 (1822).

[7] Eaton, Man. Bot. ed. 5: 420 (1829). The genus *Torreya* Eaton has not been entered in *Index Kewensis* nor Pfeiffer's *Nomenclator;* and its original place of publication is erroneously stated in Wats. Bibl. Index i. 391 and, following him, by Dalla Torre & Harms.

[8] Eaton, Man. Bot. ed. 6: 51 (1833).

abandoned *Bartonia* Muhl. in favor of *Centaurella* and took up *Bartonia* Sims.

As if the gentianaceous genus had not names enough already, Sprengel, Syst. i. 368 and 428 (1825), substituted for *Bartonia* Muhl. and *Centaurella* Michx. the new name *Andrewsia,* the fourth name for the genus and the second use of *Andrewsia.*

The status of the generic names here discussed is briefly summarized as follows:

BARTONIA Muhl. in Willd. Ges. Naturf. Freunde Berlin, Neue Schrift. iii. 444 (1801). *Centaurella* Michx. Fl. Bor.-Am. i. 97, 98, t. 12, figs. 1 and 2 (1803). *Centaurium* Pers. Syn. i. 137 (1805), not Hill (1756). *Andrewsia* Spreng. Syst. i. 368 and 428 (1825), not *Andreusia* Vent. (1804). GENTIANACEAE.

BARTONIA Sims, Bot. Mag. xxxvi. t. 1487 (1812); Pursh, Fl. Am. Sept. i. 327 (1814); Nutt. Gen. i. 297 (1817); not Muhl. (1801). *Nuttallia* (misprinted *Nuttallæ*) Raf. Am. Mo. Mag. ii. 175 (Jan., 1818)). *Torreya*[9] Eaton, Man. Bot. ed. 5: 420 (1829), not Raf. (1818), nor Raf. (1819), nor Spreng. (1821). Generally merged with *Mentzelia* L. of the LOASACEAE.

NOTES ON THE FLORA OF BOOTHBAY, MAINE—III.—POGONIA OPHIOGLOSSOIDES (L.) Ker, f. ALBIFLORA Rand & Redfield. In *Sphagnum,* Ocean Point.

RUBUS IDAEUS L., var. HETEROLASIUS Fernald, RHODORA xxi. 97 (1919). This seems to be the common raspberry just above the line of bare rock along the coast in the Boothbay region. I have collected it on an exposed bank near the sea-margin, Ocean Point, on a wind-swept hilltop on Fisherman Island, in a thicket near the sea at Cape Newagen, Southport, and on sea-cliffs at Small Point in Sagadahoc County. Also in rather open dry ground, half a mile from the sea, at

[9] The name TORREYA Arn. (1838) for an important taxaceous genus of great paleontological interest is upset by the recent adoption of the *homonym* rule. If *Torreya* Arn. is to be retained against *Torreya* Raf. (1818), *Torreya* Raf. (1819), *Torreya* Spreng. (1821) and *Torreya* Eaton (1829), it will be necessary to conserve it. For *Torreya* Arn. many authors have taken up *Tumion* Raf. Amen. Nat. 63 (1840), which was a direct renaming of Arnott's *Torreya.* Other substitutes for different genera called *Torreya* which have failed of admission to standard bibliographies, are: for *Torreya* Barton (*Malvaceae*) *Aigosplen* Raf. Amen. Nat. 62 (1840), Rafinesque, obviously meaning this as a substitute for *Torreya* Barton, although he said "of Eaton"; for *Torreya* Spreng. (referred to *Clerodendron*) *Patulix* Raf. l. c. (1840).

The name *Nuttallia* Torr. & Gray (1840), often maintained for a rosaceous genus, is antedated by *Nuttallia* Raf. (1818), *Nuttallia* DC. (1821), *Nuttallia* Spreng. (1821), and *Nuttallia* Barton (1822). *Nuttallia* Torr. & Gray has become *Osmaronia* Greene (1891).

Ocean Point, were two clumps in which most of the canes had the broad-based prickles and tomentose surface of var. *heterolasius*. Occasional canes differed in being perfectly glabrous, simulating those of var. *aculeatissimus*, but the leaves even on the glabrous canes had tomentose petioles.

Acer rubrum L., var. tomentosum Kirchner. Trees with mature leaves densely tomentose beneath occur with the typical form at Ocean Point and at Southport.

Hieracium canadense Michx., var. hirtirameum Fernald. Occasional plants are found at Ocean Point, sometimes in the same clump with the typical form. I am indebted to Professor Fernald for his identification of my material of this variety.—Norman C. Fassett, Madison, Wisconsin.

Pinus strobus L., forma **prostrata** (Mast.), comb. nov.—*P. Strobus*, var. *prostrata* [Masters] in Kew Hand-list Conif. 101 (1896), *nomen;* Rehder in Bailey, Cycl. Am. Hort. iii. 1350 (1901). *P. Strobus prostrata* Rehder acc. to Beissner, Mitt. Deutsch. Dendr. Ges. viii. 107 (1899).

Although forma *prostrata* is based on a horticultural form, it is apparently the extreme form of the species in very exposed subalpine habitats. In nature we know it from the serpentine mountains of western Newfoundland: North Arm, Bay of Islands, *Long & Fogg*, no. 37; Blomidon, *Mackenzie & Griscom*, no. 10,032. It there forms spreading and closely depressed fruiting carpets not more than 5–8 dm. high, sprawling over areas 2–3 m. across.—M. L. Fernald and C. A. Weatherby.

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THE IDENTITY OF LYCOPODIUM POROPHILUM

L. R. Wilson

In an attempt to understand the Wisconsin material of *Lycopodium porophilum* Lloyd & Underwood (*L. lucidulum*, var. *porophilum* (L. & U.) Clute) it has become evident that this form has been misinterpreted, and as treated in Gray's Manual and in other manuals contains two elements. These two elements are *L. Selago*, var. *patens* (Beauv.) Desv. and *L. lucidulum*, forma *occidentale* Clute.

The spores of the various North American Lycopods have been studied (paper now in press) and differences were found between those of *L. Selago* and *L. lucidulum*. The spores of true *L. porophilum* have a distinct *L. Selago* pattern, which suggests relationship between these two forms, since all other distinct species examined have characteristic spores.

Herbarium specimens from various parts of North America and Europe were next consulted and found to be confusing until a series of *L. Selago* specimens was constructed to show gradation from the appressed leaves of the variety *appressum* to the less appressed leaves of the type and the wide-spreading aspect of the variety *patens*. Comparison of a fragment of the type specimen of *L. porophilum* with *L. Selago*, var. *patens* shows these two forms to be identical.

During the investigation specimens from New England which had been identified as *L. lucidulum*, var. *porophilum* were obtained from the Gray Herbarium. Examination of the specimens proved them to be a rather distinct form of *L. lucidulum*, the second element confused with the so-called *L. porophilum*. Further comparison with western material has shown these specimens to correspond to *L. lucidulum*, forma *occidentale* Clute. Other specimens of this form have been examined from Minnesota, Wisconsin and Indiana.

The habitats of the eastern and middle western specimens were subalpine or northern. Those of the west were from the bases of the mountains and in the highlands; these habitats appear to correspond with the approximate altitude and ecology of the more eastern stations. In as much as typical *L. lucidulum* is not reported from the western United States it seems justifiable to treat Clute's forma *occidentale* as a variety with definite habitat and range.

Lycopodium lucidulum, var. **occidentale** (Clute), n. comb. *L. lucidulum*, forma *occidentale* Clute, Fern. Bull. **11**: 13. 1903. *L. porophilum* Lloyd & Underwood, Bull. Torr. Bot. Club **27**: 150. 1900, in part but not as to type specimen. *L. lucidulum*, var. *porophilum* Clute, The Fern Allies p. 111. 1905, in part; Gray's Manual edition 7: 55. 1908, in part.

In the east and probably as far southwest as eastern Ohio or Kentucky *L. Selago*, var. *patens* appears as an ecological form found growing in milder conditions at lower altitudes than the type or in mesophytic habitats. In Wisconsin, Indiana and part of Ohio there seems to be another factor that determines the range of this plant. That is Pleistocene isolation. In Wisconsin this plant is restricted almost entirely to the Driftless Area and its border. One exception to this range was recorded by the writer in 1930[1] but re-examination of this specimen shows it to be *L. lucidulum*, var. *occidentale*. However, in 1931 F. H. Knowlton and A. M. Fuller collected one plant of the variety *patens* growing back of a sand bar on Lake Superior at Cornucopia, Bayfield County, Wisconsin. This plant apparently developed from a water-, ice- or wind-carried gemma, the source of which might have been Isle Royale, since that is the closest known station. According to Mr. Fuller of the Milwaukee Public Museum there are other plant affinities at this point in Wisconsin with Isle Royale.

The isolated and marginal distribution of *L. Selago*, var. *patens* to the Driftless Area in Wisconsin is interesting. No station for this plant is known from the interior of that area though there are plenty of suitable habitats. Outside of the Driftless Area there are also suitable habitats but no plant of this species has been discovered except at Cornucopia as noted above. The distribution is very suggestive of the isolation of this subarctic and arctic species probably during the third substage of the Wisconsin glaciation.[2] It may also suggest

[1] Wilson, L. R. Lycopodiaceae and Selaginellaceae of Wisconsin. Trans. Wis. Acad. Sci., Arts & Lett. 25: 170 & 172. 1930.

[2] Leverett, Frank. Moraines and shore lines of the Lake Superior basin. U. S. Geol. Surv. *Prof. Paper* 154-A p. 19. 1929.

that glacial climate was confined very largely to the border of the Driftless Area and milder conditions were prevailing in the interior of that area where plants of warmer climates could persist. Dr. N. C. Fassett has recorded numerous plants from the Driftless Area of Wisconsin which might have persisted there during the Pleistocene with *L. Selago*.[3] This also seems probable, since the Driftless Area was never at any one time completely surrounded by ice.[4] In Indiana the same relation to glacial boundries is apparent from specimens in the herbarium of C. C. Deam. All recorded stations are south of the drift of the first substage of the Wisconsin glaciation. In Ohio the same conditions appear but are not as well understood. It may be that in that state several other factors have had much to do with the distribution of this species.

There is some conflict in statements as to the type of rock with which this variety is associated. In Gray's Manual the habitat is given as cool calcareous cliffs. Lloyd and Underwood in their description of *L. porophilum* (*L. Selago*, var. *patens*) state that it occurs on sandstone. In Indiana C. C. Deam has collected it on a limestone cliff. In Wisconsin the writer has tested the hydrogen ion concentration of the soil associated with this form at one station and found it to be approximately 6.3. This is a slightly acid soil but a type that could easily result from the leaching of soil on limestone, so it appears that the conflicting habitats recorded in literature cannot be considered too seriously.

In September of 1930 and 1931 plants and gemmae of both *L. lucidulum* and *L. Selago*, var. *patens* were placed in the greenhouse under various controled conditions to have them closer at hand for study. The plants of both species produced new leaves which were characteristic of their respective species. The gemmae of *L. lucidulum* began to grow after seven months and those of *L. Selago*, var. *patens* began a month later. The gemmae that were planted in September, 1931, began growing at the end of two weeks and the roots of both species were covered with a plumose covering of fungus which may have been responsible for the early growth. The development in *L. lucidulum* differs from that of *L. Selago*, var. *patens* in that the shoot is usually about 5 mm. long before two small leaves become distinct.

[3] Fassett, N. C. Notes from the Herbarium of the University of Wisconsin. RHODORA **33**: 224–228. 1931.

[4] Thwaites, F. T. The Driftless Area. Outline of Glacial Geology. Dept. of Geol. Univ. of Wis. p. 148. 1927.

Those following the first two are markedly serrate. In the latter species, leaves are present from the earliest development of the shoot and are entire like those of the mature plant. These characters were checked in the field and in general bore out the laboratory observations. *L. Selago*, var. *patens* always produced its first leaves as described but when *L. lucidulum* was found in exceedingly dry places the shoot was shorter than observed elsewhere. In the two species studied the plants from gemmae could always be distinguished from one another by the serrate or oblanceolate leaves of *L. lucidulum.*

The writer wishes to express his appreciation to Mr. Percy Wilson of the New York Botanical Garden to Mr. C. A. Weatherby of the Gray Herbarium, to Director S. C. Simms of the Field Museum of Natural History, to Mr. H. H. Smith of the Milwaukee Public Museum, to Dr. J. H. Schaffner of the Ohio State University and to Mr. C. C. Deam of Bluffton, Indiana, for the use of specimens and to Dr. N. C. Fassett and Mr. F. T. Thwaites for their helpful criticisms.

KEY TO LYCOPODIUM SELAGO, L. LUCIDULUM AND THEIR VARIETIES

A. Leaves linear-attenuate to lanceolate, entire; spores 32 to 36 mu in diameter, with papillation uniform in size and distribution....B.
  B. Leaves appressed....C.
    C. Leaves not crowded, ascending.........................*L. Selago.*
    C. Leaves crowded, much appressed..........*L. Selago*, var. *appressum.*
  B. Leaves spreading, often reflexed................*L. Selago*, var. *patens.*
A. Leaves oblanceolate, widest near or above the middle, serrate or entire; spores 20 to 26 mu in diameter, with papillation irregular in size and distribution....D.
  D. Leaves serrate....................................*L. lucidulum.*
  D. Leaves entire or slightly serrate..........*L. lucidulum*, var. *occidentale.*

DEPARTMENT OF BOTANY,
UNIVERSITY OF WISCONSIN.

THE STATUS OF TWO INTRODUCTIONS BY MINOT PRATT AT CONCORD, MASSACHUSETTS: CAMPTOSORUS RHIZOPHYLLUS AND HELENIUM AUTUMNALE.—Among the botanical papers of the late Walter Deane is a hectograph copy in longhand of a list of "Plants Introduced about Concord, Mass., by the late Minot Pratt," dated March 25, 1898, and probably compiled from Dame & Collins' Flora of Middlesex County. It is in the nature of a circular to members of the New England Botanical Club requesting information concerning the status of any of the plants enumerated. Mr. Deane particularly wished to learn whether "any show a tendency to spread and become significant components of the local vegetation."

I suspect that a correspondence soon developed with Alfred W. Hosmer, who had become extraordinarily familiar with the botanical rarities of Concord, perhaps through the early stimulus of Pratt himself. In any event, when RHODORA appeared in 1899, Hosmer published an account[1] of his observations regarding the Pratt introductions, a subject in which he had been particularly interested since boyhood. Out of sixty-seven species definitely regarded as introduced during a period extending possibly from 1860–1875, twenty-four were cited as persisting or spreading at the turn of the century. Among these latter is mentioned *Camptosorus rhizophyllus* Link at three stations.

Within the last five years I visited the old lime quarries in the "Esterbrook country" in the northern part of the town where the walking-fern had been set out fifty years earlier. There was still a single specimen hanging in a niche by the skin of its teeth (to use an expressive vulgarism) with every indication of utter discouragement. The entire plant would have rattled around in a match box.

More interesting to me is the appearance of *Helenium autumnale* L. on Hosmer's list of those introductions "which have not been found in recent years" (circ. 1899). I had collected a lone specimen fully twenty years ago in a meadow under the east slope of Nashawtuc Hill. Shortly after the war I was much surprised to find a large colony thoroughly established in this same meadow in an area five or six rods in diameter. Of all the Pratt introductions, I venture to say that it is the most successful, despite Mr. Hosmer's belief to the contrary. However, it is entirely possible that the occurrence of *H. autumnale* at my station is strictly fortuitous, as is probably the case with *H. nudiflorum* Nutt. which on a single occasion I have collected in the same meadow, and sparingly in an abandoned pasture further up the Sudbury River. I find no allusion to *H. nudiflorum* in Pratt's manuscript at the Concord Library, nor in Deane's list, nor in the RHODORA article cited above. It is extremely unlikely that Minot Pratt could have included such a conspicuously different species in a consignment of *H. autumnale* without noting the fact.—RICHARD J. EATON, Boston, Massachusetts.

[1] RHODORA, 1: 168–172.

RECORDS OF UNITED STATES PLANTS, CHIEFLY FROM THE CHICAGO REGION

PAUL C. STANDLEY

THE species listed and annotated below are chiefly plants observed by the writer in the Chicago area, mainly in northwestern Indiana, during 1930 and 1931. Although the records pertain primarily to the local flora, some of the rarer introduced species have a slight historical interest for the whole region covered by Gray's Manual. There are reported, also, a few records based upon material received from correspondents of Field Museum.

ALLIUM STELLATUM Ker.—INDIANA: Between McCool and Porter, Porter County, a large colony on a railroad embankment, August 23, 1930, *Standley* 57456. Doubtless an introduction.

ACNIDA TAMARISCINA (Nutt.) Wood.—This western species is occasional in waste ground and vacant lots in Chicago. Collected August 26, 1930, at Roosevelt Road and Cicero Avenue, *Standley* 57464.

CHENOPODIUM URBICUM L.—Collected at Roosevelt Road and Cicero Avenue, August 26, 1930, *Standley* 57463; also on Chicago Avenue, No. 57459.

This is one of the rarest of the pigweeds in the United States, although plants of *Chenopodium murale* often are mistaken for it. When once seen growing, it never can be confused with the latter. It is not common in Chicago, but it does not seem to be particularly rare.

CORISPERMUM NITIDUM Kit.—In place of the single species of *Corispermum* reported from the Indiana dunes at the foot of Lake Michigan, there evidently are two distinct representatives of the genus that grow in the sand. In September and October it is easy to distinguish them at a glance, and there is also a difference in their dates of flowering. The more abundant species is *C. nitidum* Kit., represented by *Standley* 57478, collected at Ogden Dunes, Porter County, Indiana, October 4, 1930. *C. hyssopifolium* L. is represented by No. 57479 from the same locality. The two plants often grow intermixed in the same colonies.

ERUCASTRUM POLLICHII Schimp. & Spenn.—INDIANA: Porter County, on the west boundary at the crossing of Road 53, September 1, 1930, *Standley* 57469. Only two plants were found, growing on a railroad embankment.

I have seen the plant elsewhere only in Glacier Park, Montana, but it has been found at several widely separated localities in the United States.

Rosa rubifolia Mill.—This handsome wild rose, if it is a valid species, is rare in the Lake Michigan region, if actually native there. More probably it is a prairie plant. Collected July 5, 1930, in Porter County, Indiana, northeast of Hobart, growing abundantly in fence-rows in one locality, and making a handsome display with its abundant flowers, *Standley* 57448.

Baptisia tinctoria L.—Indiana: Gary, Lake County, at Grant Street and Fortieth Avenue, July 5, 1930, *Standley* 57413.

To one familiar with this plant as it grows so plentifully in Maryland and Virginia, for instance, it is rather amusing to find its local occurrence a matter of some interest. The species was reported many years ago from the Chicago region, but had not been detected by recent collectors, and it was suspected that it had become extinct. However, it was found in abundance at the locality indicated, growing in low moist sandy land, and making a really handsome display of flowers. I have not observed it elsewhere in the region.

Coronilla varia L.—Indiana: Crown Point, Lake County, July 19, 1931, *Standley* 57484; roadside at the entrance to the Catholic Cemetery, a large and vigorous colony in the grass.

Lathyrus tuberosus L.—Wisconsin: Lodi, July, 1930, *Miss Emma Richmond.* Sent to Field Museum for determination by Miss Richmond, who states that the plant forms large patches on a railroad embankment, where it has been under observation for seven or eight years.

Cercis canadensis L.—The redbud is plentiful enough in the Mississippi Valley, and is reported to grow throughout Indiana, except in the lake counties. I had not found it near the lake until May 23, 1931, when a few trees were seen from Road 6, in Porter County, 2.6 miles east of the road leading north to McCool. About half a mile south of this spot, on the bank of a small stream, there were four large trees, the largest with a trunk 25 cm. in diameter.

Gaura parviflora Dougl.—A weedy western plant, for which two stations may be reported in the Lake Michigan region: Indiana: East Chicago, plentiful in vacant lots, August 20, 1930, *Standley* 57454. Porter County, east boundary where crossed by Road 53, several plants on and near the railroad embankment, September 1, 1930, No. 57468.

Some of the plants were as much as two meters high. They attract attention because of their curious habit, each individual suggesting a small bushy tree with tall slender trunk and thick symmetrical top.

Eustoma Russellianum (Hook.) Griseb., f. **Fisheri**, f. nov. A forma typica non nisi corollis albis differt.—Texas: Evergreen, June 20, 1931, *George L. Fisher* 5 (Herb. Field Mus., type).

The usual form of this robust plant, with its large, dull blue blossoms, is one of the showiest of North American gentians. It thrives particularly well in strongly saline soil, and especially about gypsum outcrops. The form with white corollas is not particularly rare, and I have seen it on various occasions in New Mexico.

Although it is scarcely a mark of great distinction to have a form named for one, the writer is glad to have this opportunity of recognizing in some manner the work of George L. Fisher, whose deep interest and intense enthusiasm for botanical subjects have led him to assemble during recent years a huge amount of valuable herbarium material.

Phlox pilosa L., var. fulgida Wherry, f. **albiflora** (MacM.), comb. nov. *P. pilosa* L., f. *albiflora* MacM. Metasp. Minn. Vall. 432. 1892.—Illinois: Near Elgin, July, 1929, *C. F. Groneman*. Growing with the normally colored form of var. *fulgida*, the phase of *Phlox pilosa* occurring about Lake Michigan.

Solanum elaeagnifolium Cav., f. **Benkei**, f. nov. Corolla omnino alba.—Texas: Near mouth of the Rio Grande, about Brownsville, rare, March 20, 1930, *H. C. Benke* 5209 (Herb. Field Mus., type).

Solanum elaeagnifolium is one of the noxious weeds of the Southwest, invading gardens and other cultivated ground in much the same manner as the common bull-nettle, *Solanum carolinense*, in the Mississippi Valley. The corollas ordinarily are of a handsome shade of azure blue, but plants with pure white corollas occur not infrequently.

Linaria minor (L.) Desf.—Indiana: Porter County, western border at Road 53, hundreds of plants on the railroad embankment, September 1, 1930, *Standley* 57466, 57467.

The plants were growing on both sides of the road that crosses the railroad at this point, and since this throughfare is the county line, the species may be recorded also for Lake County!

During March and April, 1930, Mr. H. C. Benke made a collecting trip to Louisiana, Arkansas, and Texas, and at the writer's request he gave particular attention to the genus *Houstonia*, which is exceptionally well represented throughout that region. The large series of good specimens that he obtained includes most of the species that occur in the area visited, and several collections that are of more than casual interest.

HOUSTONIA PARVIFLORA Holzinger.—This rare species is represented by a single number that is worthy of record: TEXAS: Corpus Christi, April 2, 1930, *Benke* 5198. Corollas very small, purple; plants small and spreading.

HOUSTONIA LANCEOLATA (Poir.) Britton, f. **albiflora**, f. nov. A forma typica corollis albis differt.—ARKANSAS: Mena, high situations in the high mountains, April 20, 1930, *H. C. Benke* 5206 (Herb. Field Mus., TYPE).

At the same locality there were obtained two collections of typical *H. lanceolata*, Nos. 5200 and 5202. In the former the corollas were red-purple; in the latter pale, and almost white.

HOUSTONIA TENUIFOLIA Nutt., f. **leucantha**, f. nov. Corollae albae. —ARKANSAS: Mena, rocky mountain tops, April 20, 1930, *H. C. Benke* 5207 (Herb. Field Mus., TYPE).

The typical form, represented by Nos. 5201 and 5204 from Bethesda Springs, Arkansas, has light rose-purple or light red-purple corollas. It grows in dry pine woods on mountain sides.

HOUSTONIA PUSILLA Schoepf, f. **albiflora**, f. nov. A forma typica tantum corollis albis differt.—LOUISIANA: New Iberia, March 16, 1930, *H. C. Benke* 5191 (Herb. Field Mus., TYPE), 5194.

The ordinary form of the species, with blue corollas, was growing at the same locality, the two forms in separate colonies. *Houstonia pusilla* was collected also at Fisher and Lake Charles, Louisiana, Mena, Arkansas, and Corpus Christi, Texas.

LATHYRUS JAPONICUS VERSUS L. MARITIMUS

M. L. FERNALD

THE Beach Pea has been so universally known as *Lathyrus maritimus*, either of Bigelow, "(L.) Bigelow" or (L.) Fries, that the change of name forced upon it by the alteration in the International Rules of Nomenclature adopted in 1930 seems at least unfortunate. By the original International Rules *L. maritimus* might be maintained as the correct name; but, with the intrusion into the Rules of the principle that the publication of a name (even though it be a taxonomic synonym or otherwise unavailable) prevents the transfer into the genus of an earlier published species under an identical trivial or specific name, the combination *L. maritimus* has to be excluded and we must take up for the Beach Pea of Europe, North and South America and Asia the name *L. japonicus* Willd. The situation, both taxonomically and nomenclaturally, is confused and in order that the discussion of these matters may be as clear as possible it is necessary first to define the entities involved. The following synopsis of the chief varieties of this circumpolar (or circumboreal) species gives the leading diagnostic character.

a. Stems 1–3 (rarely –10) dm. long, 0.5–2.5 mm. thick (in dried specimens): leaflets thin, submembranaceous, green and not strongly glaucous; the better developed ones (on each plant) 1–4 (–5) cm. long, 0.7–2.5 cm. broad; tendrils mostly simple: peduncles filiform, 0.5–1.5 mm. thick, often equaling or exceeding the subtending leaves: corolla 1.8–3 cm. long . . *b.*
  b. Plant glabrous or essentially so throughout . . . *L. japonicus* (var. *typicus*).
  b. Plant more or less pubescent; the stem, lower leaf-surfaces, peduncles, pedicels and calyx all or nearly all densely pilose. Var. *aleuticus.*
a. Stems 0.2–1.5 m. or more long, 2–5 mm. thick (in dried specimens): leaflets subcoriaceous or fleshy, glaucous; the better developed ones (on each plant) 2–7 cm. long, 1.5–4 (in the rare forma *acutifolius* down to 0.5) cm. wide; tendrils mostly forking: peduncles stoutish, 1–2 mm. thick, definitely shorter than the subtending leaves: corolla 1.5–2.5 cm. long . . . *c.*
  c. Stems and leaves glabrous or sparsely pilose and glabrate: rachis (of raceme), pedicels and calyx glabrous (or calyx-lobes merely ciliolate) . . . *d.*
    d. Leaflets elliptic or obovate, 1.5–4 cm. broad . . . . . . Var. *glaber.*
    d. Leaflets elliptic-lanceolate, acute, 0.5–1 cm. broad. Var. *glaber,* forma *acutifolius.*
  c. Stems (at least above), lower surfaces of leaflets, peduncles, rachises, pedicels and calices densely pilose . . . . Var. *pellitus.*

L. japonicus Willd., var. **typicus.** *L. pisiformis* Houttuyn, Pfl. Syst. viii. 608, t. 65, fig. 1 (1782), not L. (1753). *L. japonicus* Willd. Sp. Pl. iii^2. 1092 (1803). *L. maritimus,* var. *Thunbergianus* Miquel, Ann. Mus. Bot. Lugd.-Bat. iii. 45—reprinted as Prol. Fl. Jap. 233 (1867).—Northeastern Siberia and Alaska, south to Japan, northeastern China and Oregon; very locally also in Greenland and Labrador and in southern Chile. The following are characteristic. Greenland: Igaliko, 1906, *Chr. Deichmann.* Labrador: Chateau Bay, July 14, 1891, *Bowdoin College Exped.,* no. 58. Alaska: Kuskokwim R., 1884, *Weinmann;* Attu Island, June 26, 1873, *W. H. Dall;* Akutan, *E. C. Van Dyke,* no. 320, in part (mixed with var. *aleuticus*); Karluk, *C. Rutter,* no. 73; mouth of Ankow R., *Funston,* no. 20; Burroughs Bay, *Walker,* no. 1014. Washington: Golden Gardens, Seattle, *J. W. Thompson,* no. 5247; Roft R., *Conard,* no. 324. Oregon: mouth of Columbia R., June, 1886, *Henderson;* mouth of Chetco R., June, 1884, *Howell.* Siberia: Karaginok (collector unknown). Japan: Simoda, *C. Wright;* Zenibako, July, 1882, *Takenobu;* Iwanai, July, 1882, *Takenobu;* Atoika, near Kusuri, July 2, 1884, *Miyabe;* Nagasaki, *Oldham*, no. 365; Yokohama, 1862, *Maximowicz.* KOREA: Port Hamilton, 1859, *Wilford;* Korean Archipelago, 1863, *Oldham.* CHILE: Port Melinka, November 23, 1868, *Cunningham* (not quite typical).

Southward in the Northern Hemisphere passing to var. *glaber:* northward, in subarctic and arctic areas, more generally represented by

Var. **aleuticus** (Greene), n. comb. *Pisum maritimum* L. Sp. Pl. ii. 727 (1753), in small part (Lapland plant). *L. maritimus aleuticus* Greene in T. G. White. Bull. Torr. Bot. Cl. xxi. 450 (1894).—Southern Greenland, Labrador, arctic and subarctic northwestern America, arctic northeastern Siberia, and arctic Europe, south to Newfoundland, eastern Saguenay Co., Quebec, James Bay (northern Ontario), southern Alaska and southern Kamtchatka. The following belong here. GREENLAND: Julianehåb, 1855, *Rink*, 1889, *Hartz;* Igdlorssuit, Prins Christians Sund, 60° 10′ N., *A. E. & M. P. Porsild.* LABRADOR: Nain, *Sornborger*, no. 220; Assizes Harbor, *C. S. Sewall*, no. 186; Cape Harrigan, *Bishop*, no. 404[a]; Windy Tickle, *Bishop*, no. 404[b]; Manak's Island, *Bishop*, no. 405; Mallijak, *Sornborger*, no. 221; Hopedale, *Bowdoin College Exped.* no. 223; Red Islands, *Bishop*, no. 404; Gready Island, *Bishop*, no. 406; Hawkes Harbor, *Abbe & Hogg*, no. 464; Petty Harbor, *Bishop*, no. 407; Rodney Mundy Island, *Abbe & Hogg*, no. 465; Lake Melville, *Bowdoin College Exped.* no. 117; Rigolet, *Wetmore*, Nat. Herb. Can., no. 102,993; Northwest River, *Wetmore*, Nat. Herb. Can. no. 102,994; White Bear River, *Woodworth*, no. 294; Battle Harbor, *Bowdoin College Exped.* no. 92; Battle Island, July 23, 1913, *Ekblaw;* Dumpling Harbor, July 16, 1864, *B. P. Mann;* Red Bay, *Bowdoin College Exped.* no. 24; Forteau, *Fernald & Wiegand*, no. 3642. NEWFOUNDLAND: Baccalieu Island, June 28, 1902, *Sornborger;* Barred Islands, August 13, 1903, *Sornborger;* Isthmus Cove, Pistolet Bay, *Wiegand, Gilbert & Hotchkiss*, no. 28,631; Flower Cove, *Fernald, Long & Dunbar*, no. 26,812; Grassy Island, St. John Bay, *Fernald, Long & Fogg*, no. 1839 (with forking tendrils of var. *glaber*); Port à Port, *Mackenzie & Griscom*, no. 10,333. QUEBEC: Archipel Ouapitagone, *St. John*, Herb. Geol. Surv. Can. no. 90,573; east coast of Hudson Bay, June 24, 1896, *Low.* ONTARIO: Moose Factory, Hudson Bay, *W. Haydon*, no. 36. ALASKA: Nome, *C. N. Powers*, no. 13; Golovin Bay, 1881, *J. Muir;* Unakakleet, Norton Sound, *Johnston & Palmer*, no. 12; Fort St. Michael, Norton Sound, 1865–66, *Bannister;* St. Paul Island, August, 1893, *C. H. Townsend;* Unimak Island, *Murie*, no. 65; Dutch Harbor, Unalaska, *Van Dyke*, nos. 8, 107; Atka Island, 1880, *Turner;* Nazan Bay, Atka Island, *Van Dyke*, no. 236; Kyska Island, July 4, 1873, *Dall;* Kodiak Island, *ex Acad. Petrop.;* Sitka, 1865–66, *Fisher.* SIBERIA: Arakamtchetchene Island, Bering Straits, *C. Wright;* Copper Island and Bering Island, *Stejneger*, no. 211; Bering I., July, 1891, *Grebnitsky;* Kamtchatka, *Beechy Voyage;* Petropavlovsk, June 3, 1928, *Eyerdam.* RUSSIAN LAPLAND: "Lapponia," *Schrenck;* Gross Renntier Insel (or Bolschoj Olenij Ostrow), Kola-Fjord, July 7, 1927, *A. Tolmatchew.* NORWAY: "prope Uvebakken Finmarkia occidentalis." *Blytt.*

Var. *aleuticus,* characterized by its dense pubescence, is, it will be noted, the northernmost extreme of the species. While all the material of *L. japonicus* at hand from Japan, Washington and Oregon is glabrous, nearly all the material from Kamtchatka, Alaska, Labrador and Greenland is definitely pubescent, and all which I have seen from Newfoundland and from arctic Europe is also pubescent. The typical glabrous form of *L. japonicus* is sometimes found with var. *aleuticus* in Kamtchatka, Alaska, Greenland and Labrador, but it is there decidedly exceptional; but var. *aleuticus* is, very evidently, the common extreme in the subarctic and arctic floras. This conclusion is supported by Hultén's statement in regard to the inclusive *L. maritimus:* "The hairiness of the species varies a good deal, here [in Kamtchatka] as well as in other parts of its area. . . . On the whole, more northern specimens are more hairy, although this is not always the case."[1] Then Hultén adds: "Most of our [Kamtchatka] specimens should be referred to f. *velutinus* FR."

The latter comment suggests that Fries had a forma *velutinus,* but I have been unable to find a satisfactory diagnosis of it. In 1846, in a tabulation of the Scandinavian occurrence of vascular plants, Fries used for a Lapland plant the name *Lathyrus maritimus,* var. *velutinus* Fries, Summa Veg. Scand. 46 (1846), a *nomen nudum,* quite without characterization. By inference, since Fries referred to a Lapland plant, it might be assumed that he had the arctic and subarctic extreme which I am here calling *L. japonicus,* var. *aleuticus;* but, unless his var. *velutinus* was published elsewhere with a diagnosis, the name cannot stand. Greene's *L. maritimus,* var. *aleuticus* was well described, with "stipules and leaflets thin, pubescent on the lower surface," "A fairly constant variety of the North Pacific coasts," and it rests upon definite type material.

Just as typical glabrous *Lathyrus japonicus* is represented southward by the coarser and thick-leaved, glaucous, shorter-peduncled and smaller-flowered var. *glaber,* so var. *aleuticus* gives way on the Atlantic coast of North America to var. *pellitus,* which, on the coast from the lower St. Lawrence to New Jersey, entirely replaces it and is much more common than the smooth var. *glaber.*

[1] Hultén, Fl. Kamtch. and Adj. Isl. iii. 115 (1929).

Var. **glaber** (Ser.), n. comb. *Pisum maritimum* L. Sp. Pl. ii. 727 (1753), for the most part. *P. dasigynum* Raf. Am. Mo. Mag. iv. 194 (1819). *L. maritimus* Bigel. Fl. Bost. ed. 2: 268 (1824), as a new species, not based on *Pisum maritimum* L. but purposely (though erroneously) differentiated from it. *P. maritimum, β. glabrum* Ser. in DC. Prodr. ii. 368 (1825). *L. californicus* Dougl. in Lindl. Bot. Reg. xiv. t. 1144 (1828). *Orobus maritimus* (L.) Reichenb. Fl. Germ. Excurs. 538 (1832). *L. maritimus* (L.) Fries, Fl. Scand. 106 (1835), direct transfer of *Pisum maritimum* L. *L. maritimus*, var. *glaber* (Ser.) Eames, RHODORA, xi. 95 (1909).—Temperate coasts of northwestern Europe from Finland, Sweden and Norway to Germany, Holland, Belgium, northwestern France, (Spain?), and the British Isles; Atlantic coast of North America from Newfoundland (lat. 50°) and the lower St. Lawrence (inland to the Isle of Orleans), Quebec, south to Long Island; inland on Lake St. John (Quebec), Oneida Lake (New York), the Great Lakes (southern Ontario, northern and western New York, northern Ohio, northern Indiana, Michigan, northern Illinois, Wisconsin and Minnesota), and Lake Winnipeg and the Lower Saskatchewan R. (Manitoba); Pacific North America from southern British Columbia to Humboldt Co., California; Japan. The following, selected from a very large series, are characteristic. NEWFOUNDLAND: Cow Head, *Fernald & Wiegand*, no. 3641; Shag Cliff, Bonne Bay, *Fernald, Long & Fogg*, no. 1841; French (or Tweed) Island, Bay of Islands, *Fernald, Long & Fogg*, no. 309. QUEBEC: Marten River, Gaspé Co., *Fernald & Pease*, no. 25,173; Tadousac, August 7, 1892, *G. G. Kennedy;* Ile-aux-Couleuvres, Lac St.-Jean, *Victorin*, no. 16,092; Ste. Anne de Kamouraska, *Svenson & Fassett*, no. 2013; Ile à Deux Têtes, *Victorin*, no. 25,524; St.-Laurent de l'Ile d'Orleans, *Victorin*, no. 16,093. MAGDALEN ISLANDS: Alright Island, *Fernald, Long & St. John*, no. 7701; Ile du Hâvre-aux-Maisons, *Victorin & Rolland*, no. 9704. NEW BRUNSWICK: Miscou Island, *Blake*, no. 5585; Shediac, July 4, 1914, *F. T. Hubbard;* Quaco, *Fassett*, no. 2284; Harvey, *Fassett*, no. 2283. NOVA SCOTIA: Yarmouth, *Howe & Lang*, no. 7; Sand Beach, *Fernald & Linder*, no. 21,724. MAINE: Perry, *Fernald*, no. 1954; Brooklin, *A. F. Hill*, no. 629; Deer Isle, *Hill*, no. 2094; Camden, July 12, 1902, *G. G. Kennedy;* Monhegan Island, *Jenney, Churchill & Hill*, no. 3199; Wells, July 14, 1894, *Parlin*. NEW HAMPSHIRE: Newcastle Island, September 19, 1901, *E. F. Williams;* Rye, *B. L. Robinson*, no. 694. MASSACHUSETTS: Plum Island, August 4, 1899, *E. F. Williams;* Gloucester, June 7, 1896, *Rand & Robinson;* Revere, *Pease*, nos. 766, 7755; Weymouth, July 29, 1928, *Knowlton;* Plymouth, *Fernald, Hunnewell & Long*, no. 9755; Harwich, *Fernald & Long*, no. 16,697; Chilmark, 1891, *S. Harris*. RHODE ISLAND: Newport, *Mearns*, no. 594; South Kingston, June 11, 1927, *Bill & Emerton;* Westerly, August 21, 1913, *Bissell, Harger & Weatherby;* Block Island, *Fernald & Long*, no. 9754. CONNECTICUT: Old Lyme, June 13, 1912, *Blewitt;* Saybrook Point, September 7, 1908, *Blewitt*. NEW YORK: Flushing, Long Island, June 21, 1887, *Poggenburg;* Oneida Lake, *Haberer,* no. 2623; Lake Ontario, Woodville, *House,* no. 8175; L. Ontario, Sterling, *Whetzel,* no. 12,341. PENNSYLVANIA: Presqu' Isle, Erie Co., *Pease,* no. 12,977, *Dickey,* no. 28. ONTARIO: Pt. Abino, June 15, 1901, *ex Biltmore Herb.;* Stevens Point, *MacMillan & Sheldon,* no. 1264. OHIO: Lake Erie, Ashtabula Co., September 12, 1914, *MacDaniels;* Lake Erie, Lake Co., August 12, 1922, *R. J. Webb.* INDIANA: Lake Michigan, Edgemoor, *Lansing,* no. 2596. MICHIGAN: Lake Huron, near Port Huron, July 23, 1899, *C. K. Dodge;* Lake Superior, Keweenaw Co., *Farwell,* no. 750; Lake Michigan, Stevensville, *Lansing,* no. 3232. WISCONSIN: Lake Michigan, Door Co., *E. J. Palmer,* no. 28,805. MINNESOTA: Grand Marais, *Rosendahl & Butters,* no. 4669. MANITOBA: Lake Winnipeg Valley, 1857, *Bourgeau;* Saskatchewan R. 1857–8, *Bourgeau.* BRITISH COLUMBIA: District of Renfrew, Vancouver Island, *Rosendahl & Butters,* no. 52; Nitinat Lake, west coast of Vancouver I., *W. R. Carter,* no. 139. WASHINGTON: San Juan Islands, *S. M. & E. B. Zeller,* no. 908; Pt. Ludlow, September 15, 1890, *F. Binns;* Bellingham Bay, Whatcom Co., *Suksdorf,* no. 1823 (transition to var. *typicus*). OREGON: Fidalgo Island, 1858, *Lyall;* Curry Co., *M. E. Peck,* no. 8746 (transition to var. *typicus*). CALIFORNIA: "N. W. Am.," *L. californicus* Dougl. cult. at Kew; Eureka, Humboldt Co., *Tracy,* no. 3736. JAPAN: Jahikari, Hokkaido, September 10, 1903, *Arimoto.* LATVIA: nördlich v. dem Kriedshafen bei Libau, *Grøntved,* no. 088. SWEDEN: Ystad, Sc. austo. *Ringius;* Tobbisborg, Skåne, July 17, 1928, *Asplund.* NORWAY: Klaŭver in Insö, July 7, 1925, *Resvoll-Holmsen.* GERMANY: Baltic sea near Warnemünde, *Detharding* in Fl. Germ. Exsicc. no. 350, *Griewank* in F. Schulz, Herb. Norm, no. 774. FRANCE: St. Valery, Somme Distr., July, 1849, *Cosson.* ENGLAND: Kingsdown, Kent, June 15, 1837, *N. B. Ward,* August 17, 1907, *Raine;* Walmer, Kent, September, 1860, *John Stuart Mill.* IRELAND: Rosbigh, Kerry, *Andrews,* no. 311.

Var. GLABER, forma **acutifolius** (Bab.), n. comb. *L. maritimus, β. acutifolius* Bab. Man. Brit. Bot. 82 (1843).

Originally described from Unst, Shetland Islands: "Leaflets elliptic-lanceolate, acute, petioles straight, stems slender, straggling." I have seen no authentic material, but since Hooker, describing *L. maritimus* as "Glaucous, glabrous" (Hook. Stud. Fl. Brit. Isl. 104 (1870)) and Syme, similarly describing it "glabrous and glaucous" (Engl. Bot. ed. Syme, iii. 110 (1874)) both include var. *acutifolius* under it, without indication that it is not glabrous, I take var. *acutifolius* to be a form with narrow and acute leaflets such as rarely occurs within the normal range of the var. *glaber.* The only American material I have seen is from NEWFOUNDLAND: White Point, Bonne Bay, *Fernald, Long & Fogg,* no. 1840.

Var. **pellitus**, n. var., a var. glabro differt caulibus foliorum paginis inferioribus stipulis pedunculis rhachibus pedicellis calycibusque plerumque dense pilosis.—More common than var. *glaber* on the coast of North America from Newfoundland and the Gulf of St. Lawrence to New Jersey, inland on Lake St. John (Quebec) and Lake Champlain (Vermont); in Atlantic America commonly mistaken for typical *L. maritimus.* The following, from a very large representation, are characteristic. NEWFOUNDLAND: Dildo Run, Notre Dame Bay, *Fernald, Wiegand & Bartram,* nos. 5805, 5806; Ship Cove, Avalon Peninsula, 1928, *Agnes M. Ayre;* Great Barachois (or Barasway Bay), *Fernald, Long & Fogg,* no. 310; Grassy Island, St. John Bay, *Fernald, Long & Fogg,* no. 1838; Wild Cove, Bay of Islands, *Fernald & Wiegand,* no. 3640. ST. PIERRE ET MIQUELON: Anse à Henry, St. Pierre, *Arsène,* no. 321. QUEBEC: Ile à Marteau, Archipel de Mingan, *Victorin & Rolland,* no. 18,476; Clarke City Landing, *Fernald & Long,* no. 28,630; Moisie R., *P. W. Bowman,* no. 226; St. Alphonse, Ha-Ha Bay, Saguenay R., August 5, 1902, *E. F. Williams;* Baie de St. Prime, Lac St.-Jean, *Victorin,* no. 16,091; Cap à l'Aigle, *J. Macoun,* no. 66,817; Rivière du Loup, *Victorin,* no. 94; Ilet Brulé, Bic, *Rousseau,* no. 26,625; La Peninsule, Baie de Gaspé, *Victorin, Rolland, Brunel & Rousseau,* no. 17,249. MAGDALEN ISLANDS: Wolf Island (Pointe du Loup), *Fernald, Bartram, Long, & St. John,* no. 7700; Brion Island, *St. John,* no. 1918. NEW BRUNSWICK: St. Andrew's, June 28, 1900, *J. Fowler.* NOVA SCOTIA: St. Paul Island, *Perry & Roscoe,* no. 271 (TYPE in Gray Herb.); Bird Island, Cape Breton, *Nichols,* no. 584; Baddeck, *J. Macoun,* no. 19,056; Pictou, *Howe & Lang,* no. 480; Pembroke Shore, *Fernald & Linder,* no. 21,721; Sable Island, *St. John,* nos. 1265, 1266. MAINE: Moose Island, Passamaquoddy Bay, *Fernald,* no. 1958; Roque Bluffs, July 17, 1913, *Knowlton;* Little Duck Island, July 16, 1901, *Rand;* Swan's Island, *A. F. Hill,* no. 749; Matinicus, June 12, 1919, *C. A. E. Long;* Harpswell, *J. E. Dinsmore,* no. X264; Great Chebeague Island, *Fernald,* no. 1953; Kittery, *Fernald & Long,* no. 13,969. VERMONT: Lake Champlain, Burlington, June 14, 1897, *Eggleston;* South Burlington, June 26, 1912, *Knowlton;* Maquam Bay, Lake Champlain, Swanton, *S. F. Blake,* no. 3204. MASSACHUSETTS: Rockport, *L. B. Smith,* no. 651; Plymouth, September 2, 1911, *R. A. Ware;* Swansea, *S. N. F. Sanford,* no. 10,091; Bourne, *F. S. Collins,* no. 2846; Dennis, June 10, 1916, *Hunnewell & Blake;* Provincetown, *Fernald & Long,* no. 18,643; Penikese, *Fogg,* no. 1432; Cuttyhunk, *Fogg,* no. 2263. RHODE ISLAND: Tiverton, *E. A. Mearns,* no. 284; Little Compton, *S. N. F. Sanford,* no. 10,037; Westerly, August 31, 1919, *Weatherby & Collins;* Block Island, *Fernald & Long,* no. 9753. CONNECTICUT: Guilford, June 14, 1906, *G. H. Bartlett;* Madison, *Eames & Godfrey,* no. 8742; Stratford, *Blewitt,* no. 1747; Fairfield, August 22, 1898, *Eames.* NEW YORK: Fisher's Island, *St. John,* no. 2773; Riverhead, *St. John,* no. 2774. NEW JERSEY: Woodbridge, July, 1887, *Lighthipe.*

Var. *pellitus* may possibly occur throughout the range of var.

glaber. European descriptions, not distinguishing between the arctic *L. japonicus*, var. *aleuticus* and the more southern var. *glaber*, often define *L. maritimus* as glabrous or pubescent, though in descriptions based solely on the southern extreme in Europe, like those of Hooker and of Syme (cited in the discussion of forma *acutifolius*), we find the common European plant described as "glabrous." I have seen no convincing material of var. *pellitus* from Europe, temperate Asia, Pacific North America nor the Great Lakes, in most (or all) of which areas var. *glaber* is abundant. On the coast from the Maritime Provinces of Canada to Long Island var. *pellitus* is the common Beach Pea, the collections made in this area, without special selection, by botanists of the past century and represented in the herbaria before me showing 108 sheets of var. *pellitus*, 70 of var. *glaber*.

No one can regret more than I the necessity to abandon for the familiar Beach Pea, known to every observing visitor to our coasts and to the dunes of the Great Lakes, the unusually appropriate and very familiar name *Lathyrus maritimus*. But, unfortunately, this well known plant is the very exceptional victim of a system which in the main is aimed at conservation of established and familiar names, but in this case fails; and if it had been possible, as many hoped could be done, to win sufficient support in the International Congress at Cambridge for conservation of specific names, there would be hope of retaining *Lathyrus maritimus*. In summary, the bibliographic situation, regardless of varieties, is as follows:

PISUM MARITIMUM L. Sp. Pl. ii. 772 (1753).

LATHYRUS JAPONICUS Willd. Sp. Pl. iii². 1092 (1803).

PISUM DASIGYNUM Raf. Am. Mo. Mag. iv. 194 (1819).

LATHYRUS MARITIMUS Bigel. Fl. Bost. ed. 2: 268 (1824), published as a wholly distinct new species, which Bigelow purposely distinguished from *Pisum maritimum* L. (1753), saying: "it has been often taken for the *Pisum maritimum* of Europe. It is, however, decidedly a Lathyrus."

LATHYRUS CALIFORNICUS Dougl. in Lindl. Bot. Reg. xiv. t. 1144 (1828).

OROBUS MARITIMUS (L.) Reichenb. Fl. Germ. Excurs. 538 (1832).

LATHYRUS MARITIMUS (L.) Fries, Fl. Scand. 106 (1835), direct transfer of *Pisum maritimum* L. (1753).

The bibliography should make it clear that Bigelow in 1824 published as a wholly NEW SPECIES, *Lathyrus maritimus*, based on a wholly NEW TYPE,[1] the plant of the Boston region ("Beach, Dorchester, Chelsea"), and particularly emphasized that the Boston

[1] Bigelow's citation with doubt, of the "*Syn.* PISUM MARITIMUM. *Pursh?*," referred, of course, to the eastern American plant.

plant is not the European *Pisum maritimum* because it is "decidedly a Lathyrus." The circumstance that *Pisum maritimum* L. was later found by Fries to be a *Lathryus* and that in 1835 he published it as *L. maritimus* (L.) Fries in no way changes the fact that the name *L. maritimus* was already preëmpted by Bigelow for a plant which he purposely published as a new and different species. Under the original International Rules it was possible to argue (as some of my most discriminating nomenclatural correspondents have done) that, since Bigelow's plant is *taxonomically* conspecific with *Pisum maritimum, Lathyrus maritimus* Bigel. (1824) is *taxonomically* synonymous with *Pisum maritimum* L. and that, therefore, the proper name for the aggregate-species is *L. maritimus* (L.) Fries (1835). Under the International Rules before their alternation at Cambridge such a solution was perhaps possible. But, with the newer emphasis on the TYPE, it becomes clear that Bigelow's name, based on a wholly different type, is not at all a *nomenclatural* synonym of *Pisum maritimum.* Consequently, when Fries, in 1835, transferred *P. maritimum* into *Lathyrus,* the name *L. maritimus* was already preoccupied by a plant *validly published* as a different species, so that there was no place (under the now existing rules) for a *L. maritimus* based on a type different from that of Bigelow. It follows, therefore, that *L. maritimus* (L.) Fries is untenable, while the current citation of the authors of the combination, "(L.) Bigel." very definitely misrepresents Bigelow's intent; and, since two of the phases of the variable species had still earlier and available names, there is no course open, under the existing rules, but to adopt for the aggregate-species the earliest name not preëmpted, LATHYRUS JAPONICUS Willd. (1803).

It may further be stated that, although I am here treating *Lathyrus maritimus* Bigel. (under the name *L. japonicus,* var. *glaber*) as essentially the same as *Pisum maritimum* L. of Europe, there are really slight differences between them—enough so that extreme "splitters" might at any moment maintain that they are different species. Rafinesque, Bigelow, Douglas and Lindley have all done so! The foliage of the American plant averages rather larger than in the European: in the altogether too limited representation of European *L. japonicus,* var. *glaber* before me, the largest leaflets measure 4 cm. long and 2.3 cm. broad and the largest stipules are 2 cm. broad (Hooker says "*Leaflets* 1–2 in."; Gams in Hegi, "2 bis 4 cm lang und ½ bis gegen 2 cm breit"); but in the plant of the New England coast (*L. maritimus* Bigel. *sen. str.*) the lower leaflets of each leaf are commonly 4–7 cm. long and 2–4 cm. broad, with the stipules up to 3.5 cm. broad. Consequently, although I am not myself separating the coarser, glabrous extremes from temperate Europe and temperate North America, it cannot be said that they are strictly identical. In fact, Nuttall, having var. *glaber* from the Great Lakes and calling it *Pisum maritimum*, said "differs from the European species in having a pubescent legume";[1] whereupon Rafinesque, in a review of Nuttall's work, promptly seized the opportunity: "*Pisum maritimum*, N., is not that of L.; it must be called *P. dasigynum*."[2] The slight difference in the legume emphasized by Nuttall and capitalized by Rafinesque is not constant but when Lindley got hold of material of the coarser glabrous plant of temperate North America he did not hesitate to treat it as a distinct species, *L. californicus* of Douglas's Journal ined. (Lindl. Bot. Reg. xiv. t. 1144), without a suggestion that it is a large development of the Sea Pea of Britain, the North Sea and the Baltic.

In view of the facts that *Lathyrus maritimus* Bigel. was by its author considered a new species, that Rafinesque had previously treated it as a new species, and that Lindley, getting apparently the same plant, also treated it as a distinct species, and in view, also, of the well known tendency of some taxonomists to see "species" where others see only varieties or minor forms, the provision of the revised International Rules is wise, that an earlier specific name cannot be transferred if "the resulting binary combination has been previously and validly published for a different species."[3] *Lathyrus maritimus* Bigel. was the name "validly published" for what Bigelow considered a different species, and it is sufficiently different so that by some other taxonomists it was independently treated as a new species and it may again be taken up as such. At any rate its *taxonomic* reduction is a matter of individual judgment; *nomenclaturally* it is a different species.

The identification of the various specific and varietal names involved in this discussion has, in the main, presented few difficulties; the most difficult is *Pisum maritimum* L. Typical *Lathyrus japonicus* Willd. is clearly the slender glabrous plant of Japan and adjacent

[1] Nutt. Gen. ii. 95 (1818).
[2] Raf. Am. Mo. Mag. iv. 194 (1819).
[3] Art. 58 of the Proposals by the British Imp. Bot. Congr. adopted as Art. 48bis at Cambridge.

coasts, well illustrated by Houttuyn, whose plate was cited by Willdenow. Miquel's *L. maritimus*, var. *Thunbergianus* goes back to the same sources and to a specimen from Thunberg. The identity of Greene's *L. maritimus*, var. *aleuticus* is clear. As I point out in the discussion of it, it is possible that there is an earlier valid name for it in *L. maritimus*, var. *velutinus* Fries; but, as Fries originally published it, this was a *nomen nudum*.

Pisum maritimum L. Sp. Pl. ii. 727 (1753) was a mixture of at least two varieties. The Lapland element, judging from the material at hand from Lapland, was the small and slender, thin-leaved and large-flowered arctic plant which I am treating as *Lathyrus japonicus*, var. *aleuticus*. From this plant Linnaeus presumably derived the *pubescent* character emphasized in his description in Fl. Suec. no. 608 (1745). Most of the references given by Linnaeus in 1753 are to the coarser, glabrous and glaucous plant which grows from Finland and southern Scandinavia to Germany, France and Britain, the "English Sea-Pease" of Ray and other early authors cited by Linnaeus.

Rafinesque's *Pisum dasigynum* rested solely on Nuttall's *Pisum maritimum* from "shores of Lakes Erie, Huron and Michigan" and is consequently the common glabrous-leaved plant of the Great Lakes. Bigelow's description of his *Lathyrus maritimus* (1824) was characteristically complete and it unquestionably belongs to the common plant of "glaucous aspect" of Bigelow's region. This, as already pointed out, may be somewhat coarser than the common European plant, but enough smaller plants are found in America to bridge over the slight difference. *Pisum maritimum*, β. *glabrum* Seringe (1825) was simply and clearly characterisized: "foliis glabris.—In Canada," and can be only the common glabrous plant of eastern Canada.

Phylogenetically *Lathyrus japonicus*, var. *aleuticus*, occurring as a tolerably uniform plant around the arctic and subarctic areas, would seem to be the primitive or ancestral type, which, pushing southward into more temperate conditions, has become modified into the glabrous but thin-leaved *L. japonicus*, var. *typicus* and into the two coarser and heavier-leaved extremes of temperate regions, vars. *glaber* and *pellitus*.

Gray Herbarium.

PICEA GLAUCA, FORMA PARVA

M. L. Fernald and C. A. Weatherby

Picea glauca (Moench) Voss, forma **parva** (Victorin), comb. nov. *P. canadensis*, forma *parva* Vict. Gymnosp. Quebec, 73 (1927).

As demonstrated by Rehder, RHODORA, xvii. 60–62 (1915), the name *Picea glauca* must be used for the White Spruce. *P. canadensis* (Mill.) BSP. was based merely on *Abies canadensis* Mill. Gard. Dict. ed. 8, sp. no. 4 (1768). Except for the English name "*The Newfoundland White Spruce Fir,*" the descriptive phrases given by Miller were word-for-word identical with two of the three diagnostic phrases used (or quoted) by Linnaeus in characterizing *Pinus canadensis* L. Sp. Pl. ed. 2, 1421 (1763). In both cases (*Pinus canadensis* L. and *Abies canadensis* Mill.) the Hemlock (*Tsuga canadensis*) and the White Spruce were confused. The first Linnaean phrase (also Miller's first diagnosis) "*Pinus* foliis solitariis linearibus obtusiusculis submembranaceis" clearly belongs to *Tsuga* and was a modification of the diagnosis quoted by Linnaeus from Gronovius: "Abies foliis solitariis confertis obtusis membranaceis." Gronovius gave a good account of the Hemlock and his type, *Clayton*, no. 547, is the type of *Pinus canadensis*, therefore of *Tsuga canadensis*. The last diagnosis given by Linnaeus (and by Miller in 1768) had been borrowed by Linnaeus from Miller's earlier account of the White Spruce, without binomial "Abies foliis piceae[1] brevioribus, conis parvis biuncialibus laxis." The fact that Miller in 1768 took over bodily the two parts of Linnaeus's *Pinus canadensis* and used the same specific epithet (even though he omitted to cite the synonym *Pinus canadensis*) is clear evidence that Miller did not intend to define a new entity; also evidence that he did not understand the species any better than Linnaeus had.

Further evidence that Miller did not really know his *Abies canadensis* (which consisted of two generic elements) is afforded by his statement: "The fifth sort [his *Abies Mariana* or '*Black Spruce Fir of North America with very small cones*'] . . . . rarely arrives to the size of the fourth [his bigeneric *Abies canadensis*]: however, the inhabitants of America use the branches of both indifferently in making of Spruce-beer, from whence the trees obtained the title of Spruce-trees."

Now, everyone who, like the senior author, grew up in a spruce region, knows that the White Spruce is never used for making beer, having a disgusting odor and flavor, whence the colloquial names "Skunk Spruce" and "Cat Spruce"; but that the chief ingredient of spruce beer is the branchlets of either *Picea mariana* or *P. rubens*,

[1] Referring to *Pinus Picea*, or *Picea Abies*, the Norway Spruce.

both known in the woods indiscriminately as "Black Spruce." This fact has long been recognized by those who know the northern forests. Thus, the younger Michaux, recording for the Black Spruces (as *Abies nigra*) the Canadian name "Épinette à la bière" said "C'est avec les jeunes branches de l'*Abies nigra* et préférablement avec celles de la variété dite *Black Spruce*, Sapinette noire, qu'on fabrique la bière connue sous le nom de bière de spruce, *spruce beer*"[1]. But, referring to earlier misconceptions, he stated of the White Spruce (his *Abies alba*): "Je puis également affirmer, ... que ce n'est pas avec les rameaux de cette espèce que se fabrique la bière de spruce, puisqu' au contraire, on évite soigneusement de s'en servir, parce que lorsque ses feuilles sont froissées elles répandent une odeur fort et désagréable que se communique, dit-on, à la liqueur."[2] Similar explicit statements are given by others who know the making of spruce beer.

It is, therefore, evident that Miller's *Abies canadensis* was both the Hemlock and the White Spruce, and that he ascribed to it, furthermore, the properties of the Black Spruce. As an illustration of a *nomen confusum*, no better example could be found.

Gray Herbarium.

Suksdorf's "Untersuchungen in der Gattung Amsinckia."[3]—Another praiseworthy contribution to the literature of systematic botany has recently been published by the veteran Washington botanist, Mr. W. N. Suksdorf of Bingen, Washington. This one, also written in German, as is the author's custom, is a detailed monograph of the difficult genus *Amsinckia*. Descriptions of two hundred and thirty species are included, and an unusually large number of novelties is proposed; altogether these number one hundred and ninety-two, all but thirty of which are from California, the area, apparently, in which the genus reaches its greatest development. There is one new nomenclatorial combination. The remainder of the new species are from Yukon, British Columbia, Washington, Oregon, Idaho, Utah, Nevada, Arizona, New Mexico, Lower California, and two species from South America. By publishing this paper before January 1, 1932, the author has avoided the necessity of writing a Latin summary for his proposed new species.

It is evident that the author is not entirely free from some misgivings in regard to the large number of new species described, and he suggests that such a number is likely to arouse suspicion as to the merit of his work.

[1] F. A. Michaux, Hist. Arb. Forest. de l'Am. Sept. i. 131 (1810).

[2] F. A. Michaux, l. c. 136 (1810).

[3] Werdenda $1^{5, 6, 7, 8}$: 47–114, 1931 (December 31). Published by the author at Bingen, Washington. Price $1.00.

He states, however, that from his point of view, the subject lends itself to no other interpretation. To quote a few sentences from the introduction: "Der Formenreichtum der Gattung Amsinckia übertraf alle meine Erwartungen. Mein Arbeit wird wohl keinen Botaniker befriedigen; ich selbst bin auch nicht damit zufrieden; glaube aber sie wird dahin führen, dass wir bald die Gattung besser verstehen werden. Die grosse Zahl der neuen Arten spricht nicht günstig für meine Arbeit, denn sie wird Misstrauen erregen. Die Sache liess sich aber nicht anders machen, nach meiner Ansicht."

The genus is divided into the four subgenera, Muricatae, Microcarpae, Tessellatae, and Vernicosae, chiefly on the basis of fruit characters, namely, of size, shape and sculpture of the nutlets, and on the number and arrangement of the vascular bundles of the corolla. For some of the subdivisions, the character of the position of the stamens, whether high or low on the corolla, is used.

Dr. Asa Gray, in the Synoptical Flora in 1886, recognized only six species and two varieties of *Amsinckia.* Macbride, in 1917, characterized twenty-one species.[4] In that work Macbride states: "Altogether *Amsinckia* is the most perplexing group I have studied and I can only hope that this effort to define its natural components may lead to careful field-work by some one who may then be in a position to prove or correct my interpretation. It is conceivable, with the better understanding gained from field-observation of specific limitations within the group, that it will be found to consist of many more species than the twenty-one here recognized." Perhaps no one is in a better position than Suksdorf to carry on the work of further elucidating this genus. During the last twenty years his attention has been focused on *Amsinckia.* In his garden at Bingen he has cultivated many species and thus has had the opportunity of studying them closely in the living condition. He has collected Amsinckias in many parts of western United States, principally in Washington and California; indeed, some of his first collections of specimens of the genus were made in the latter state as early as 1875, when he was a student at the then very new University of California. For his monograph he has had the benefit of collections of *Amsinckia* from the Gray Herbarium of Harvard University, the University of California, the California Academy of Sciences, the State College of Washington, and those from his own very extensive herbarium at Bingen.

Though it is not to be expected that the results of Suksdorf's work will be accepted *in toto* by all botanists, yet the monograph is one that will merit careful consideration by all serious students of the Boraginaceae.—George Neville Jones, State College of Washington, Pullman, Washington.

Abies balsamea (L.) Mill., forma **hudsonia** (Bosc), comb. nov. *Picea Fraseri*, var. *hudsonia* (Bosc) Knight & Perry, Syn. Conif. Pl. 39 (1850). *A. hudsonia* Bosc ex Knight & Perry, l. c. in syn. (1850). *A. Fraseri* (B) *nana* Lindl. & Gordon, Journ. Hort. Soc. Lond. v. 209 (1850), based on "*Pinus hudsonica*" of Gardens (presumably a

[4] Macbride, J. Francis, A Revision of the North American Species of Amsinckia. Contrib. Gray Herbarium of Harvard University, **49**, n. s.: 1–16, 1917.

misprint for *Abies hudsonia*). *A. Fraseri*, var. *Hudsoni* Carrière, Traité Gén. Conif. 200 (1855). *A. Hudsoni* Hort. acc. to Carr. l. c., in syn. (1855). *A. balsamea Hudsonica* Veitch, Man. Conif. 83 (1881), wrongly ascribed to Engelm. *A. balsamea prostrata* Hort. acc. to Veitch, l. c. in syn. (1881). *A. balsamea* [var.] *hudsonia* Sarg. Sylva, xii. 109 (1898), erroneously ascribed to Engelm.

The dwarf, prostrate extreme of *Abies balsamea* is certainly only a depressed *form*, a response to bleak habitats, quite parallel with the dwarf forms in *Picea* and other groups.—M. L. FERNALD AND C. A. WEATHERBY.

DRUCE'S COMITAL FLORA.[1]—The venerable Dr. Druce was the most intense student of the local occurrence of the vascular plants in Great Britain. His many county floras and his somewhat single-handed and often dictatorial editing of the local records published in the Reports of the Botanical Society and Exchange Club of the British Isles are familiar to many American botanists. In spite of the patent triviality and the quibbling character of many of the published items (such as a dignified scientific journal would scarcely wish to publish), their real meat was thoroughly digested by the Editor; and he was alert, to an extent probably unparalleled, to carry on extensive local botanizing and to follow up the discoveries of others. In his own words "A new record was not to be sneered at but was a real joy."

Druce's last extensive work was the preparation of THE COMITAL FLORA OF THE BRITISH ISLES, "being the Distribution of British Plants . . . throughout the 152 Vice-Counties of Great Britain, Ireland, and the Channel Islands, with the Place of Growth, Elevation, World-Distribution, Grade, Chief Synonyms, and First Names by which the Plants were recorded as British, . . . with an original Coloured Map showing the Botanical Vice-Counties presented by WILLIAM JAMES PATY, Esq." This final and very useful book of Druce's was never seen by him in its finished form, for, as his close friend and publisher, Mr. Costorphine, writes in a personal letter, "it was issued on the day of his death." The book, then, is a most appropriate monument to a life of intense activity and devotion to the recording of local data on the British flora.

The volume will not appeal to those who look for continuous reading and logical development of a theme or for a philosophic consideration of the facts recorded. After historical and explanatory introductory matter it becomes completely matter-of-fact and, until it is understood, cryptic. It is comparable with a railroad timetable or with stock-market reports, though a trifle more satisfying than the latter. As a sample (selected for its brevity and because the plant is familiar to most readers of RHODORA) take

660.—LIPARIS Rich.

1.—L. Loeselii (L.) Rich.

Uliginal. Germanic. Fenny bogs, damp hollows in sand-dunes. Rare. P. Lowland.

[1] GEORGE CLARIDGE DRUCE. The Comital Flora of the British Isles. *T. Buncle & Co.*, Market Place, Arbroath. 1932. *Price* 20 s.

Europe, N. and C.; Italy; Russia, S.; Amer. N.

Eng. 7.

25, 26, 27!, 29!, 31, 41!, 44!.

Two forms occur—the uliginal and the dunal.

Orchis lilifolius . . . In the watery places of Hinton & Teversham Moors.—Ray Cat. Cant., 106, 1640.

The numbers, translated, mean that *Liparis Loeselii* is found in 7 of the 152 vice-counties of England; the succeding numbers (25, 26, 27, etc.) that these 7 vice-counties are East Suffolk, West Suffolk, East Norfolk, etc.

Thus condensed and carefully organized in the book we have a vast amount of detail, such as is possible only in a country which has been extensively botanized. The subdivisions of Britain into botanical vice-counties, quite regardless of political divisions, has long been practiced and was extensively elaborated by Hewett C. Watson in his famous Topographical Botany (1870). This new and much fuller development of the same condensed method of recording innumerable items is here noted because it has long seemed to the reviewer that something of the sort would be most useful in New England. Our knowledge of much of the area, like the "Maine Woods," for instance, is too limited for such treatment; but a region like Cape Cod, with the well defined Upper, Middle and Lower Cape, or Coös County, New Hampshire, with the acid or subacid alpine, subalpine and wooded mountain regions and with the sharply differentiated calcareous low area to the north, give suggestions for a proper segregation into vice-counties which have a real significance. Without further expanding upon the desirability of some such work in America, the Comital Flora of Druce is highly recommended to students of local floras as a model to be closely studied.—M. L. F.

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THE NEW ENGLAND BOTANICAL CLUB

Vol. 34. October, 1932. No. 406.

MONOGRAPHIC STUDIES IN THE GENUS ELEOCHARIS—II[1]

H. K. Svenson

(Plates 219–221)

Series 6. Palustriformes

Sub-series: Palustres

Sub-series: Truncatae[2]

a. Achenes[3] 0.7–1.5 mm. long (including style-base); upper sheath truncate, indurated and usually mucronate at summit. . . . *b.*
  b. Achenes with prominent keel-like angles; spikelets long-cylindric. . . . . .62. *E. tricostata.*
  b. Achenes without keel-like angles. . . . . *c.*
    c. Rootstocks very stout, 4–5 mm. in diameter; scales of the rootstock 2–3 cm. long; culms subterete (Northwestern United States). . . . . .68. *E. decumbens.*
    c. Rootstocks thinner; rootstock-scales when present rarely exceeding 1 cm. in length; culms usually angled or flattened. . . . . *d.*
      d. Culms flattened, frequently exceeding 1 mm. in width; scales of the spikelet (except sometimes in var. *atrata*) with conspicuous whitened, often bifid, acuminate tips. . . . . .60. *E. compressa.*
      d. Culms 4–8-angled; scales obtuse to acute, or in *E. acutisquamata* with acuminate but not whitened tips. . . . . *e.*

[1] Brooklyn Botanic Garden Contributions, No. 65. The present paper is a continuation of the series in Rhodora xxxi., there ending on p. 242. The numbering of the species continues that in the earlier paper.

[2] This group (defined in Rhodora xxxi. 128 and Contrib. Gray Herb. No. 86 (1929)) is strictly American. For treatment of the North American representatives of the sub-series Palustres see M. L. Fernald and A. Brackett, Rhodora xxxi. 57–77, and Contrib. Gray Herb. No. 83 (1929).

E. densa, without apparent septae, and very close to the tropical *E. geniculata*, is omitted from the present key and will be later treated with *E. geniculata* and *E. nodulosa*.

[3] In study of the achene-markings a magnification of 30x–40x has been used.

e. Scales acuminate, usually somewhat spreading (Texas)..............................61. *E. acutisquamata.*
e. Scales obtuse to acute.....*f.*
f. Style-base much depressed or truncate, often with a central apiculate projection.....*g.*
g. Tip of upper sheath whitened; achenes 0.7–1 mm. long; culms capillary, not exceeding 8 cm. in height (Newfoundland to Western Quebec and Northern New England).......59. *E. nitida.*
g. Tip of upper sheath dark-girdled; achenes 0.9–1.5 mm. long; culms coarser (sometimes capillary in typical *E. capitata*).....*h.*
h. Rootstocks creeping and elongated......58. *E. capitata.*
h. Rootstocks vertical and greatly thickened; the numerous wiry culm-bases persisting (Northern Pacific States)............67. *E. Bolanderi.*
f. Style-base conic, pyramidal or mucroniform.....*i.*
i. Style-base mucroniform, its sides nearly parallel; the nearly smooth achenes showing only faint reticulation under magnification (Mexico to South America)..................65. *E. montana.*
i. Style-base conic or pyramidal.....*j.*
j. Spikelets linear-lanceolate, 1–1.5 cm. long. 64. *E. Parishii.*
j. Spikelets ovoid to ellipsoid.....*k.*
k. Surface of achene scarcely reticulate under magnification; style-base pyramidal (Texas)..........................66. *E. Palmeri.*
k. Surface of achene clearly pitted or reticulate under magnification.....*l.*
l. Surface of the olivaceous achene coarsely and deeply roughened-reticulate, the projecting angles of the cells conspicuous ....58. *E. capitata.*
l. Surface of the yellowish or brown achene with shallow but distinct pitting or reticulation.....................63. *E. arenicola.*
a. Achenes 1.7–2 mm. long (including style-base); upper sheath oblique, not indurated...............................69. *E. fallax.*

The following abbreviations for herbaria are employed in citation of specimens (where no letter is appended, the specimens are in the Gray Herbarium):

B. Brooklyn Botanic Garden; C. Canadian National Herbarium; D. C. C. Deam; G. Gray Herbarium; I. University of Illinois; N. United States National Herbarium; N. Y. New York Botanical Garden; P. Pomona College; Ph. Philadelphia Academy of Natural Sciences; S. Riksmuseet, Stockholm; T. University of Tennessee; W. University of Wisconsin.

With the exception of *E. palustris* no North American species of *Eleocharis* has suffered so much from nomenclatorial tangles as *E. capitata*, and it is safe to say that none offers so complex a series of morphological variations. Until comparatively recent times the name *E. tenuis* (Willd.) Schultes was accepted for the common plant of eastern United States, but Blake[1] has shown that the name *E. capitata* must be based entirely upon the Clayton specimen cited by Linnaeus from Gronovius' "Flora Virginica," an interpretation which has been followed by nearly all botanists in America. Blake's view has, however, been disputed by Farwell (RHODORA xxxii. 180–181 (1930) and Am. Midland Nat. xii. 175–178 (1930), who would apply the name *E. capitata* to the plant now known as *E. obtusa* (Willd.) Schultes upon the basis of Linnaeus' description of the spikelet as "subglobosa" and the culm as "tereti." Kalm's specimen of *E. obtusa* now in the Linnaean herbarium seems not to have been there in 1753 (Blake, RHODORA xxxii. 182 (1930)), but Farwell believes that a literal interpretation of the description is all-important and that the species under discussion was based upon a specimen of *E. obtusa* then in Linnaeus' herbarium but unrecorded and subsequently lost. Britton[2] has also found it difficult to reconcile Linnaeus' description of the spikelet as "subglobosa" with the elliptic spikelets which are characteristic of *Scirpus tenuis* and concludes that there was probably "some ancient error or mixture." Robert Brown was by no means the first botanist to recognize difficulties in the determination of *Scirpus capitatus* L., for as early as 1789, Ehrhart[3] had recognized that the contemporary interpretation of *S. capitatus*, the plant now called *Eleocharis ovata* (Roth) R. & S., was incorrect. Roth, in his earlier work,[4] held to Schreber's treatment, but in 1793[5] clearly realized that *Scirpus capitatus* did not grow in Germany and characterized the true plant as having tetragonous culms, no bristles, three stamens and three styles, in other words, *S. tenuis*. The plant which had been passing in Europe as *Scirpus capitatus* was thereupon described by Roth as *Scirpus ovatus*. The counterpart of this interpretation is seen in America in the treatment of *Scirpus obtusus* as *S. capitatus* L., by

[1] RHODORA xx. 23 (1918).

[2] TORREYA xix. 246 (1919). See also the discussions by Fernald, RHODORA xxiii. 106 (1921), and by Mackenzie, RHODORA xxx. 237 (1928).

[3] Beiträge iv. 155 (1789), where *Scirpus capitatus* of Schreber, Krocker and Roth [i. e. *E. ovata*] is said to differ from *S. capitatus* L., the former having a compressed culm, two stamens, and a bifid style. This comparison I take to be with the Gronovian plant (*Clayton* 380), but there is the very remote possibility that Kalm's plant (*E. obtusa*) might have been the basis of comparison, since *E. obtusa* invariably has three stamens and sometimes a three-parted style.

[4] Tent. Fl. Germ. i[1]. 28 (1788), referring to Schreber's Spic. Fl. Lips. 60 (1771).

[5] Tent. Fl. Germ. ii[2]. 562 (1793). "Planta indicata et sub hoc nomine descripta non est Scirpus capitatus Linn., monenti Praes. *de tetrabar*, sed longe aliena et nova species. Deleatus itaque nomen specificum cum differentia specifica et eiusdam loco ponatur."

Barton,[1] Elliott, Bigelow and other early writers. Perhaps this general confusion explains Roth's comparatively late (1793) publication of *Scirpus ovatus*, a European plant well known in earlier times.[2]

Linnaeus' description of *Scirpus capitatus* (Sp. Pl. i. 48 (1753)) was very brief:

5. SCIRPUS culmo tereti nudos etiformi, spica subglobosa. Scirpus culmo setaceo nudo, spica subglobosa. *Gron. virg.* 12. *Habitat in* Virginia.

It is most probable that Clayton's specimen came from eastern Virginia,[3] and a photograph loaned to me by Dr. Blake reveals the slender form which is characteristic of the coastal region. Since this form must be considered as typical, the outline of the achene becomes important, but Clayton's plant, which has been kindly examined for me by Mr. J. E. Dandy of the British Museum, is unfortunately immature and without achenes. There is little doubt however that the achenes, if they had been developed, would be small, olivaceous, and with a pyramidal style-base. Dr. Robinson's no. 470, collected in Clayton's neighborhood, agrees well in habit with the Linnaean specimen, and I have figured it (FIGS. 56, 57) as representing typical *E. capitata*. The typical form is recognizable as the very slender plant of moist, often sandy places, common northward to New England on the coastal plain and to some extent in the Piedmont region, and also found together with many other plants typical of the coastal plain in the silicious region of southern Nova Scotia.[4]

The name *Scirpus filiformis* Lamarck (1791)[5] antedates *Scirpus tenuis* Willd. (1809). A photograph of the type of *Scirpus filiformis* has been kindly supplied to me by Professor H. Lecomte of the Muséum d'Histoire Naturelle, in Paris. In this photograph four detached culms with spikelets occupy the center of the sheet together

[1] Compend. Fl. Phil. 31 (1818). "*S. ovatus* Willd. . . . *S. capitatus* Schreb. and Swartz. . . . From a careful comparison of original specimens from Schreber, Willdenow, and Swartz, in my herbarium with our native plant, I have added the above synonyms."

[2] A number of pre-Linnaean references are given by Willdenow, Sp. Pl. i. 294 (1797).

[3] John Clayton (1686–1773) was clerk of Gloucester County, Virginia. For biographical sketch see Britten, Journ. Bot. 47. 297–301 (1909).

[4] Mrs. Erlanson, Mich. Acad. Sci. Papers iv. 130 (1925), considers the very depauperate form represented by Grimes' no. 3774 from the vicinity of Williamsburg, Virginia, as probably the type form, but the Clayton type as shown in Dr. Blake's photograph is considerably larger than the Grimes' specimen in the Gray Herbarium.

[5] Ill. i. 138 (1791). The complete Latin citation is as follows:

651. SCIRPUS *filiformis*. S. culmo filiformi subangulato nudo, spica terminali ovata, squamis obtusis. Ex America septentrionali.

with the label "*Scirpus filiformis* du New York. Neumas [? the name is illegible] 88." Three culms to one side of the sheet have a small illegible label apparently reading "du la Caroline freyer [?]." One of the latter is identical with the material from New York, which is unmistakably typical *Eleocharis capitata;* the other culms from Carolina, though appearing immature, probably represent *E. tricostata* and so conform to a later description by Vahl,[1] and also to the derived descriptions by Pursh and Poiret of *S. filiformis* "spica oblonga obtusa." "Hab. in Carolina inferiore Lamarck." Although there is some mixture of species, the predominating material, in addition to carrying the label, conforms to Lamarck's description "culmo filiformi subangulato" and "spica terminali ovata." On the basis of material represented in this photograph *Scirpus filiformis* Lam. should without hesitation be considered a synonym of *S. capitatus* L.

The exact identity of *Scirpus tenuis* Willd. is not clear, but a minute fragment of a spikelet of the type specimen in the Berlin Herbarium, which I have examined through the kindness of Dr. Mattfeld and Mr. Weatherby,[2] seems to be the typical form of *Scirpus capitatus.* The type is in a juvenile state, having been grown at Berlin from seed sent to Willdenow by Muhlenberg. *Scirpus ellipticus* Willd. no. 1172, derived from Muhlenberg, and included under *E. tenuis* by Boeckeler, is, according to Dr. Mattfeld's letter, in a still younger condition. The culm of *Eleocharis tenuis* has generally been considered as four-angled, and the cross-section is so illustrated in Gray's Manual, ed. 7, fig. 258, but some material, and this is especially so in capillary specimens from Pennsylvania and Virginia, shows five-angled culms when carefully sectioned. *Scirpus quadrangulatus* Muhlenberg (1813), generally considered as a synonym of *Scirpus tenuis,* would seem by its very name to have been outstanding in culm characteristics, and it is very likely the plant with prominently four-angled culms, not uncommon in Pennsylvania, which I treat as *E. capitata* var. *pseudoptera* Weatherby.

As in other species of *Eleocharis,* variation in achenes is striking, but in *E. capitata* there is also a remarkable diversity in the culms as

[1] Vahl, Enum. ii. 248 (1805); Pursh, Fl. N. Am. i. 54 (1814); Poiret, Encyc. Meth. Suppl. v. 93 (1817); also *Isolepis filiformis* R. & S. Syst. ii. 106 (1817) and *Eleocharis filiformis* Kunth, Enum. ii. 146 (1837).

[2] I wish here to express my appreciation of Mr. Weatherby's kind assistance throughout my work at the Gray Herbarium in translations and bibliographic references, and especially for a series of detailed notes on the morphology and geographical variation of *Eleocharis capitata.*

seen in cross-section. Not only has the study of individual achenes of each specimen been necessary, but also in a very large number of cases sections of the culm have been examined. For routine work culms were boiled and then cross-sectioned with fine scissors. For the more careful cutting and staining of cross-sections of specimens, some of which are shown in the accompanying plate (220), I am greatly indebted to Miss H. M. Rusk of the Brooklyn Botanic Garden, and for the photographing of these sections, in addition to the achenes shown on the same plate, I must thank Mr. Louis Buhle, also of the Brooklyn Botanic Garden. To all who have made loans of specimens for study I am very grateful.

Four distinct geographical trends, which I have treated as varieties, appear in this examination of achenes and culm-sections. The var. *typica* characteristic of the coastal plain, has capillary culms, small olivaceous achenes with deep pitting and pyramidal style-base; var. *verrucosa* of the Mississippi Valley is similar, but with a depressed style-base; var. *borealis* is the coarse plant in bogs northward; and var. *pseudoptera* is confined to a limited area in the Middle Atlantic States. The achenes range from 0.9 mm. to 1.2 mm. in length including the style-base, but their mass varies much more than these small limits would indicate, due to varietal differences in turgidity of achene and in relative length of style-base. The achenes of var. *borealis* are as a rule larger in bulk than those of the other varieties. On the Atlantic seaboard there is little difficulty in the delimitation of these geographical variants and the number of intergrading specimens is surprisingly few. On the other hand examination of a large number of specimens from the Great Lakes region and the Mississippi Valley has not fully solved the problem of the interrelationship of *E. capitata*, *E. compressa*, and *E. acutisquamata*. A critical determination of specimens of *Eleocharis* is often difficult or even impossible if the material has been collected in the flowering stage, or if, as so often happens, the achenes have failed to develop, due to the attack of fungi or to other causes. The following key will serve to distinguish these geographical varieties of *E. capitata:*

a. Achenes wax-yellow,[1] in age becoming golden-yellow to dull orange,[2] averaging 1–1.1 mm. long (including the style-base); reticulation of achene usually shallow, the wavy transverse bands formed by the projecting cells thus more

[1] According to Ridgeway's "Color Standards and Color Nomenclature." Washington, D. C. (1912).

[2] *Xanthine-orange* in Ridgeway.

regular than in the typical variety; style-base flattened-triangular, often poorly distinguished from the body of the achene, with a short central projection; culms relatively stout, usually 6–8-angled. Bogs, meadows and pond-shores, Newfoundland to British Columbia and southward to the mountains of Tennessee.........................Var. *borealis.*

a. Achenes olivaceous[1] (before maturity sometimes yellowish in var. *pseudoptera,* or yellowish-white in var. *typica*); reticulation of achene usually deep.....*b.*

b. Culms about 0.5 mm. thick, greatly elongated (usually 30–90 cm. tall), with 4 wing-like angles; achenes 1–1.1 mm. long, including the flattened triangular style-base. New Jersey to Virginia..............................Var. *pseudoptera.*

b. Culms capillary, rarely exceeding 30 cm. in height; achenes averaging 0.9–1 mm. long, including the style-base.....*c.*

c. Achenes with an acute pyramidal style-base often 1/5 as high as the body of the achenes; culm 4-angled or 5-angled. Atlantic Coastal Plain.....................Var. *typica.*

c. Achenes with a flattened style-base; reticulation as in var. *typica* but usually with some of the cell-projections verrucose; culms 5-angled. Mississippi Valley.....Var. *verrucosa.*

58. E. CAPITATA (L.) R. Br. var. **typica** (FIGS. 56, 57 and PLATE 220, FIGS. 1, 13). Culms capillary, 0.5–4 dm. high, usually quadrangular with slightly concave sides or five-angled, erect from a thickened creeping ligneous rootstock; stolons thickened, elongate, covered with acute brown or reddish scales; sheaths truncate at the apex, with a short mucro: spikelets ellipsoid to ovoid, acute or blunt, 3–10 mm. long, 20–30-flowered; scales ovate, obtuse or acute, reddish-brown to black, with a scarious margin and green keel; the lowest scale suborbicular and larger: styles 3-fid; stamens 3: achene obovoid, 0.8–1 mm. long, trigonous, olivaceous, alveolate, sometimes with wavy transverse bands formed by the projecting angles of the vertically elongated cells: style-base brownish, pyramidal: bristles 2 or 3, rarely persisting, light brown, less than half as long as the achene.—Prod. i. 225 (1810) as to the name-bringing synonym; S. F. Blake, RHODORA xx. 23–24 (1918). *Scirpus capitatus* L., Sp. Pl. i. 48 (1753). *Scirpus tenuis* Willd., Enum. i. 76 (1809). (?) *Scirpus quadrangulatus* Muhl., Cat. 6 (1813) *nomen nudum,* not *S. quadrangulatus* Michx., Fl. i. 30 (1803). *Scirpus filiformis* Lam., Ill. i. 138 (1791); Pursh, Fl. N. Am. i. 54 (1814). *Eleocharis tenuis* Schultes, Mant. ii. 89 (1824); Torr., Ann. N. Y. Lyc. iii. 309 (1836) and Fl. N. Y. ii. 349 (1843); Kunth, Enum. ii. 145 (1837) probably excl. Brazilian plants;[2] Boeckl., Linnaea xxxvi. 448 (1869–1870); Britton, Journ. N. Y. Mic. Soc. v. 108 (1889); Britton & Brown, Ill. Fl. i. 255, fig. 595 (1896);[3] C. B. Clarke, Ill. Cyp. t. 39, figs. 6–9 (1909).[4] *Scirpus ellipticus* Willd.[5] ex Kunth, Enum. ii.

[1] *Yellowish-olive* in Ridgeway.

[2] Plants which I have seen so labeled are not *E. capitata.*

[3] This illustration represents the typical achene with conical style-base.

[4] These figures, accompanied in the legend by the notation "forma filiformis" undoubtedly represent the typical variety.

[5] In a letter sent to Mr. Weatherby, Dr. Mattfeld writes that the material represented by Willdenow 1172 is very young, and consists of a mixture of three spikelets of *Scirpus tenuis* and one of *S. obtusus,* as identified by Dr. Gray.

146 (1837); ?*Eleocharis filiformis* Kunth and *E. elliptica* Kunth, Enum. ii. 146 (1837). *Eleogiton filiformis* A. Dietr., Sp. Pl. 96 (1840). *Trichophyllum tenue* Farwell, Rep. Mich. Acad. Sci. xxi. 359 (1920).—Nova Scotia to Virginia, chiefly on the coastal plain, but ascending some of the river valleys of eastern New England. Nova Scotia: North Sydney, Cape Breton Island, *Macoun* 32228 (C); Halifax, *Macoun* 32224 (C); dryish gravelly banks, Meteghan, *Fernald & Long* 20154; peaty open pasture, Yarmouth, *Bissell, Pease, Long & Linder* 20152, 20153; flood plain of Salmon River, Truro, *Bean & White* 20159; New Germany, *Hamilton* 80823; Shubenacadie Grand Lake, *Fernald & Bissell* 20160. New Hampshire: shallow margin of river, Woodstock, *Fernald* 15508. Massachusetts: Amesbury, *A. A. Eaton;* Mystic Pond, *Wm. Boott* in 1873; Gay Head, *Seymour* 1605; West Tisbury, *Seymour* 1867, 1868. New York: moist depressions in oak woods, Bay Terrace, Staten Island, *Svenson* 3496 (culms 4–6 angled); swamp north of Manorville, Long Island, *Ferguson* 1502 (B); Montauk, *Ferguson* in 1923; swamp, Hempstead Reservoir, Long Island, *Ferguson* 392 (B). New Jersey: Kaigns Point, *MacElwee* 293; Forked River, *MacElwee* in 1896. Pennsylvania: Naomi River, Pocono Mt., *Porter* in 1893 (Ph); McCalls Ferry, *MacElwee* 724; roadside ditch, Greene County, *Dickey* 252 (pathological); Cresson, *Wm. Boott* in 1875; Whiteland, Chester County, *E. B. Bartram* 1025. Delaware: 1 mile west of Stanton, *Randolph* 106 (distributed as *E. Torreyana*); sandy shores of estuarine inlet, Claymont, *Svenson* 3156. Maryland: sandy soil, open scrub land 2 mi. west of Elkton, *Randolph* 132. District of Colombia: wet places in woods, Marshall Hall, *Holm* in 1899 (W). West Virginia: by creek, Pickens, Randolph County, *H. H. Smith* 1354 (W). Virginia: Williamsburg, *Grimes* 3760; Millboro, *C. F. Wheeler* in 1907; in dry soil of old fields near Buckroe, *Robinson* 470; Fairfax, *E. C. Leonard* 321 (B).

Var. **borealis**, n. var. (figs. 58, 59 and tab. 220, figs. 4, 15), culmis crassioribus 6–8-angulatis; achaeneis luteis, angula exteriore obtusa; stylo-basi depressa, obtusa vel truncata, in medio apiculata.—Newfoundland to British Columbia; southward to New Jersey, Tennessee, Indiana, and Illinois. Specimens examined: Newfoundland:[1] borders of pools and rills in limestone barrens, St. John Bay, *Fernald et al* 27523; Bay Bulls, Avalon Peninsula, *Fernald, Long & Dunbar* 26327; Bay of Islands, *A. C. Waghorne;* gravelly river bank, Glenwood, *Fernald & Wiegand* 4706; St. Johns, *Robinson & Schrenk* 127; springy places in ledges and gravel, Grand Falls, *Fernald & Wiegand* 4707; peaty or muddy borders of ponds, Grand Falls, *Fernald & Wiegand* 4710. Quebec: Romaine, Saguenay County, *St. John* 90183 (G, C); arbor vitae swamps, Carleton, Bonaventure County, *Fernald, Collins & Pease* in 1904; north fork of Madeleine River, Gaspé County, *Fernald,*

[1] Only a few specimens from the large collection in the Gray Herbarium from Newfoundland are cited.

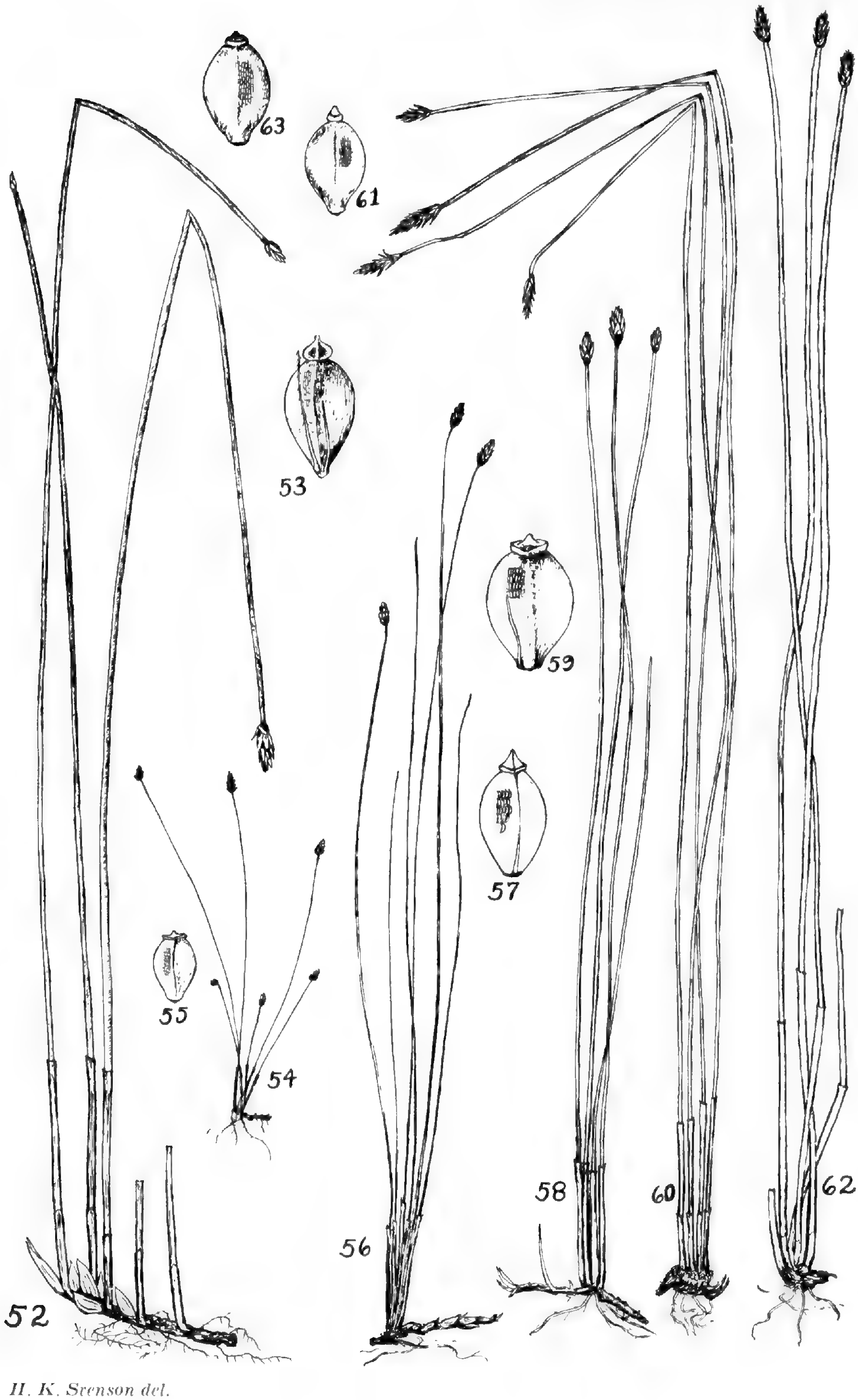
Dodge & Smith 25497; vicinity of Montmorency Falls, *Macoun* 9300; Anticosti, *Marie-Victorin* 20162 (G, W), 2715 (W); Grindstone Island, Magdalen Islands, *Fernald et al* 6962. NEW BRUNSWICK: Bathurst, *Blake* 5443; St. John River, Connors, *Pease* 2969; Restigouche River, *Macoun* 32225 (C). NOVA SCOTIA: North Mt., Belle Isle, *Fernald et al* 23379; cool swamp near Digby, *Howe & Lang* 205; Rockville, Yarmouth County, *Fernald & Long* 20158; brackish marsh, Sand Beach, Yarmouth, *Long & Linder* 20147 (TYPE in Gray Herb.); border of brackish marsh at head of Abram River, *Fernald, Bean & White* 20161. MAINE: bog, summit of Mt. Battie, Camden, *G. G. Kennedy* 21; Sangerville, *Fernald* 303 (G, W); Monhegan Island, *Churchill* in 1921 (W); Orr's Island, *A. H. Norton* in 1924 (W) with somewhat flattened culms and large blackish spikelets. NEW HAMPSHIRE: bog near Crawford House, *Greenman* 1136; Warren, *E. F. Williams* in 1908; Holderness, *F. C. Seymour* in 1915 (W). VERMONT: sandy shores of bay north of South Hero, *E. Brainerd* in 1899; Ripton, *E. F. Williams* in 1908; South Cliff, Willoughby Mt., *Faxon* in 1895. MASSACHUSETTS: Great Pond, South Weymouth, *Greenman* 749; white cedar swamp, Springfield, *Clark & Seymour* G581 (W); Chelsea, *W. Boott* in 1853; Polpis, Nantucket, *M. A. Day* 30; Granville, *Seymour* 171. RHODE ISLAND: Morris Swamp, Providence, *J. F. Collins* in 1892. CONNECTICUT: Oxford, *Harger*, Kneucker Cyp. Exsicc. 138. NEW YORK: South Hill, Ithaca, *C. C. Thomas* 1766; Lake Harris, 1650 ft. alt., Essex County, *House* 7351; Mud Pond, Oswego, *Fernald, Wiegand & Eames* 14183; in sphagnum, pine barren bog, Central Islip, *Ferguson* 3052 (B); near bottom of glacial kettle-hole, Montauk, *N. Taylor* in 1914 (B). NEW JERSEY: Ridgefield, *Dautun* 21; Torrey ex herb. Thurber (without locality). PENNSYLVANIA: Dillerville Swamp, Lancaster County, *Heller* in 1901 (as *E. glaucescens*). TENNESSEE: Fountain City dam, in water, *J. K. Underwood*, April 23, 1930 (B). ONTARIO: Marshfield, *C. F. Wheeler* in 1893; Frenchman's Bay, Lake Huron, *Macoun* 34570; Pelee Island, Lake Erie, *Macoun* 32227 (C). MICHIGAN: Port Huron, *C. K. Dodge* in 1893; Bois Blanc Island, Jackson County, *Camp* 3224 (W); sandy shore of Temperance Point, L. Michigan, *Ehlers* 2652 (W). INDIANA: East Chicago, *Lansing* 2578; Roby, *Lansing* 2541; Clarke, *Umbach* 3887 (W), 3647 (W), 4205 (W); along railroad, east of Bushrod, Greene County, *Deam* 10650 (D); marl border of Fish Lake, Lagrange County, *Deam* 39074 (D) (perhaps *E. compressa*); low marl border of lake east of Lagrange, *Deam* 36640 (D); low marl border of Still Lake, Howe, *Deam* 31298; in a slough 1 mi. south of Griffith, Lake County, *Deam* 31635 (D); Deep Lake, Noble County, *Deam* 14686 (D); ditch along railroad, Idaville, White County, *Deam* 38865 (D). WISCONSIN: Green Bay, *J. H. Schuette;* Bailey's Harbor, Door County, *J. J. Davis* in 1929 (W); Cornucopia, *J. J. Davis* in 1880 (W); Clark's Lake, *J. J. Davis* in 1929. MANITOBA: Red Deer Lake, lat. 53, *Macoun* 74. MINNESOTA: Fort Snelling Reservation, *C. O. Rosendahl* 2098. MONtana: Columbia Falls, *R. S. Williams* in 1895. British Columbia: swamp near Goldstream, *Macoun* 1067 (G, Ph); Eagle Pass, *Macoun* 7558.

Var. **pseudoptera** Weatherby,[1] n. var. (tab. 220, figs. 3, 16), vaginis superioribus longe mucronatis, mucroni ad 1.5 mm. longo; culmis arcte quadrangulatis saepe leviter transverse septatis, angulis peracutis tenuibus siccatis sicut alae prominentibus, fasciculis vasorum plerumque 4, singulis ad angulas singulas, vel rarius 2 ad culmi latera inter angulas, costas tenues formantibus, distributis; achaeniis olivaceis vel luteis obovoideis pyriformibusve infra in basim sicut stipitem subabrupte angustatis, minute reticulato-rugosis, stylo-basi fusco vel griseo plerumque depresso mucrone angusto acuto cuspidata rarius convexo vel subpyramidale terminato.—Except when otherwise noted, all of the following specimens are at the Philadelphia Academy of Natural Sciences. New Jersey: in fresh water, Bergen Point, Hudson County, June 18, 1893, *Thomas Seal*, type in herb. Philadelphia Acad.; ditches and wet places, New Egypt, *Gross* 745; Skunk Swamp in a ditch, West Cape May, *O. H. Brown*, June 20, 1907; Closter, *Austin* in 1864 (B); New Durham, *Dautun* in 1903 (B); Hasbrouck Heights, *Dautun* in 1908 (B). Pennsylvania: herb. *C. W. Short* (W); Bucks County, *Pretz*, June 17, 1899; wet springhead, Bethlehem, *Pretz* 5734; Ogontz, *B. Long* in 1908; Philadelphia, *Nuttall;* Springfield, *B. H. Smith*, June 20, 1891; serpentine region southeast of Wissiston, *Van Pelt* in 1905; cedar barrens, *Pennell*, June 27, 1912; forming a swale in serpentine barrens along Conewago Creek, *Svenson* 3454 (B). Delaware: without definite locality, *Baldwin* ex herb. Schweinitz; low ground along Penn. R. R., Claymont, *Svenson* 3457 (B); springy place in field, 1 mi. west of Stanton, *L. F. & F. R. Randolph* 107 (G). Virginia: 4-mile run, *A. S. Hitchcock* in 1905 (I).

In this variety, which ranges from New Jersey and eastern Pennsylvania to Virginia, the culms, though becoming the stoutest in the entire species, remain 4-angled and with 4 vascular bundles, or if one or two others occur sometimes between the angles, they are much smaller, forming only a slender rib. The angles are very acute and project at the corners of the culm like narrow wings. The achenes of this variety are in most cases olive, subpyriform and with a truncate tubercle. The sheaths commonly have an unusually long and prominent mucro (up to 1.5 mm. long). This variety is easily recognized in the field; the elongated glistening culms form dense swales, sometimes nearly a meter high.

Var. **verrucosa**, n. var. (tab. 220, figs. 2, 14), achaeniis olivaceis verrucosis, stylobasi depressa; culmis quinquangulatis.—Indiana:

[1] The description is by Mr. Weatherby.



H. K. Svenson del.

ELEOCHARIS, SERIES PALUSTRIFORMES.

(Habit × ½; achenes × 15).

FIGS. 52, 53, E. DECUMBENS; 54, 55, E. NITIDA; 56, 57, E. CAPITATA, var. TYPICA; 58, 59, E. CAPITATA, var. BOREALIS; 60, 61, E. ACUTISQUAMATA; 62, 63, E. COMPRESSA.

H. K. Svenson del.

Eleocharis, series Palustriformes.

(Habit × ½; achenes × 15).

Figs. 64, 65, E. arenicola; 66, 67, E. Parishii; 68, 69, E. Bolanderi; 70, 71, 72, E. montana; 73, 74, E. Palmeri; 75, 76, E. tricostata; 77, 78, E. fallax.

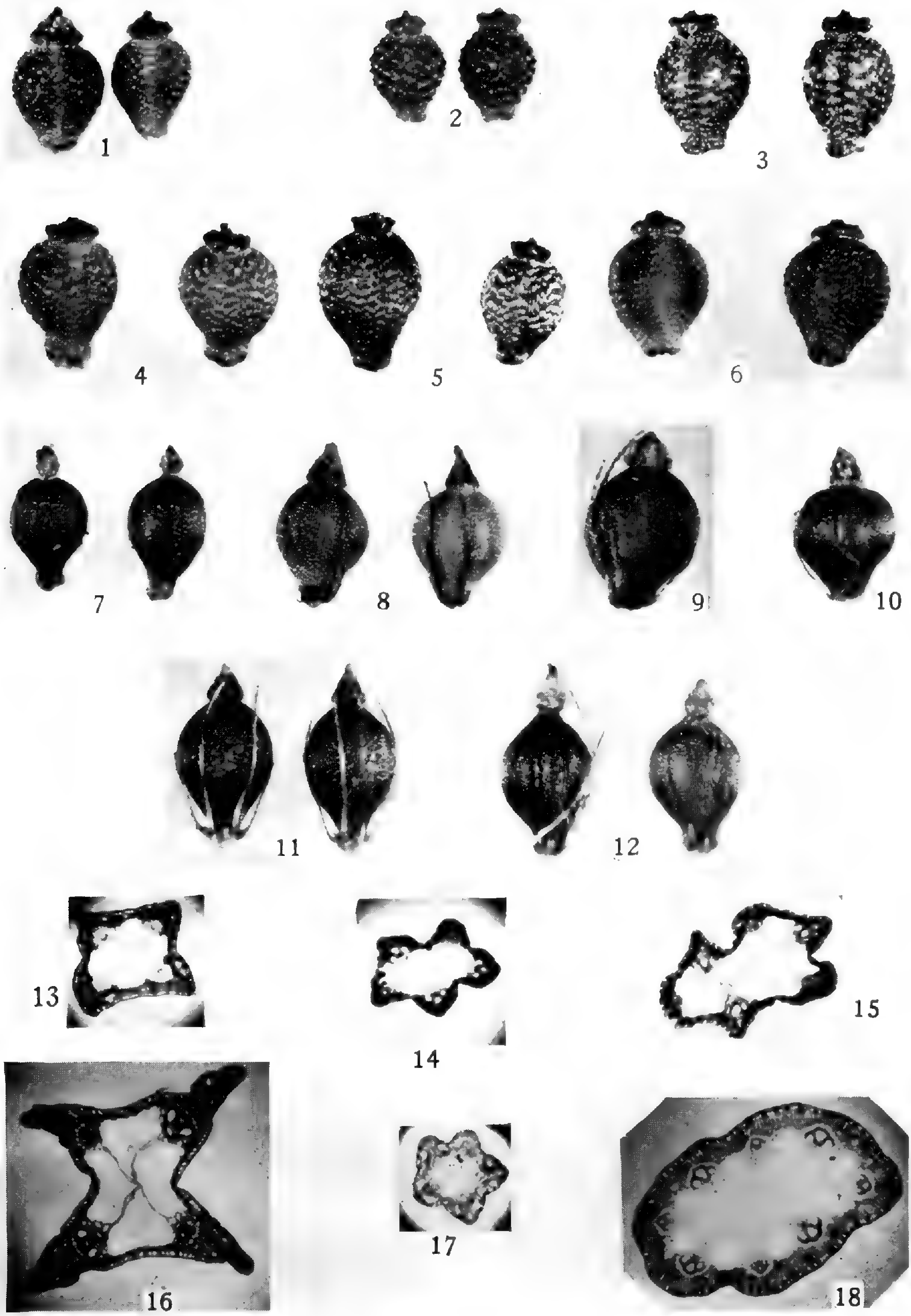


Photo. Louis Buhle.

ELEOCHARIS, SERIES PALUSTRIFORMES.

(Achenes × 20; cross-sections of culms × 40).

FIGS. 1, 13, 17, E. CAPITATA, var. TYPICA; 2, 14, E. CAPITATA, var. VERRUCOSA; 3, 16, E. CAPITATA, var. PSEUDOPTERA; 4, 15, E. CAPITATA, var. BOREALIS; 5, 18, E. COMPRESSA; 6, E. COMPRESSA, var. ATRATA; 7, E. ACUTISQUAMATA; 8, E. ARENICOLA; 10, E. MONTANA; 11, E. PALMERI; 12, E. PARISHII.

border of a swamp 1 mi. east of Palmyra, *Deam* 23414; along ditch 6 mi. south of Terre Haute, *Deam* 48781 (B); 2 mi. southeast of Degonia Springs, Warrick County, *Deam* 25278; roadside 4 mi. southeast of Loogootee, *Deam* 12848; roadside 8 mi. southeast of Cannelton, *Deam* 25054; in hard white clay soil in an abandoned field along Little Pigeon Creek, Spencer County, *Deam* 46803; border of a pond 9 mi. south of Marengo, *Deam* 23476; in low woods 4 mi. southeast of Palmyra, *Deam* 23427; in an interdunal marsh 2½ miles southeast of Tefft, *Deam* 45927; low wet woods 3½ miles southeast of Hanover, *Deam* 38889; in hard white clay soil 5 mi. southeast of Mt. Vernon, *Deam* 46779;[1] low woods 10 mi. southwest of Mt. Vernon, *Deam* 25382. ILLINOIS: moist open soil, Glen Ridge, Macon County, *I. W. Clokey* 2373 (I); moist ditch, Wady Petra *V. H. Chase* 643 (D, G, I); Peoria, *M. F. Brendel* (I); thin upland soil in open woods, Taylorville, *W. E. Andrews* in 1899 (I); Mississippi river bottoms, Oquawka, *H. N. Patterson* (I); prairie, Denver, *F. C. Gates* 8824 (I); *Vasey* 18611 (without locality) (I). MISSOURI: wet woods, St. Louis [?], *Eggert* May 21, 1878 (B). ARKANSAS: Cedar Gap, low wet ground, alt. 1675 ft., *O. E. Lansing* 3040 (TYPE in Gray Herb.). OKLAHOMA: damp ditches, Pryor Creek (Indian Territory), *R. Bebb* 274[a] (W).

59. E. NITIDA Fernald (FIGS. 54,55). Perennial from a slender rootstock: culms capillary, 4-angled, striate, 2–8 cm. high; apex of upper sheath slightly inflated, whitish: spikelet oblong-ovoid, somewhat acute, 2.5–4.5 mm. long, 1.5–2.5 mm. thick, 8–20 flowered; scales elliptic-oblong, with rounded tips, purplish-brown, with greenish ribs and very narrow scarious margins, the lowermost larger: achene golden-yellow when mature, narrowly obovoid, sharply trigonous, 0.7–1 mm. long, the roughened surface and depressed tubercle as in *E. capitata* var. *borealis*.—RHODORA viii. 129 (1906); Robinson & Fernald in Gray, Man. ed. 7, 184. fig. 260 (1908).—Moist places, chiefly in acid peat, Newfoundland and Quebec, south to Nova Scotia and New Hampshire. NEWFOUNDLAND: springy pasture at foot of Lookout Mountain, Bonne Bay, *Fernald & Wiegand* 2708; wet peaty barrens at about 365 m., Lookout Mountain, Bonne Bay, *Fernald, Long & Fogg* 1347; damp gravel at margin of Junction Brook, *Fernald & Wiegand* 4711; wet soil, Millerton, *Jansson* in 1930. QUEBEC: springy place, at border of swamp, Parker's Station, Pontiac County, *Macoun* in 1903, (TYPE in Gray Herb.). NOVA SCOTIA: exsiccated roadside gutter, North Mt., Belle Isle, *Fernald et al* 23380. NEW HAMPSHIRE: boggy pastures by Dixville road, Colebrook, *Fernald & Pease* 16972.

[1] Deam's nos. 46779 and 25382 have some of the achenes with conical style-bases and are perhaps transitional to var. *typica*.

(*To be continued*)

DIARRHENA FESTUCOIDES

M. L. Fernald

Diarrhena **festucoides** (Raf.), comb. nov. *Festuca diandra* Michx. Fl. Bor. Am. i. 67, t. 10 (1803), not Moench (1794). *Diarina festucoides* Raf. Med. Repos. hex. 2, v. 352 (1808). *Diarrhena americana* Beauv. Agrost. 142, t. 25, fig. II (1812). *Korycarpus arundinaceus* Zea ex Lagasca, Gen. et Sp. Pl. 4 (1816). *Diarina sylvatica* Raf. Journ. de Phys. lxxxix. 104 (1819). *Corycarpus arundinaceus* Zea ex Spreng. Syst. i. 123 (1825). *Diarrhena diandra* (Michx.) Wood, Class-Bk. ed. 2: 612 (1847); Hitchcock, Trans. Acad. Sci. St. Louis, v. 529 (1891). *Korycarpus diandrus* (Michx.) Kuntze, Rev. Gen. Pl. 772 (1891).

Although the generic name *Diarrhena* Beauv. Agrost. 142 (1812) is conserved under the International Rules over "Corycarpus ('Korycarpus') Zea in: Acta matrit. (1806)" and "Diarina Raf. in Med. Repos. New York V. (1808) 352," there is considerable doubt whether its conservation was necessary. *Diarina* was not validly published as a genus by Rafinesque in 1808. At that time he merely enumerated in a "Prospectus" many things "which I mean to publish, and only want arrangement and leisure," like much which we all project without proper publication, although careful workers refrain from rushing into print with unconsidered matter. Among the prospective "genusses . . . will be . . . Diarina (festucoides) from the festuca diandra, *Mich.*" Without a single word of differentiation *Diarina* (1808) was not a validly published new genus. As a validly published genus *Diarina* started in Raf. Journ. de Phys. lxxxix. 104 (1819), where it was well described and the name of its species changed from that of 1808: "Type *D. sylvatica,* qui est la *Festuca diandra* de Michaux, etc." In the meantime, however, in 1812, Palisot de Beauvois, without any reference to Rafinesque and his *Diarina festucoides* of 1808, coined the new generic name *Diarrhena,* giving its proper derivation, a detailed generic diagnosis and analytical figures, and he called the one species *D. americana.* Since *Diarina* Raf. had no valid publication as a genus until 1819 and Rafinesque made no reference whatever to the *Diarrhena* of Beauvois (1812) the two must be treated as wholly different generic names (not as mere variations of spelling); and it should be clear that the conservation of *Diarrhena* (1812) over *Diarina* (1819) was unnecessary.

When we consider *Korycarpus* it is at once noteworthy that the best bibliographies are unable to state the page of its publication. Thus Index Kewensis has

KORYCARPUS, Zea, in Act. Matr. (1806); ex Lag. Gen. et Sp. Nov. 4 (1816) = **Diarrhena,** Rafin.

Overlooking for the moment the fact, already discussed, that *Diarrhena* was a genus of Beauvois, not of Rafinesque, we come to the more significant point: that neither Dalla Torre & Harms, Briquet (Règles Internationales) nor Nash (in Britton & Brown, where *Korycarpus* is taken up) could carry the reference to anything more conclusive. The Royal Society Catalogue gives no paper by Zea as late as 1806, though Lagasca cited in his general bibliography "Zea in Actis Academiae medicae matritensis." This series is not enumerated in such later bibliographies as I have been able to examine. Turning again to Lagasca (1816), whose publication of *Korycarpus* is cited in Index Kewensis and by Dalla Torre & Harms, we get a clue. Lagasca's *Genera et Species Plantarum, quae aut novae sunt, aut nondum recte cognoscuntur* has (p. 4) a diagnosis of "KORYCARPUS, Zea" with *K. arundinaceus* "Ze. Ac. Matr. 1806" clearly described as its one species, grown in the Botanic Garden at Madrid from seed received in 1803. The genus and species were put out by Lagasca among "*Genera et Species . . . quae . . . novae sunt,*" not as a genus and a species already published; and in the Preface (Lectori) he explicitly states that much of the new material published by him was derived from a manuscript which in 1806 was passed around among the students at Madrid. Until *Korycarpus* Zea can be carried back of Lagasca in 1816, its actual publication by Zea, himself, in 1806 is at least open to doubt. The last publication by Zea given by Colmeiro[1] was in 1805.

Although *Diarina* was not validly published as a genus by Rafinesque in 1808, the SPECIFIC NAME, *festucoides,* was validly published, a substitute for *Festuca diandra* Michx. (1803) which was invalidated by *F. diandra* Moench (1794). By some (for instance, Sprague, in a letter regarding a parallel case) it might be argued that, since *Diarina* Raf. (1808) was not then validly published as a genus, its species would, therefore, be illegitimate. But, following the abandonment years ago of the salutary and constructive "Kew Rule," the species and the specific epithets have now become all-important. Under the more upsetting and complicating rules now in force it makes little or no difference under what genus or what generic name a species was proposed, so long as it was proposed as a species. The species stands by itself, regardless of the nomenclatural or taxonomic status of the genus under which it was first put forward. Thus, *Lysimachia terrestris* (L.)

[1] Colmeiro, La Botánica y los Botánicos de la Península Hispano-Lusitana, 191 (1858).

BSP. (of the *Primulaceae*) rests, as to specific name, on Linnaeus's absurd publication of it as a Mistletoe, *Viscum terrestre* L.!

In his classic *Flora Caroliniana* (1788), Thomas Walter was unable to place many NEW SPECIES in proper genera; consequently, when too much puzzled, he repeatedly set up a new genus *Anonymos*. He had 2 genera with the pseudonym *Anonymos* under the *Diandria Monogynia*, 2 under *Triandria Monogynia*, 3 under *Pentandria Monogynia*, 3 under *Pentandria Digynia*, and so on to a total of 28. These various genera were all properly characterized, with diagnoses distinguishing them from related genera and with splendidly detailed descriptions; yet, as *Anonymos*, they had no generic names! The fact that Walter considered them genera is clear: "there are four plants called *Anonymos aquaticus*, two called *A. repens*, and six called *A. caroliniensis*."[1] That these are all species and not to be considered as belonging to one heteromorphic genus was clearly and rightly maintained by Blake: "It seems to the writer . . . that these names should not be rejected on the ground of homonymy, since the genera under which they were published, though unfortunately all provided with the same apology for a name, were properly described and differentiated, and the case is therefore not comparable with that of identical specifics in the same genus."

In this case the species belonged to validly defined but nameless genera; in the case of *Diarina festucoides* the validly published species belonged to a named but invalidly published genus. Walter's new specific names under his 28 nameless genera have been transferred to their proper genera and we now have the universally recognized *Crotalaria rotundifolia* (Walt.) Poir., *Gerardia setacea* (Walt.) J. F. Gmel., *Elytraria caroliniensis* (Walt.) Pers., *Lachnanthes tinctoria* (Walt.) Ell., *Ruellia caroliniensis* (Walt.) Steud., *Lithospermum caroliniense* (Walt.) MacM., *Nymphoides aquaticum* (Walt.) Fern., *Micranthemum umbrosum* (Walt.) Blake, etc., etc.

Many other somewhat parallel cases come to mind; but those cited are sufficient to indicate that, with the abandonment of the "Kew Rule" and the treatment of specific epithets quite apart from the generic, the whole theory of specific nomenclature was changed. Under the existing rules *Diarina*, in 1808, was not a validly published GENUS; but, at the same time, *D. festucoides* was an adequately published SPECIES.

GRAY HERBARIUM.

[1] Blake, RHODORA, xvii. 130 (1915), in a paper, "Some Neglected Names in Walter's Flora Caroliniana."

Geranium divaricatum in the United States.—There are two sheets in the United States National Herbarium named *Geranium divaricatum* Ehrh. One specimen was collected by M. S. Bebb in Ogle County, Illinois, and the other by F. C. Gates (No. 2209) on the campus of the University of Illinois, Urbana, on October 1, 1907. No mention of this species is made in the current floras of the Eastern United States, nor in the North American Flora. It is possible that the plant has not survived its early immigration, or that it may have been referred to some of our native or established species. The plant collected by Bebb (U. S. Nat. Herb. 593651) agrees with the description given by Bonnier (Flore Complète de France, Suisse et Belgique **2**: 82. pl. 99, f. 519). Bonnier described the carpels as "ridés en travers (cross-wrinkled) et velus," agreeing with our specimens. In the related species, *Geranium molle* L., he describes the carpels as "ridés en biais" (slant-wrinkled). The leaf-outline of our specimens differs conspicuously from that of *Geranium molle*. In *Geranium divaricatum* the leaf segments are oval, and somewhat pinnatifid. In *Geranium molle* the segments are cuneate-obovate and 3-toothed, the middle tooth being somewhat longer than the lateral ones. Bonnier gives the range of *G. divaricatum* as Spain, France, and Central Europe to western Asia. Other specimens examined are from Russia, Southeastern Europe, and Switzerland.—Ivar Tidestrom, Bureau of Plant Industry, Washington, D. C.

PHYMOSIA REMOTA IN CAPTIVITY

S. C. Wadmond

That was a most interesting bit of news in the July Rhodora telling of the discovery of a new station for this rarest of American phanerogams, and particularly since, as I sat down to read the article, I had only to glance out of the window to see Phymosia in bloom in my own garden, where it thrives like a green bay tree. It occurred to me that a brief account of our efforts to preserve it from extinction might be of interest.

The story begins ten or more years ago when the late Dr. Millspaugh, realizing that Phymosia would soon become extinct in its then only known station—the little gravelly island in the Kankakee River near Altorf, Illinois—brought a few seeds from its island home to Mrs. C. L. Hutchinson, that worthy patron of plant and bird life, hoping this exceedingly rare plant might be made to grow on her Lake Geneva, Wisconsin estate, "Wychwood," and thus be saved from utter extinction. She has told me of how eagerly and how anxiously she and her skillful head gardener, Mr. William P. Longland, watched for the germination of the curious hairy kidney-shaped seeds. Five plants rewarded their efforts the first season.

Just as soon as it was well established, distribution began. Seven years ago Mrs. Hutchinson sent the writer a vigorous root which has now developed into several fine colonies. From these two sources plants are now growing in the Arnold Arboretum, Missouri Botanical Garden, at the Universities of Wisconsin and Chicago, and other institutions, as well as in dozens of private gardens at Lake Forest and Winnetka, Illinois, and Geneva and Delavan Lakes, Wisconsin. Herbarium specimens have been sent to many institutions by the writer.

Plants and seeds sent to W. A. Toole of Baraboo, Wisconsin grew nicely and so successful has he been with it that his 1932 catalog lists the seeds for sale under the name *Sphaeralcea remota!* He found, however, that the seeds did not germinate readily, and on the advice of the Seed Laboratory of the United States Department of Agriculture, scarified them between pieces of emery paper. From the scarified seeds he got very good germination but practically none from seeds previously planted which had not been so treated. In his catalog he suggests that for successful germination the seeds be soaked in warm water for 24 hours before planting.

Only yesterday I had the very great pleasure of seeing at least 500 plants in bloom at the Lakeview Nursery at Williams Bay, Wisconsin with probably as many more plants which will bloom next season, the entire thousand originating from two roots given them by Mrs. Hutchinson several years ago. They likewise reported that the seed did not germinate with them.

The Manuals do not tell of it but when Phymosia gets any sort of a chance at all it sends out great thick underground rootstocks in all directions, which at frequent intervals bring to the surface a new plant, strong and lusty. Every fall it becomes my painful duty to dig out these invaders from all sorts of unexpected places in the garden where they have intruded. Although there is a four foot gravel walk enclosing a fine colony at Wychwood, Mr. Longland tells me it frequently appears on the other side of the walk, so vigorous and penetrating are those great rootstocks.

There are probably 150 to 200 plants in the Wychwood Sanctuary growing under various habitat conditions. A small colony is established on a sandy, gravelly island on the lake border, but here the soil is not so congenial and competition from other plants is severe, so that it has not developed the rootstock habit as it has in the garden. Evidently similar conditions obtained at the original Illinois station and occur also in Virginia as described in the July RHODORA, which militated against its spread in this manner.

The authors of the July article note that it bears few lateral branches. The island colony at Wychwood does just this thing, but under cultivation in the garden, frequent lateral branches become the rule rather than the exception.

Another habit which the books do not mention is that its flowers open only in full sun. On cloudy days the flowers never open fully; on sunny days not until about 8:00 or 8:30 a. m., closing about 5:30 to 6:00 in the evening.

It is a strange fate indeed which left one little colony of this plant on a tiny gravelly island in the Kankakee River, Illinois, and another survival 2000 feet up the slope of a Virginia mountain, the two stations so remote that its specific name becomes more meaningful than ever.

DELAVAN, WISCONSIN.

NOTES ON FESTUCA OCTOFLORA

M. L. FERNALD

FESTUCA OCTOFLORA Walt., var. **tenella** (Willd.), comb. nov. *F. tenella* Willd. Sp. Pl. i. 419 (1797).

F. OCTOFLORA, var. **glauca** (Nutt.), comb. nov. *F. tenella, β glauca* Nutt. Trans. Am. Phil. Soc. v. 147 (1834).

Festuca octoflora was considered by Piper[1] as a species occurring through the length and breadth of the United States and overlapping into Canada and Mexico. Such an inclusive range is certainly very unusual, if not unprecedented, in our indigenous flora; but, although admitting the species to be "very variable," Piper felt that "for the

[1] Piper, North American Species of Festuca, Contrib. U. S. Nat. Herb. x. 11 (1906).

most part the characters are too inconstant for nomenclatorial recognition." Nevertheless, the material in the Gray Herbarium falls rather definitely into four pronounced variations, which, although not absolutely exclusive, have marked geographic segregation. *F. octoflora* came presumably from the Santee valley in South Carolina. Walter, Fl. Carol. 81 (1788), cited no station and "according to Professor A. S. Hitchcock, there is no specimen to represent this species in the part of Walter's herbarium preserved in the British Museum."[1] Walter's preface was written at Santee: "Carolinae Meridialis, ad Ripas Fluvii Santee"; consequently, I am taking as typical *F. octoflora* the extreme of the species which abounds in the Santee region.

This plant, typical *F. octoflora,* is the large southern extreme, at once distinguished from the common plant of New England, New York and Pennsylvania by its greater size in all parts; the lower glumes 3.5–4.5 mm. long; the longer awns of the lemmas 3.5–7 mm. long. This plant occurs rather generally in the Southern States from Florida to Texas, thence northward to Oklahoma and southern Illinois and near the coast to southern New Jersey. Typical *F. octoflora* is apparently the plant described as var. *aristulata* L. H. Dewey, Contrib. U. S. Nat. Herb. ii. 457 (1894).

The common plant of the North, from southern Maine to southwestern Quebec, thence to southern British Columbia, south to the interior of Georgia, and to Colorado, with a slight occurrence southward into Arkansas, Texas and California, is smaller in all parts, with loosely spiciform inflorescences; lower glumes 2.3–4 mm. long; lemmas with awns 1–3 mm. long. Rare transitional specimens occur, but in the main the northern series is clearly defined. Willdenow's description of *Festuca tenella* with "Panicula *simplicissima secunda*" and the probability that the plant might originally have been sent from Pennsylvania by Muhlenberg both suggest the northern plant. In order to verify this assumption, I wrote Professor Diels at Berlin and through his unfailing interest and generosity and the great courtesy of Dr. Pilger, who looked up the Willdenow sheet, my identification is now confirmed. The original sheet of Willdenow contained 5 specimens, one of which has now been deposited in the Gray Herbarium. This is a thoroughly characteristic specimen of the northern plant which I am calling *F. octoflora,* var. *tenella.*

[1] Piper, l. c.

In the flatter interior of the United States, centering on Arkansas and Oklahoma, but extending locally eastward to western Florida, northeastward to Illinois, northward to South Dakota and Wyoming and southwestward to New Mexico, much of the material passing as *Festuca octoflora* has a crowded inflorescence, the spikelets imbricated, and the awns of the lemmas greatly reduced or quite wanting, varying from mere mucronate tips to a length of 2 mm., while the glumes are even shorter than in the other varieties, the lower 1.5–3 mm. long. This extreme proves to be *F. tenella* β *glauca* Nutt., very inadequately described from Fort Smith, Arkansas. The type, at the Academy of Natural Sciences of Philadelphia, has been most kindly lent me by Dr. Pennell.

The long-awned western extreme (Colorado and New Mexico to southern California and Lower California) was described as *Festuca pusilla* Buckl. Proc. Acad. Phil. 1862, 98 (1863) from "Upper California, Nuttall" (erroneously transcribed by Piper as "northern California"). A portion of the Nuttall material in the Gray Herbarium shows it to be the common tufted plant of southern California. It is *F. octoflora*, subsp. *hirtella* Piper, l. c. 12 (1906), although the latter subspecies (or variety) was based only on characters of pubescence which seem very inconstant, rather than on the characteristic habit, compact inflorescence and long awns.

Gray Herbarium.

Picea rubens Sarg., forma **virgata** (Rehder), comb. nov. *P. nigra*, var. *virgata* Rehder in Bailey, Cyclop. Am. Hort. iii. 1334 (1901). *P. rubra*, f. *virgata* Rehder, Rhodora, ix. 110 (1907).

By the "homonym" rule adopted at Cambridge the name *Picea rubra* (DuRoi) Link (1831) cannot be maintained, because of the earlier, though "*illegitimate*," *P. rubra* Dietr. (1824), a direct renaming of *Pinus Abies* L. The first unequivocal name of the American Red Spruce seems to be *P. rubens* Sarg.—M. L. Fernald and C. A. Weatherby.

Phragmites communis Trin., var. **Berlandieri** (Fournier), comb. nov. *P. Berlandieri* Fournier, Bull. Bot. Soc. France, xxiv. 178 (1877).

It has long seemed highly improbable that an indigenous plant found throughout temperate and tropical North America should be quite identical with typical *Phragmites communis* of Europe; and when, at the Fifth International Botanical Congress at Cambridge, a party spent one day on the fenlands whence *Phragmites* is regularly harvested for thatch, the American members very generally felt that there was a difference, though at that time hardly definable, between the English plant and the coarser Reed we knew at home. Study of the European and the North American material brings out no essential morphological differences between the two, but in the American series the spikelets run rather longer than in the European, mostly 1–1.7 cm. long, the European generally described as having spikelets under 1 cm. in length, though sometimes longer. As shown by mature panicles of 28 numbers of the European plant before me the typical *P. communis* has the 1st glume 2.5–5 (av. 3.5) mm. long, the 2nd glume 5–7 (av. 5.7) mm. long. Holmberg describes the European with 1st glume 3, the 2nd 6 mm. long; Ascherson & Graebner say about 2 and 6 mm. respectively; and Hegi says for the 1st somewhat more than 2, the 2nd twice as long. A very large representation of the North American plant (var. *Berlandieri*) gives measurements of the 1st glume 4–6 (av. 4.65) mm. long, of the 2nd 6–8.5 (av. 7.3) mm. long.—M. L. FERNALD, Gray Herbarium.

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RHODORA, *Rhododendron canadense.*

Rhodora

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THE POLLINATION OF RHODORA

John H. Lovell and Harvey B. Lovell

(Plate 222)

One of the most beautiful of early-blooming New England shrubs is rhodora, *Rhododendron canadense* Torr., which in May, before the appearance of the leaves, produces numerous clusters of rose-colored flowers. It is sometimes described as rare, but at Waldoboro, Maine, thousands of these shrubs may be found growing in damp, open pasture lands and in sphagnum bogs.

In 1881, Hildebrand in his "Flora" gave a brief account of its pollination; but otherwise its ecology has received little attention. The large, short-pedicelled flowers are bilabiate, about 2 cm. long by 4 cm. broad. The upper lip is 3-lobed, but the two lower petals are nearly distinct, oblong-narrow, and quickly become recurved. There are ten stamens, the five lower being longer than the five upper, but they are not as long as the style so that self-pollination is not likely to occur. The filaments are purplish, covered with short white hairs at the base; the anthers open by apical pores; the pollen is white in tetrads which are joined together by sticky threads of viscin. All of the pores are turned toward the center of the flower by the bending of the upper portion of the filaments. Thus a female bumblebee can not pass between them without coming in contact with the pollen which is held on the ends of the anthers by the viscin threads.

The stigma is five-lobed and very glutinous. At the beginning of anthesis it is firmly held in a little cap formed by the apex of the middle lobe of the upper lip, while the style under tension is sharply bowed in the middle. At this stage pollination is impossible. The anthers dehisce as soon as the flower opens, and if the pollen is all removed before the stigma is released, autogamy can not occur. In five flowers the stigma was observed to be covered by the tip of one of the lower petals, and, when it became reflexed, was carried down with it. The continued elongation of the style causes the stigma to spring out of the cap of the upper lip, after which it moves downward projecting beyond the anthers. A queen bumblebee coming from another flower, if dusted with pollen, would then touch the stigma first and effect cross-pollination. If there still remained pollen in the anthers, it might be transferred by insects, especially by small bees and flies, to the stigma. Occasionally a stamen is as long as the style, and autogamy may occur by the anther and stigma coming in contact. One such case was observed.

Minute drops of nectar were observed on the receptacle between the upper lip of the corolla and the base of the filaments. The floral tube is very short, and the tongue of a queen bumblebee can reach the nectar through small openings between the filaments. Dark purple lines usually two in number on the inner side of the upper lip may serve as honey guides.

Visitors: *Bombus terricola* Kirby ♀; *B. ternarius* Say ♀; *B. fervidus* Fabr. ♀; *B. vagans* Cr. ♀; *B. bimaculatus* Cr. ♀; *Apis mellifica* L. ☿; *Halictus pilosus* Sm. ♀; and the fly *Eristalis bastardii* Macq. May 20 to June 4. Waldoboro, Maine.

Rhodora is a bumblebee flower and is pollinated by female bumblebees, the only caste of this genus on the wing in May. The head of the bumblebee touches the upper, and the ventral side of the abdomen the lower anthers. The honey-bee is only an occasional visitor and it is doubtful if it can reach the nectar. There is no reliable record of a surplus of honey ever being gathered from this or any other species of rhododendron or azalea. A beekeeper at Divide, West Virginia, writes that he was unable to find a single honey-bee on the bloom of the rhododendrons, though they cover the land for mile after mile.

Waldoboro, Maine.

An Addition to the Wool-waste Flora of eastern Massachusetts.—On Sept. 14, 1932, Mr. John A. Collins, Jr., observed in the yard of the Arlington woolen mills at Lawrence a strange weed. As he graphically described it, it had a stem an inch in diameter at the base, about four feet long and trailing on the ground; leaves like a young squash vine or large hollyhock; and flowers more than an inch long and in shape and structure resembling those of a *Gerardia*. They did not resemble *Gerardia*, however, in their color, which was a pale lilac, with a few darker spots on the spreading corolla-lobes near the throat and three lines of bright orange running back from the lower lobe into the throat.

Mr. Collins sent fresh material to the Gray Herbarium, where it was determined as a devil's-claw, *Martynia*, or *Proboscidea*, as the particular group to which this plant belongs is now often called. It is not, however, the species, *P. louisianica*[1] (Mill.) Thell. which is reported in manuals as an occasional waif in the northeastern United States. Except for its paler color (and that is a kind of variation to be expected), the flower agrees excellently with the description and illustration of *P. fragrans* Decsne. in Van Eseltine's "Preliminary Study of the Unicorn Plants (Martyniaceae)," N. Y. State Agr. Exp. Sta. Techn. Bull. 149 (1929). Mr. Collins's plant is not, as to foliage, the typical form of that species, which has lobed leaves, but the entire-leaved form (according to Van Eseltine) described as *P. violacea* Decsne.

P. fragrans is a native of Mexico. I find no record of it from the northeastern United States. At Lawrence, it grew beside one of the mill buildings where wool is scoured and where, therefore, seeds which have come with the wool are particularly likely to be thrown out with the waste.—C. A. Weatherby, Gray Herbarium.

MONOGRAPHIC STUDIES IN THE GENUS ELEOCHARIS—II

H. K. Svenson

(Concluded from page 203)

60. E. compressa Sull. (fig. 62, 63 and pl. 220, figs. 5, 18). Culms strongly flattened, often 1.5 mm. in width, striate, erect from thickened creeping rootstocks: upper sheaths 2–9 cm. high, reddish-brown to stramineous, truncate, faintly to prominently toothed: spikelets 5–12 mm. long, oblong-ovate to ovate, acute or obtuse: scales ovate-lanceolate, chestnut brown, the whitened tips attenuate and commonly bifid: style 3-fid: achene 1–1.5 mm. long, obovate-pyriform, golden-

[1] Dr. S. F. Blake has kindly called my attention to the fact that the spelling of the specific name "*louisiana*," used in Gray's Manual and other recent works, though actually appearing in the text of the eighth edition of Miller's Gardening Dictionary, was corrected to "*louisianica*" in a list of errata at the end of the volume.

yellow to brown, bluntly trigonous to nearly terete, granular-roughened or reticulate under magnification, the raised margins of the cells often forming undulating lines: the style-base depressed-conic to globose-conic, usually acute: bristles 1–5, fugacious, usually shorter than the achene.—Am. Journ. Sci. xlii. 50 (1842); A. Gray, Man. ed. 2. 497 (1856). (?) *Scirpus acuminatus* Muhl. Desc. Gram. 27 (1817); *E. acuminata* Nees, Linnaea ix. 294 (1835); Kunth, Enum. ii. 156 (1837); Boeckl. Linnaea xxxvi. 448 (1869–1870); Britton & Brown, Ill. Fl. i. 255, fig. 596 (1896); Robinson & Fernald in Gray, Man. ed. 7. 184, fig. 259 (1908); Britton in Abrams, Ill. Fl. Pacific States i. 266, fig. 637 (1923).—Wet places, usually in calcareous soil; western Quebec to Saskatchewan, southward to Georgia and Oklahoma; also "Washington (?) and British Columbia" (Britton, l. c.). The following specimens have been examined. QUEBEC: Queen's Park, Aylmer, *Malte* 1198[a]. NEW YORK: Rome, *Vasey;* Dexter, *Vasey.* PENNSYLVANIA: Bair's Island, Lancaster County, *MacElwee* (Ph.) MARYLAND: rocky island in the Potomac, Montgomery County, *J. D. Smith* in 1881. DISTRICT OF COLUMBIA: Washington, *L. F. Ward* in 1879; wet grounds, *Morris* 2963 (B). GEORGIA: Chicamauga Park, *Canby, Sargent & Bush* 128. ONTARIO: Belleville, *Macoun* 295; near Sarnia, *C. K. Dodge* 7170 and in 1895 (G, B); Temagami Forest Reserve, *C. K. Dodge* 407 (C); Thunder Bay, Ontario, *Macoun* 32178 (C); east coast of Lake Nipegon, *Macoun* 32177 (C); Oliphant, *A. B. Klugh* in 1905 (B). MICHIGAN: Port Huron, *C. K. Dodge* in 1898; Thunder Bay Island near Alpena, *C. F. Wheeler* in 1895; between Eagle Rock and E. Narba (?), Lake Superior, *Robbins* 111. OHIO: wet places in the Darby Plains, 15 miles west of Columbus, *Sullivant* (TYPE coll.) (G). INDIANA: slope of the Ohio River, North, *Deam* 48551 (D); low border of lake northwest of Laketon, *Deam* 31950 (D). WISCONSIN: Avoca, *J. J. Davis* in 1923 (W) and 1931 (W); arena, *J. J. Davis* in 1922 (W); Durand, *J. J. Davis* in 1920 (W). ILLINOIS: Wady Petra, *V. H. Chase* 635 (G, I), 613 (G, I, D); wet prairie, Mira, *H. A. Gleason* 1557; *E. Hall* in 1870 (locality not given); wet prairies, Englewood, *E. J. Hill* 60 in 1875 (I); Kankakee, *E. J. Hill* in 1870 (I), 39 and 45[a] in 1874 (I), 150 in 1878 (I); Mississippi river bottoms, Oquawka, *Patterson* (I); clay roadside, Gardner's Park, Chicago, *A. Chase* 1025 (I); Peoria, *Brendel* (I); swamp near Mt. Carmel, Wabash County, *J. Schneck* in 1897 (I); wet prairies, Wheaton, *J. Schneck* 25 in 1894 (I); Ringwood, *Vasey* (I, B); Forest Glen, *W. S. Moffatt* 102 (W). IOWA: Clinton, *Vasey;* Grinnell, *M. E. Jones* in 1877 (P); Wright County, *Shimek* in 1882 (W); Vinton, *J. J. Davis* (without date) (W). MISSOURI: wet places in hills, St. Louis, *Eggert* in 1887; open dry slopes, Cedar Gap, alt. 1675 ft., *O. E. Lansing* 3000; prairie swales, Greenwood, *B. F. Bush* 6696; St. Louis, *J. A. Drushel* 4275 (N, B). SASKATCHEWAN: damp prairie, Bredenbury, *Macoun & Herriot* 73041 (G, C); Souris Plain, *Macoun* 6; Moose Jaw Creek, *Macoun* 32174 (C); Moose Mts. Creek, *Macoun* 301. MANITOBA:

Forest, *Macoun* 16378 (C); Porcupine Mts., *Macoun* 32179 (C). North Dakota: in wet soil, Butte, *Lunell* in 1906; Leeds, *Lunell* 8; White Rock, *Powell* in 1903. South Dakota: Brookings, Williams (P). Nebraska: Minden, *Hapeman* in 1897 (D, W); Kennedy, *Bates* in 1893 (B); Arabia, *Bates* in 1891 (B); Long Pine, *Bates* in 1898 (B). Kansas: Topeka *B. B. Smyth* in 1891 (I). Oklahoma: low places near Marietta, *G. W. Stevens* 87. Britton & Brown (l. c.) also include Louisiana in its range.

E. acuminata (Muhl.) Nees is based on Muhlenberg's brief description "Culmo nudo compresso pedali. Spica una terminali ovata acuminata. Cal. squama fusca acuminata." There has been no definite typification of the species which is supposedly in the Muhlenberg herbarium in Philadelphia. Torrey (1836) could find no specimens to correspond with the description, nor have I, in a recent examination of the Muhlenberg collection, been able definitely to trace any plant as *S. acuminatus*. Some of the Muhlenberg herbarium has been converted into book-form in which the specimens lie loose among the pages. Under the heading "Scirpus Mon. 26b" appears a single culm of *E. tuberculosa* in mature fruit with the label "26 c," four or five culms of *E. rostellata* and an equal amount of unlabeled *E. Smallii* which has acuminate spikelets and scales, and which is in the flowering stage. These specimens of *E. Smallii*, though conforming fairly well with Muhlenberg's incomplete description of *Scirpus acuminatus*, can not under such circumstances be considered as the type of *S. acuminatus*, and it has been a relief to fall back on Sullivant's thorough description of *E. compressa*, which is substantiated by excellent herbarium material. Farwell has recently[1] considered *Eleocharis glaucescens* (Willd.) Schultes to be a synonym of *E. acuminata*, but there seems to be little basis for this disposition of *E. glaucescens*.[2] A photograph in the Gray Herbarium of the Willdenow plant shows that *E. glaucescens* is a member of the *Palustris* group.

The specific delineation and geographical distribution of *E. compressa* are still unsettled and can only be accurately determined by extensive field work in the central states. The chief means of differentiation employed in this treatment are the wide flattened culms and the acuminate, often bifid scales. These characters are most marked in material from the prairie states; especially at the borders of the range occasional specimens are found with narrower culms and with scales which are not so markedly acuminate. Such forms are

[1] Rhodora xxxii. 30 (1930).
[2] See the paper by M. L. Fernald, Rhodora xxxii. 31 (1930).

with the greatest difficulty separated from *E. capitata* to the eastward and from *E. acutisquamata* to the southwest. This is especially true of some of Deam's plants from marl bogs in Indiana. In typical *E. compressa* the achene has a tendency to be more rounded than in *E. capitata,* with less prominent surface-markings and the style-base usually in the form of a low cone. In all the specimens examined the fibrovascular system is practically continuous, whereas in *E. capitata* the four to eight fibrovascular bundles are separate.

Distinct, in most cases, from typical *E. compressa* is a plant of the Great Lakes region to Anticosti, characterized by large spikelets and conspicuously blackened scales which are usually short-acuminate:

Var. **atrata,** n. var. (TAB. 220, FIG. 6), squamis atratis; spicis frequenter majoribus, in specimine typico ad 1.2 cm. longis.—ANTICOSTI:[1] Riv. McKane, *Marie-Victorin & Rolland-Germain* 27515. NEW YORK: wet limestone rocks, Buffalo, *Clinton* in 1864 (G). PENNSYLVANIA: damp dunes, Presque Isle, *Pease* 12991, (TYPE in Gray Herb.). ONTARIO: Port Colborne, *Macoun* 34568 (G, C); Pt. Edward, *Macoun* 34569 (G, C); river shore, Galt, *Herriot* 16 (G). MICHIGAN: dune sand, Saugatuck, *Wheeler* in 1904 (G); Muskegon, *Wheeler* in 1900 (G); Clifton, *Farwell* 548 (G); Douglas Lake, Cheboygan County, *Swallen* in 1924 (G); Sailor's Encampment, *E. T. & S. A. Harper* in 1897 (W, B); sandy shore of Little Traverse Bay, *Ehlers* 2536 (W). INDIANA: moist sand, Indiana Harbor, *Bebb* 2048 (W); swales, Clarke, *Umbach* 3558 (W); swales, Gary, *Umbach* 3691 (W). WISCONSIN: Washington Island, Door County, *A. M. Fuller* 1420 (D).

E. erythropoda Steud. Syn. Cyp. 76 (1855) described with culms "compressiusculo" "Ohio Am. Sept." "*Scirpus tenuis,* Herb. Un. it. Frankii 1837" is probably *E. compressa.*

61. E. ACUTISQUAMATA Buckl. (Fig. 60, 61 and PL. 220, FIG. 7). Culms 3–4 dm. high, rigid, slender, (about 0.5 mm. in diameter), angled, striate and sulcate, from lignified thickened rootstocks: sheaths gray to purplish, the apical tooth not conspicuous: spikelets oblong-ovate, acute, 0.7–1 cm. long, 15–20 flowered: scales reddish-brown, ovate-lanceolate, with inconspicuous whitened acute to acuminate tip: achene 1–1.5 mm. long (including the style-base), golden-yellow to brownish, obovate-pyriform, almost terete, with a very blunt outer angle, and a granular-roughened obscurely reticulated surface: style-base brown, short-conic: bristles none.—Proc. Acad. Sci. Philadelphia 1862. 10 (1863).—Texas and Oklahoma. TEXAS: San Saba County, *Buckley* (TYPE in herb. Philadelphia Acad.); Edwards Plateau, 14 mi. west of Austin, *Tharp* 995 (Ph); marshy sand, Austin, *Tharp* 1009 (Ph); near Austin, *Buckley,* very young (Ph). OKLAHOMA: Limestone Gap, *G. D. Butler* 261 (G).

[1] The separation of *S. compressa* from *S. capitata* in Anticosti is especially difficult.

E. acutisquamata is related to *E. compressa*, but differs in having narrow culms, less prominent scale-tips, and apparently a more ligneous base. The achenes, as in typical *E. compressa*, are nearly terete, with granular-reticulate surface. Within *E. acutisquamata* should perhaps be included a *Drummond* plant from New Orleans, represented in the Gray Herbarium as a portion of a mixed sheet labeled "Eleogenus obtusus." It is perhaps from the collection (*Drummond* 408) included by Boeckeler, Linnaea xxxvii. 450 (1869–1870) under *E. Dombeyana.*

62. E. TRICOSTATA Torr. (FIG. 75, 76). Rootstock stout, creeping, 2–5 mm. thick: culms 2–6 dm. high, usually slender, striate, compressed or sub-terete: sheaths 2–6 cm. high, loose, reddish to stramineous, with longitudinal striations, and a toothed apex: spikelets densely flowered, long-cylindric, 6–18 mm. long, 2–3 mm. thick, obtuse or sometimes acute: scales ovate, obtuse, reddish-brown with a yellowish midrib and a broad hyaline apex, often emarginate or reflexed: style 3-fid: achene yellow to dark brown, 0.8–1 mm. long, obovoid, with three prominent keel-like angles, the surface roughened-reticulate: style-base brown, short conical, acute: bristles none.—Ann. N. Y. Lyc. iii. 310 (1836); Boeckl., Linnaea xxxvi. 454 (1869–1870); Britton, Journ. N. Y. Mic. Soc. v. 108 (1889); Britton & Brown, Ill. Fl. i. 254, fig. 594 (1896); Small, Fl. S. E. United States 186 (1903); Robinson & Fernald in Gray, Man. ed. 7. 184, fig. 257 (1908).—Southeastern Massachusetts to Florida. MASSACHUSETTS: Almanac Pond, Nantucket, *Bicknell* in 1907; wet places, Nantucket, *Flynn* in 1899. NEW JERSEY: Deer Pond, Atco, *Meredith* in 1921; Whitesboro, *Van Pelt* in 1907; ditch, Atsion, *Meredith* in 1922; Davenport, *MacElwee* 614. GEORGIA: muddy margin of pinebarren pond, Decatur County, *R. M. Harper* 1199; wet pine-barrens, Sumter County, *R. M. Harper* 1008. FLORIDA: *Chapman* (without locality); moist sandy soil near Jacksonville, *Curtiss* 5667; pine-barren swamp, Duval County, *Fredholm* 5742.

63. E. ARENICOLA Torr. (FIG. 64, 65 and PL. 220, FIGS. 8, 9). Culms erect from extensively creeping reddish rootstocks, 0.5–4.5 dm. high, rigid, striate: upper sheath deep brown at base, usually becoming stramineous toward the truncate apex: spikelets ovoid to oblong, blunt, 4–13 mm. long, many-flowered: scales ovate, obtuse, brownish or yellowish, with a hyaline margin: style 3-fid: achene 1 mm. long, obovoid, triangular, with blunt angles, golden-yellow to brown, with a minutely punctulate to finely reticulate or almost spherulate glossy surface: style-base conical, short, sessile at the apex of the achene, or sometimes with a slight constriction: bristles 4–6, brown, toothed, equaling or shorter than the achene.—Torr. in Engelm. & Gray, Bost. Jour. Nat. Hist. v. 237 (1847); S. Wats., Bot. Calif. ii. 222 (1880); Small, Fl. S. E. United States 186 (1903). *E. montana* Britton, Journ. N. Y. Mic. Soc. v. 109 (1889) and in Abrams, Fl. Pacific

States i. 266, fig. 636 (1923); S. B. Parish, Bull. Southern Calif. Acad. Sci. iii. 83, pl. vii. (1904); Jepson, Man. Pl. Calif. 148, fig. 137 (1923). *E. Dombeyana* Boeckl. Linnaea xxxvi. 450 (1869–1870), in part. *Trichophyllum arenicolum* House, Am. Midland Nat. vi. 204 (1920).—Sandy soil, South Carolina to California, Mexico, and Guatemala (?); Brazil. The following specimens have been examined: South Carolina: Sullivan's Island, *Ravenel;* Isle of Palms, Charleston Harbor, *Robinson* 262; Navy Yard, Charleston, *Robinson* 255; Sullivan's Island, Charleston, *Robinson* 256. Florida: sandy seashore, Apalachicola, *Chapman,* Herb. dup. 3869 (in part); damp soil near Dayton, *Deam* 1827; margin of Palm Creek, west of Everglades, Curtis 3073 G, Ph, B). Louisiana: Gretna, opp. New Orleans, *Ball* 345; Hale (without loc.). Texas: *Lindheimer* 205 (type coll.); *C. Wright* 1859; Liberty County, E. Texas, *C. Wright;* Western Texas to El Paso, *C. Wright* 713; in low wet grounds, Tarrant County, *Ruth* 717 (Ph); Hondo, Medina County, *Pilsbry* in 1903 (Ph); Gamble's Ranch, Armstrong County, *E. J. Palmer* 13992 (B); Abilene, *Tracy* 7972; Cibolo River, Selma County, *Groth* 206; wet ground, Austin, E. *Hall* 696 (G, P); San Antonio, *Clemens* 391 (P), 392 (P). Oklahoma: Knowles, Beaver Co., *G. W. Stevens* 521 and 332; Marietta, Love County, *G. W. Stevens* 85; Shattuck, Ellis Co., *G. W. Stevens* 3109; Alva, Woods Co., *G. W. Stevens* 673; Thackerville, Love County, *G. W. Stevens* 59; Fair Valley, Woods County, *G. W. Stevens* 230 (G, P); Buffalo, Harper County, *G. W. Stevens* 290; between Seiling & Tologa, Dewey County, *G. W. Stevens* 882; Tishomingo, Johnston County, *G. W. Stevens* B3561. Colorado: Fort Collins, *C. F. Baker* in 1893 (P). Arizona: Santa Cruz Bottoms near Tucson, *Griffiths* 4056; Huachuca Mts., *Griffiths* 4842, 4843; Willow Springs, *E. Palmer* 554; Fort Huachuca, *E. Palmer* 459; Reed's Ranch, Cave Creek, Chiricahua Mts., *Blumer* 2389. California: sandy bed of Santa Ana River, San Bernardino County, *Parish* 5283; Santa River Canyon, *Munz* 2653 (P); Santa Ana R., *Parish* 11398 (spikelets elongated) (P); *Abrams* 507 (P); Glenn Ranch, Lytle Greek Canyon, San Bernardino County, *Abrams* 2740; Arrowhead Hot Springs, alt. 1600 ft., *Spencer* 1131 (G, P), and *Parish* 5529; Agua Caliente, *S. B. & W. F. Parish* 1568; Devil's Canyon, San Bernardino Mts., *Munz* 2774 (P); San Bernardino Valley, *Parish* 6295 (P); 1062 (Ph), and June 10, 1889 (P); San Bernardino, *Cummings* in 1896; San Gabriel River near Whittier, *Reed* 2276, 2274; Murrietta, *Munz* 2141 (P); Jacumba, *Munz* 1678 (P); Palm Springs, *Spencer* in 1918; El Monte, *Johnston* 1019 (P); west of Pomona, *Johnston* 1909 (P); *Coulter* 799 (without loc.); Santa Barbara, *Munz & Johnston* 11271; *J. T. Rothrock* 58; Los Angeles, *Nevin* in 1879; Los Angeles River, *Abrams* 1446 (P); Cuyamaca Mts., San Diego Co., *E. Palmer* 386; Cuyamaca Lake, *Harwood* 7247 (P); Oriflamme Canyon, 5 mi. east of Cuyamaca, *Abrams* 3930. Mexico: Saltillo, *E. Palmer* 255 (G, N) and *Arsène* 10628 (G, N, I); vic. Durango, *E. Palmer* 390; 99,974 (G, N); Tobar, Durango, *E. Palmer* 233 (G, N); San Diego, Chihuahua, 6000 ft., *Hartman* 611 (G, N); vic. Chihuahua, alt. 1300 m., *E. Palmer* 30 (G, N); Orizaba, *Botteri* 768, 770; Jalisco, *E. Palmer* 225; San Luis Potosi, circ. Morales, *Schaffner* 577, 578; Coahuila, alt. 1600 m., *Arsène* 3401 (N, I); Oaxaca, alt. 1550 m., *Conzatti* 94 & 356; sea level, vic. La Barro, Taumalipas, *E. Palmer* 287 (G, N); Route de Cholula, Puebla, alt. 2160 m., *Arsène* 902 (G, I); vic. of Puebla, *Arsène* 7162 (N); Cerró San Juan, vic. of Puebla, alt. 2170 m., *Arsène* 417 (N); vic. Hermosillo, Sonora, *Rose, Standley & Russell* 12507 (N); vic. Magdalena, *Rose, Standley & Russell* 15105 (N); quagmire, Rio de San Matras Guanajuato, *Dugès; Hartweg* 241; Cartegana, 7000 ft., *Liebmann*. GUATEMALA: swamps, *Heyde & Lux* 3554 (questionable). BRAZIL: in arenosis maritimis, Banhos do Mar, Rio Grande oppidum, Rio Grande do Sul, *Lindman*, Regnell 1 A701 (S).

There is some variation in the reticulation of achenes in *E. arenicola*. Material from Southeastern United States tends in general to have a deeper pitting or reticulation than specimens from California, the surface of the latter sometimes appearing as though covered with minute glassy spherules. Some of the specimens from Mexico are characterized by spongy culms, thickened rootstocks, sheaths with a long triangular mucro, and conspicuously imbricated scales which are black with whitish borders. The following specimens, all in the United States National Herbarium show these peculiarities and perhaps represent a distinct species: Santa Barba, vic. Puebla, alt. 2150 m., *Arsène* 1088; Cerro Tepoxachil, alt. 2300 m., *Arsène* 1039; Route de Chalula, alt. 2160 m., *Arsène* 902; vic. Puebla, *Arsène* 146 and 228.

64. E. PARISHII Britton (FIG. 66, 67 PL. 220, FIG. 12). Culms slender, striate, 1–3 dm. high, in fascicles from slender, extensively-creeping, reddish rootstocks: upper sheath brown or reddish below, stramineous above, the brownish apex truncate and toothed: spikelet linear-lanceolate, acute, 1–1.5 cm. long, rather loosely flowered; scales ovate-oblong, somewhat rigid, stramineous with chestnut or dark-brown sides, acute to obtuse with a short hyaline tip: style 3-fid: achene trigonous with a blunt outer angle, often nearly plano-convex, ellipsoid, narrowed at both ends, yellow to light brown, smooth or faintly reticulate under magnification: style-base acute, short-subulate to conic, sessile upon the body of the achene or surmounting a constriction at the apex of the achene: bristles white, 6–7, exceeding or shorter than the achene, retrorsely toothed.—Journ. N. Y. Mic. Soc. v. 110 (1889) and in Abrams, Ill. Fl. Pacific States i. 265, fig. 635 (1923); Jepson, Man. Calif. 148, fig. 136 (1923).—Nevada and California to Mexico. The following specimens have been examined. NEVADA: Las Vegas, alt. 1000 ft., *Jones* in 1905. CALIFORNIA: Palm

Springs, western edge of the Colorado Desert, *S. B. Parish* 6145; Chico, hb. *C. F. Baker* 3280 (coll. E. B. Copeland); edge of pool, Cottonwood Springs, Mohave Desert, *Munz & Johnston* 11201 and 11200 (the latter collection with blunt spikelets (pathogenic ?)); Ibex Spring, Inyo County, *Parish* 11025; Hornbrook, Siskiyou County, *Copeland* 3556; Sespe Creek, alt. 2300–2500 ft., *Abrams & McGregor* 181; Santa Inez Mts., *Cooper* 122; shore of Owens Lake, *Hall & Chandler* 7325 (P); vic. of Bonanza King Mine, east slope of Providence Mts., Mohave Desert, alt. 7000 ft., *Munz, Johnston & Harwood* 4142 (P); Palm Springs, *Munz, Street & Williams* 2328 (P); Prairie Fork of San Gabriel River, San Antonio Mts., alt. 5000 ft., *Johnston* 1631 (P). NEW MEXICO: Mangas Springs, 18 mi. northwest of Silver City, *Metcalfe* 218 (G, P). ARIZONA: Beaver Dam Creek, Virgin River, *Goodding* 764. MEXICO: Mesquite Spring (Mex. Boundary Surv.), *Mearns* 192; Lake Santa Maria, Chihuahua, *E. W. Nelson* 6415.

Elongated spikelets with mottled scales distinguish this species of the desert regions of the southwestern United States and northern Mexico from the two related species, *E. montana* (especially the Mexican phase known as *E. truncata*) and *E. arenicola*, and the essentially smooth achenes with somewhat elongated tubercles suggest that the closer relation is with the former. The type-collection, *S. B. Parish* 1569 is from Agua Caliente, San Diego County, California. The illustrations, made from Parish 6145 from the same locality, show achenes with constricted apex, but achenes with non-constricted apices with the tubercle appearing sessile (as in the illustration by Jepson) are common as are also the intermediate stages.

E. disciformis Parish, Bull. Calif. Acad. Sci. iii. 81, t. vi. (1904) and Britton in Abrams, Ill. Fl. Pacific States i. 264 (1923), an annual species with fibrous roots, is known only from the single collection "at the eastern base of the San Jacinto Mts., on the borders of the Colorado Desert, *H. M. Hall* 2013, June, 1901." Parish's illustrations of the immature achene of *E. disciformis* and the achene of *E. Parishii* are strikingly similar, and though the type at the New York Botanical Garden has the general appearance of a small (10–15 cm. high) *E. Parishii*, the annual habit may be sufficient to distinguish it as a distinct species.

65. E. MONTANA (HBK.) R. & S. (FIG. 70–72 and PL. 220, FIG. 10). Culms 0.5–3 dm. long, from elongate creeping rootstocks: sheaths as in *E. arenicola:* spikelets ovate to linear-lanceolate, 8–12 mm. long, acute, many-flowered, often with rather loose scales: scales ovate-

elliptic, usually acute, brown with a yellowish or green midrib and a hyaline margin: style 3-fid: achene 1–1.3 mm. long, obovate, shining yellow or brown, trigonous with blunt outer angle, the surface smooth or very obscurely reticulated: style-base mucroniform, acute, usually with nearly parallel sides: bristles brown, 4, exceeding or shorter than the achene.—Syst. ii. 153 (1817); Britton, N. Y. Mic. Soc. v. 109 (1889) in part; C. B. Clarke in Engler Bot. Jahrb. xxx. Beibl. 68. 24 (1901); Barros, Anales Mus. Hist. Nat. Buenos Aires xxxiv. 476, fig. 26 (1928); *Scirpus montanus* HBK. Nov. Gen. i. 226 (1816); *E. Dombeyana* Kunth, En. ii. 145 (1837); Boeckl. Linnaea xxxvi. 450 (1869–1870) in part; *E. vulcani* Boeckl. Engler Bot. Jahrb. viii. 206 (1887).—Argentina and through the Andes to Mexico. ARGENTINA: Prov. Tucuman, Dept. Chicligasta, *Venturi* 4753; Prov. Catamarco, Dept. Andalgalá, *Jörgensen* 1646; Prov. Cordoba, *Lossen* 139. PERU: Casa Caucha, *Wilkes Exped.;* Oragilla, *Wilkes Exped.* BOLIVIA: La Paz, alt. 3750 m., *Buchtien* 149 in 1919; La Paz, alt. 3800 m., *Buchtien* 1483; vic. La Paz, alt. 10,000 ft., *Bang* 144; vic. Cochabamba, *Bang* 996 (G, N); La Paz, alt. 3650 m., *Buchtien* 6399 (N) and alt. 3550 m., *Buchtien* 6409; in arenosis, Prov. Larecaja, vic. Sorata, 2000–3000 m. alt., *Mandon* 1415 (S). ECUADOR: *Spruce* 5912; in hot springs at Baños, vic. Cuenca, *J. N. Rose* 22893; Prov. Chimborazo, Huigra, alt. 1200 m., *A. S. Hitchcock* 20395; *Lehmann* 5935 [or Colombia?] (N); prope Riobamba, *Mille* 337 (N); Tilulun, vic. Ambato, prov. Tungurahua, *Pachano* 110 (N); am Cotopaxi, 3200 m., zu saltpeter saltigem Wasser, *Lehmann* 414 (TYPE coll. of *E. vulcani* Boeckl.) (N). MEXICO: bordes des fossés près Mexico, *Bourgeau* 214 (G, N) (distributed as *E. truncata*); Valley of Mexico, *Pringle* 7655; wet soil, Cuantitlan, *Pringle* 8214; Hda. Guadeloupe, Puebla, 2130 m., *Arsène* 1160 (very young). The young specimens numbered *Rose, Coulter & Rose* 8736 from Hidalgo, and *E. Palmer* 390, vic. Durango, probably belong here.

E. Dombeyana Kunth is here considered as a synonym of *E. montana*, since the material from the Andes seems homogenous and only one species appears to be represented. The type of *E. montana* was collected in the Quindiu Pass, Colombia. Within this species, as did Clarke and Boeckeler, I have included *E. truncata* from the Federal District of Mexico, which has similar achenes, but a spikelet usually longer and proportionally narrower than those observed in the Andean plants. Lehmann's no. 8735, from Colombia, which was considered (RHODORA xxiv. 25 (1922)) as perhaps representing *E. montana* (HBK.) R & S., appears on close examination to be *E. nodulosa*.

66. E. **Palmeri**, n. sp. (FIG. 73, 74 and TAB. 220, FIG. 11), culmis non rigidis, 15–21 cm. altis, e rhizomate lignescente; vaginis superioribus 2–3.5 cm. longis, supra stramineis, infra atro-brunneis, apicibus truncatis mucronatis: spiculis 3–8 mm. longis, cylindrico-ovoidis,

obtusis; squamis ovato-oblongis, obtusis, ad marginem hyalinis, frequenter emarginatis, in medio viridescentibus: stylo 3-fido: staminibus 3: achaenio 1–1.3 mm. longo, nitente, brunneo, pyriforme, obtuse trigone, sub lente paullo reticulato; stylo-basi triangulare pyramidali, acuta, achaenio quadruplo angustiore; setis 6, albidis, achaenium aequantibus, infra in disco conjunctis.—Known from a single collection, *E. J. Palmer* 33464, wet margins of Pecos River, in deep limestone canyon, near the Rio Grande, Valverde County, TEXAS (TYPE in Gray Herbarium). From *E. arenicola* it may be distinguished by the lighter scales, acute style-base and less clearly reticulated achenes.

67. E. BOLANDERI A. Gray (FIG. 68, 69). Culms very numerous, 1–3 dm. high, about 0.5 mm. in diameter, glaucous-green, erect and wiry, from a short woody rootstock: sheaths usually stramineous, sometimes purplish at base, 2–3 cm. high, slightly swollen at the indurated purplish summit, rarely with a mucro: spikelets 3–8 mm. long, elliptic to ovate, blunt or acute, about 10–20 flowered; scales dark brown to black, ovate, acute, with a short whitened scarious tip, the lowest orbicular: stamens 3: style 3-fid: achene obovoid, 1.5 mm. long, golden-yellow to black, trigonous with a blunt outer angle, with a cellular surface under magnification: the truncate apex forming a depressed style-base with a short apiculate central projection: bristles 3–4, retrorsely toothed, reddish-brown, ½ to ¾ the length of the achene.—Proc. Am. Acad. vii. 392 (1868); Jepson, Fl. Cal. 194 (1922) and Man. Fl. Pl. Cal. 148, fig. 134 (1923); Britton in Abrams, Ill. Fl. Pacific States i. 265, fig. 633 (1923).—Northern California and Southern Oregon. CALIFORNIA: bank of creek at Clarke's, *Bolander* 4869 (TYPE in Gray Herbarium); North Fork and vicinity, *D. Griffiths* 4487; Duffield Canyon, Soulsbyville, *Jepson* (as *E. montana*); Milburn, Mariposa County, *Congdon* in 1890; Mather, Tuolumne County, alt. 4500 ft., *Munz* 7390 (P); Eagle Lake, Susanville, alt. 5000 ft., *M. E. Jones* in 1897. OREGON: Owyhee, Mathew Divide, alt. 1250 m., *J. B. Leiberg* 2170; in large dense tufts in swales of "Paradise," Wallowa County, 4000 ft. alt., *W. C. Cusick* 2412 (G, P).

E. Bolanderi stands between *E. arenicola* and *E. capitata*, both in geographical range and character of the achene, the surface markings resembling those of *E. arenicola*. The markedly indurated rhizome with its persisting bristle-like culm-bases is perhaps the most distinguishing feature. The type specimen has stramineous, evidently faded, culms, and only a few good achenes, all of which are golden-yellow. The plants collected by Jepson and Congdon, cited above, show achenes which are almost black. Whether the darkened color is a normal condition or due to great maturity, cannot be determined with the limited number of specimens at hand.

68. E. DECUMBENS Clarke (FIG. 52, 53). Culms elongated, 5–6 dm. long, striate, subterete, from a stout rootstock with fibrillose roots, the culm-bases covered by conspicuous lanceolate, light-brown scales, 2–3 cm. long: spikelet ellipsoid, obtuse, 5–7 mm. long, 3.5–4

mm. thick; scales brown, ovate, obtuse: style 3-fid: achene about 1 mm. long, trigonous, yellow, minutely reticulated, with a roughened ovoid-triangular style base ⅓ as long as the achene: bristles brown, 2 or 3, some of them equalling the achene.—Kew Bull. Add. Ser. viii. 23 (1908); Britton in Abrams, Ill. Fl. Pacific States, i. 265, (fig. 634) (1923).—CALIFORNIA: Mt. Shasta, alt. 2500 m., *H. E. Brown* 424, and Yosemite National Park (acc. to Britton, l. c.).

Dr. J. K. Small has very kindly lent me the specimen (TYPE collection) in the Herbarium of the New York Botanical Garden, from which the illustration has been made.

69. E. FALLAX Weatherby (FIG. 77, 78). Perennial; rootstock creeping, about 2 mm. in diameter, beset with sheathing, herbaceous, striate, long acuminate, dark red scales: culms clustered, subterete or, at least in dried specimens, slightly compressed and somewhat elliptic in cross-section, striate, slender (0.5–1.1 mm. in diameter at the summit of the upper sheaths), 3–7.6 dm., averaging 3–4 dm., tall: upper sheaths tinged with red, subobliquely truncate at summit, the margin there entire, not thickened and cartilaginous nor hyaline, finely red-punctate when young, dark in age: spikelets ovate or lanceolate, acute, 7–10 mm. long, about 3 mm. broad; scales ovate- or obovate-oblong, obtuse, 2.5–3 mm. long, castaneous or dark red above with green mid-rib and narrow hyaline apex and margin: styles three-parted: bristles present, 3–4 (–5), downwardly barbed, half as long as the achene or only a little shorter: achenes 1.7–2 mm. long (tubercle included), about 1 mm. broad, obtusely triangular, obovoid, yellow, very slightly reticulate-roughened by the raised walls of the epidermal cells, persistent after the fall of the scales: tubercles gray, pyramidal, acute, 0.4–0.5 mm. high, about as broad or a little narrower, evidently distinct from the body of the achene, the base wider than the point of attachment so that the lateral portions, especially at the angles, are free.—RHODORA xxiv. 23. (1922). MASSACHUSETTS: fresh and brackish springy border of Dinah's Pond, Yarmouth, Aug. 16, 1919, *Fernald & Long*, no. 18,025.

This peculiar plant, the status of which still remains unknown, has the characteristics of both sub-series *Truncatae* and *Palustres*. The locality has been twice examined by the writer, without locating the source of the specimens. The intermediate morphological characters together with its seeming evanescence would suggest a hybrid, possibly *E. uniglumis* var. *halophila* and *E. capitata* var. *borealis*. Such abundant fruit however, as occurs in the material would not be expected in a plant of hybrid origin. The above description is Mr. Weatherby's (l. c.) as well as the following quotation. "It has the aspect and entire sheaths of the group of *E. palustris*, but 3-parted styles and bluntly trigonous achenes. It combines some of the characters of *E. capitata* (*E. tenuis*) and of *E. arenicola* and differs from the former in its much smoother achenes and in the regular presence of bristles, from the latter in that the achenes are persistent after the fall of the scales, and from both in the larger size of the achenes and the entire sheaths."

Geographical Distribution of Sub-Series Truncatae

This subseries[1] belongs entirely to the New World, where it has its great development in North America. The circle of species, *E. capitata, nitida, compressa,* and *acutisquamata,* offers a difficult problem in specific delimitation. *E. arenicola* is a localized species of the coastal sands from South Carolina to Florida, extending westward along the Gulf States and into Mexico and California, being apparently replaced in desert areas of the southwest by *E. Parishii.* The related *E. Palmeri* is known only from a single station on the Rio Grande. In the mountains of western United States two species, *E. decumbens* and *E. Bolanderi,* are segregated, each in a comparatively small area. Extending northward into Mexico from the Andes is a single species, *E. montana,* under which has been included *E. truncata.*

E. cylindrica, a Texan species with slender elongated spikelets, seems more closely related to the South American series *Sulcatae* and is not treated here. *E. albida,* which I have provisionally placed in the *Sulcatae,*[1] though the achenes are deep brown when over-ripe, differs from all members of the *Palustriformes* in the stout cylindric reddish bristles with close-set teeth, and, perhaps, together with *E. bermudiana,* represents an isolated group.

Explanation of Plate 219

(Habit-drawings × ½; achenes × 15)

Figs. 52 and 53, E. decumbens, from type specimen; 54 and 55, E. nitida, from type specimen; 56 and 57, E. capitata var. typica, *Robinson* 470, Virginia; 58 and 59, E. capitata var. borealis, *Fernald* 20147, Nova Scotia; 60 and 61, E. acutisquamata, *Buckley,* Texas; 62 and 63, E. compressa, from type collection.

Explanation of Plate 220

(Habit-drawings × ½; achenes × 15)

Figs. 64 and 65, Eleocharis arenicola, South Carolina, *Robinson* 256; 66 and 67, E. Parishii, California, *Parish* 6145; 68 and 69, E. Bolanderi, Oregon, *Bolander* 4869; 70 and 71, E. montana, Mexico, *Bourgeau* 214; 72, E. montana, Columbia, *Lehmann* 5935; 73 and 74, E. Palmeri, from type specimen; 75 and 76, E. tricostata, New Jersey, *MacElwee* 614; 77 and 78, E. fallax, from type specimen.

[1] Rhodora xxxi. 129 (1929).

EXPLANATION OF PLATE 221

Achenes (× 20): Fig. 1, ELEOCHARIS CAPITATA var. TYPICA, New York, *Ferguson* no. 1502; 2, E. CAPITATA var. VERRUCOSA, Missouri, *Eggert;* 3, E. CAPITATA var. PSEUDOPTERA, Delaware, *Svenson* no. 3457; 4, E. CAPITATA var. BOREALIS, Newfoundland, *Fernald & Wiegand* no. 4710; 5, E. COMPRESSA, Kansas, *Scarborough;* 6, E. COMPRESSA var. ATRATA, Michigan, *E. T. & S. A. Harper;* 7, E. ACUTISQUAMATA, Texas, *Tharp* no. 995; 8, E. ARENICOLA, Louisiana, *Ball* no. 345; 9, E. ARENICOLA, California, *Spencer;* 10, E. MONTANA, Peru, *U. S. Exploring Expedition;* 11, E. PALMERI, Texas, from TYPE specimen; 12, E. PARISHII, California, *Parish* no. 6145. Cross-section of culm (approximately 40 ×): Fig. 13, E. CAPITATA var. TYPICA, New York, *Svenson* no. 3496; 14, E. CAPITATA var. VERRUCOSA, Missouri, *Eggert;* 15, E. CAPITATA var. BOREALIS, Massachusetts, *Bartlett* no. 486; 16, E. CAPITATA var. PSEUDOPTERA, Delaware, *Svenson* no. 3457; 17, E. CAPITATA var. TYPICA, Virginia, *Leonard* no. 321; 18, E. COMPRESSA, Indiana, *Deam* no. 31950.

ASTROPHYTUM ASTERIAS IN THE UNITED STATES

ELZADA U. CLOVER

(Plate 223)

A SHIPMENT of cacti from Miss Flossie Garrison, collected in the Rio Grande Valley, Texas, was received in January, 1932 by the University of Michigan Botanical Gardens. Among them was a small specimen of *Astrophytum asterias* (Zuccarini) Lemaire of unusual interest since as far as known this species has never been reported as occurring in the United States.

Britton and Rose (The Cactaceae) record it only for Northern Mexico near Nuevo Leon, and at Ciudad, Tamaulipas. It has been found at Victoria, Tamaulipas by Romeo Posselt, an exporter of cacti, who says that in that locality it grows 200–300 meters above sea level, in limy, heavy soil. He also states that it is usually found growing in groups of from five to twenty plants in grass and under small, thin shrubs, and never found in close proximity to other succulents.

This species of *Astrophytum* is undoubtedly reputed to be rare since the Mexican Government has absolutely prohibited its exportation.[1]

The specimen from South Texas (Mich. Bot. Gard. No. 14503) was found by M. A. Clover on a ranch in Starr County eight miles north of Rio Grande City. It was growing in sandy loam on a south slope. Since its discovery a few other specimens have been found in the same locality.

Astrophytum asterias is a much depressed, spineless cactus, 2 cm.

[1] New Mexican Laws Concerning Cacti. Monatschrift der deutschen Kakteen-Gesellschaft. Mar. 1931, p. 71.

high, 7–8 cm. broad with eight low ribs. The areoles in the center of the ridge are circular and felted. Numerous minute depressions filled with tufts of white wool are dotted over the surface. These appear to be more numerous near the furrows between the ridges and at the growing point. The plant blossoms in April, the pale yellow flowers with vermillion centers arising from the apex. After one flower is almost ready to open, a second woolly bud appears at the base of the first. The flower when fully open is 4–5 cm. in diameter. The first day it opens slightly, closes again and opens the following morning. It remains in bloom until about 5:00 P.M. The next morning it is still fresh but almost closed and withers by nightfall. The petals are about 2 cm. in length, finely serrate at the tips and are extremely delicate. The outer perianth segments are narrow with brown, scarious tips. A hairy, somewhat woolly growth covers the flower tube and the bracts. The stamens are numerous and spiral around the pistil at first, later straightening out until they almost reach the tips of the stigmas. Seven to eight yellowish-green stigmas radiate from the tubular style.

Although the plant is small it is very striking with its ashy-green, depressed form divided into 7–8 equal segments, each decorated with a row of circular, felted areoles accurately spaced up the center. Even the minute woolly spots have a definite arrangement.

At a first glance the plant with its convex shape and perfect symmetry bears a marked resemblance to a sea urchin. (Small wonder that the Mexican Indians weave clever and unusual designs in their blankets and zarapes with such unique patterns for inspiration.)

Astrophytum asterias is found in commerce in the United States, how generally we do not know, but two dozen specimens were purchased from a flower stall in the market at Ann Arbor, which are now in the Botanical Garden collection (No. 14504). These had been secured from a wholesaler in Detroit, who said they came from Austin, Texas. It would be interesting indeed to know whether there is a locality in Texas from which they can be marketed in such numbers or whether (as seems more likely), they are smuggled from Mexico. The Austin dealer has not answered a letter of inquiry.

DEPARTMENT OF BOTANY, UNIVERSITY OF MICHIGAN.

EXPLANATION OF PLATE 223.

ASTROPHYTUM ASTERIAS. FIG. 1 (left), specimen from Starr County, Texas (Mich. Bot. Gard. No. 14503). FIG. 2 (right), flowering specimen purchased in Ann Arbor, Michigan said to have been originally sold at Austin, Texas (Mich. Bot. Gard. No. 14504).

CAREX RICHARDSONII IN NEW ENGLAND

M. L. Fernald

One of the rarest or most evasive of Carices of eastern North America is *Carex Richardsonii* R. Br. Its stations across the breadth of western Canada and northwestern United States are very scattered; and in the region from Illinois eastward its known stations can easily be counted on the fingers. In Illinois the famous station was that of *Dr. S. B. Mead*, who collected it at Augusta on May 26, 1845. Material from Augusta was freely distributed by Mead to students of his time and in the Gray Herbarium this collection is represented by specimens which were sent to Asa Gray, to Chester Dewey, to H. P. Sartwell, to George Vasey and to George Thurber. Except for this much duplicated collection there is no material in the Gray Herbarium from Illinois. Similarly with Indiana: material from a single station (the only one cited by Stanley Coulter) "dry sands, Pine, Lake Co. . . . May 29, 1900," collected by *E. J. Hill* and by *Agnes Chase*. Michigan is represented by two collections: Washington, June 4, 1854, *Dr. D. Cooley;* and south of Brighton, June 25, 1898, *C. F. Wheeler*, "only spec. seen." Beal cites a total of four stations for Michigan, with the comment, "Scarce" but Farwell (Am. Midl. Nat. xi. 49) adds another "for this rare sedge . . . , on sandy hillsides . . . June 1st." In Ohio it is "rare" at its single station, in Erie County.

In the state of New York, likewise, it is not only a very rare, but perhaps an extinct species. Sometime prior to 1848 Dr. Samuel B. Bradley collected very characteristic *Carex Richardsonii* in Monroe County. The material he sent to Chester Dewey (now in the Gray Herbarium) was marked by Dewey "Greece, 10 miles w. of Rochester. *Dr. Bradley*"; but a duplicate (also in Gray Herb.) sent to John Carey is marked in Carey's hand "near Rochester, N. Y. *Dewey!* in lit. 15 Feby. '48." Wherefore, the species was inserted by Carey, in his treatment of *Carex* in Gray, Man. ed. 2: 526 (1856), from "Dry ground, near Rochester, New York (*Dewey*)"; and by Dewey, in his treatment of the genus in Wood, Class-Book, issue of 1861: 765 (1861), from "Woods, Greece, N. Y. (Bradley)." In the succeeding long period since Bradley's discovery of *C. Richardsonii* it has not again been found in New York state; and subsequent statements all affirm that Bradley got it in Parma, not in Greece: "Dry woods, Parma, Monroe county, north side of the ridge, *Bradley*. Discovered in this locality long before the expedition to British America, *Dewey*";[1] "Rare. Dry woods, Parma, *Bradley*";[2] "In dry soil. The only record for this state rests upon a collection made at Parma, Monroe county, many years ago by *Bradley* (Paine, Cat. . . .). Not recently collected. The specimen from Bradley in state herbarium is labelled 'Greece, Monroe county.'"[3]

Bradley (1796–1880) was a contemporary and friend of Paine; consequently, the hint given by Paine, "north side of the ridge," Parma, may prove of significance in relocating Bradley's station. If, however, Dewey's statement, quoted by Paine, is correct, that the plant was "Discovered in this locality long before the expedition to British America," the date of Bradley's discovery goes back of 1820. Richardson, on Franklin's first journey, collected *Carex Richardsonii* apparently in June, 1820, and it was described in 1823. It is strange, if Dewey's statement is correct, that Bradley, a friend and correspondent of most of the leading botanists of his time, did not send them material soon enough for inclusion in Torrey's *Flora of New York* (1843), nor in Dewey's treatment of *Carex* in Wood's Class-Book (1845), nor in Carey's treatment of the genus in the first edition of Gray's Manual (1848). Dr. Gray's annotated copy of the latter book has the New York occurrence pencilled on the margin of the page, as an addition after the Manual had been prefaced "December 24th, 1847."

With *Carex Richardsonii* so obviously rare in the eastern United States and never found east of northwestern New York, New England botanists have scarcely thought of it as a possible member of their flora. Its discovery in Vermont, associated with some very distinctive and localized plants now indicates that it may be looked for with some confidence elsewhere in the East.

For some years my annual spring field-trip of "Botany 7" has included a small area on the northeastern slope of Mt. Equinox in Manchester, Vermont. With limited time and with confidence in the thorough scouring of the state by ever alert Vermonters and desirous of seeing merely a typical representation of the rich Alleghanian flora of the lower calcareous slope, our ascent has always

[1] Paine, Cat. Pl. Oneida Co. and Vic. 161 (1865).
[2] Beckwith & Macauley, Proc. Rochester Acad. Sci. iii. 121 (1896).
[3] House, Ann. List Ferns and Fl. Pl. N. Y.—N. Y. State Mus. Bull. no. 254: 177 (1924).

stopped at the northeast corner of Table Rock, alt. 610 m. (2000 ft.), a limestone bluff standing out prominently on the slope and conspicuous when the trees are bare of foliage.

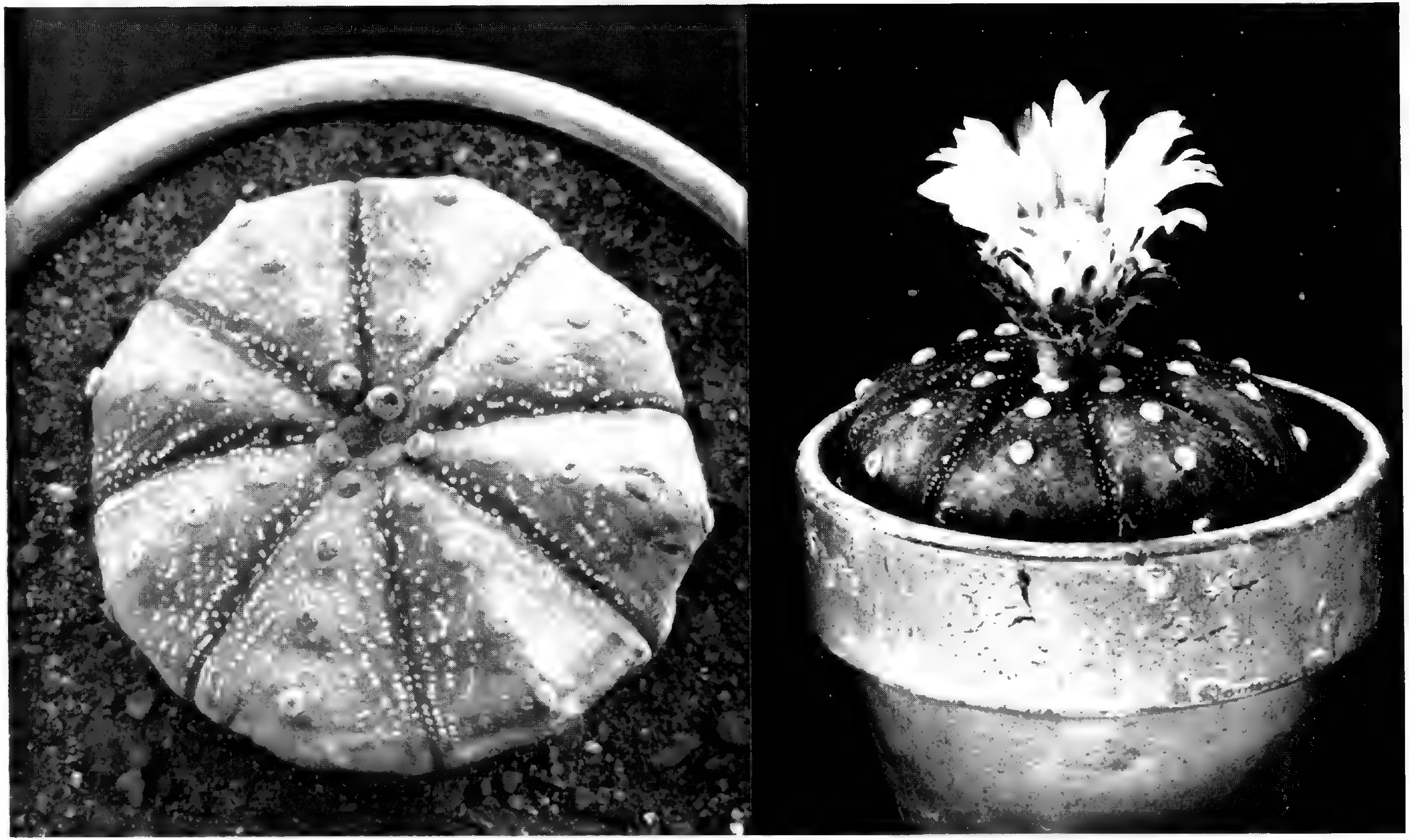
On May 21, 1932, with my Assistants, William B. Drew and Stuart K. Harris, and ten other students, some of whom will later make their marks in botany, I approached Table Rock from a different angle, from the southeast, merely to exhibit to the class the wonderful assemblage of local species there: as fine a display of *Clematis verticillaris* DC. as I know south of central Maine; *Asplenium cryptolepis* Fern., with *Arabis lyrata* L. and *A. hirsuta* (L.) Scop., in the crevices; carpets of *Juniperus horizontalis* Moench at the only inland locality for the species in New England and at its southern limit in eastern America; *Carex scirpoidea* Michx., an arctic-alpine species here reaching its southern limit in eastern America within a stone's throw of the most typical of Alleghanian plants (*Caulophyllum thalictroides, Asarum canadense, Senecio obovatus, Viola rostrata, Carex platyphylla, Orchis spectabilis, Mitella diphylla, Asclepias quadrifolia,* etc.); *Rosa acicularis,* var. *Bourgeauiana* Crépin, essentially at its southeastern limit; *Viola adunca* Sm., likewise close to its southeastern limit; and other species at least not common in New England. While the students were enthusiastically collecting these and other plants new to them, I was wholly devoted to *Carex Richardsonii,* abundant about the dry ledges and extending in the rotted debris down the slope; a fitting climax to an afternoon on a slope which, lower down, had already given us a new Vermont station for the local *Carex castanea* Wahlenb. and a well developed station of the rayless *Senecio obovatus,* forma *elongatus* (Pursh) Fern., the latter not previously recorded from Vermont.

On May 21 *Carex Richardsonii* was scarcely mature on Mt. Equinox. Therefore, desiring to put up 100 sheets of mature material for the *Plantae Exsiccatae Grayanae,* Harris and I returned to the station on June 4th. On the way, at Brattleboro and at Manchester, we constantly heard complaints of the "awful dry spring," with no appreciable rain in southern Vermont, but the young foliage, in general, had not suffered; in fact, it had grown exuberantly in two weeks. Incidentally, all the records emphasized the restriction of *C. Richardsonii* to "dry" habitats. Going to the dry but by no means parched Table Rock, we were dumbfounded to see neither *Carex scirpoidea* nor *C. Richardsonii,* though their associates of two weeks earlier had all prospered. Search on hands-and-knees over practically every foot of the southeastern section of the bluff showed not a single shriveled culm or leaf of either sedge; in two weeks they had ripened, shriveled and been harvested by the dry winds.

Such behavior of *Carex scirpoidea*, which, on the White Mountains, on Katahdin and at lower altitudes from northern Maine northward, lasts until autumn, was quite baffling. But, in view of its close relationship to *Carex pedunculata* Muhl., the culms of which mature and disappear very early, this behavior of the rare and evasive *C. Richardsonii* may well account for its rarity; it may be shriveled and unrecognizable when most other Carices are in their prime. At least, its behavior another spring will be closely watched; and it is suggested that, if the "north side of the ridge" at Parma is visited by the middle of May, Bradley's long-lost station for *Carex Richardsonii* may be rediscovered.

Gray Herbarium.

Volume 34, no. 406, including pages 193 to 212 and plates 219 to 221, was issued 8 October, 1932.



Astrophytum asterias.

Rhodora

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ILEX ARENICOLA Ashe, f. SEBRINGENSIS McFarlin.

ILEX ARENICOLA Ashe, f. OBLANCEOLATA McFarlin.

Ilex arenicola Ashe, var. obovata McFarlin.

ILEX ARENICOLA Ashe, var. PAUCIDENS McFarlin.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 34. December, 1932. No. 408.

HOLLIES FROM CENTRAL FLORIDA[1]

JAMES B. McFARLIN

(Plate 224–231)

FURTHER studies of the material collected in Polk County, Florida, during the season of 1931, indicate that *Ilex arenicola* Ashe (*Ilex cumulicola* Small), *Ilex pygmaea* McFarlin, and *Ilex caroliniana* (Walt.) Trelease have in the Lake Region of Polk County, and possibly more generally throughout the range of these species, several varieties and forms which deserve names and for which descriptions and illustrations are here given. Illustrations of *Ilex pygmaea* McFarlin (PLATE 229), from the same general region, and *Ilex arenicola* Ashe f. *sebringensis* McFarlin (PLATE 224), from the vicinity of Sebring, are also included. These two were described in this Journal (**34**: 16–18. 1932)[2]

Ilex arenicola var. *transiens* is in some characteristics similar to *Ilex opaca* in that its leaves have a strongly sinuate-spinescent margin; but its smaller leaves and general habit of growth mark it as a derivative of *Ilex arenicola* Ashe, with which it is always associated.

Ilex arenicola var. *paucidens* stands in the same relation to *Ilex arenicola* Ashe that *Ilex opaca* f. *subintegra* Weatherby does to *Ilex*

[1] Papers from the Department of Botany and the Herbarium of the University of Michigan, No. 393.

[2] A correction to the description of *Ilex pygmaea* nov. sp. in RHODORA, **34**: 17. 1932. In line 23, after "Flowers borne in few-flowered cymes on the new growth," insert: calyx of 4 broadly triangular sepals; sepals about 1 mm. long and 1.2 mm. wide, ciliate, acute or short acuminate. In line 27 after "anthers ovate, 1.4 mm. long," omit the rest of the sentence.

In line 44 after "floribus solitariis vel in cymis paucifloris in ramulis novellis," insert: sepalis 4, late triangularibus, fere 1 mm. longis et 1.2 mm. latis, ciliatis, acutis vel breviter acuminatis. On p. 18, line 3, after "antheris ovatis, 1.4 mm. longis" omit the rest of the sentence.

opaca Ait. It is the entire-leaved form of the species. Growing in the scrub with numerous dwarf oaks, it is easily mistaken for a *Quercus*.

Ilex arenicola var. *obovata* is a very distinct form of *Ilex arenicola* Ashe growing mixed with the typical form, but at once distinguished by its obovate leaves with obtuse apices.

Ilex arenicola f. *oblanceolata* is distinct only when the extreme type is found. It tends to intergrade with the typical form.

Ilex pygmaea var. *subedentata* is the entire-leaved form of *Ilex pygmaea* McFarlin and bears the same relationship to it that *Ilex opaca* f. *subintegra* Weatherby and *Ilex arenicola* var. *paucidens* do to their respective species.

Ilex caroliniana var. *jejuna* is a dwarf form of *Ilex caroliniana* (Walt.) Trelease, forming in the scrub a dense compact shrub less than a meter high. The typical form of the species usually grows in the high hammocks.

Mr. S. F. Poole collected and sent the writer material upon which two of the new forms are based. His enthusiastic coöperation has been greatly appreciated.

Ilex arenicola Ashe f. **oblanceolata** f. nov. A shrub or small tree 2.5 m. high, similar to the typical form except in its distinctly oblanceolate leaf-blade which is about three times as long as wide. Type (in Herb. Univ. Mich.) *S. F. Poole* 2, rare in the deep scrub, Lake Marion, Polk County, Florida. Plate 225. Differs from the typical *Ilex arenicola* Ashe only in the more pronounced oblanceolate leaf and at the most only an extreme variation.

Frutex vel arbuscula parva 2.5 m. alta; similis formae typicae foliis oblanceolatis exceptis, triplo longioribus quam latis. Specimen typicum (in Herb. Univ. Mich.) *S. F. Poole* 2, prope Lake Marion, Polk County, Florida. Differt a *Ilice arenicola* f. *typica* solum foliis oblanceolatis.

Ilex arenicola Ashe var. **obovata** var. nov. A shrub or small tree up to 2.5 m. high, with ascending branches. Leaves coriaceous, persistent, flat, scarcely revolute, obovate, 3.5 cm. to 4.5 cm. long (usually 4 cm.) and 1.5 cm. to 2 cm. wide; margin shallowly sinuate-spinescent; apex obtuse, base acute. Flowers and fruit not seen, probably as in the typical form from which it differs in the characteristic obovate leaf-blade which is usually twice as long as broad, and the obtuse apex. Type (in Herb. Univ. Mich.) *J. B. McFarlin* 4507, rare in the deep scrub, Lake Marion, Polk County, Florida. Plate 226.

Frutex vel arbuscula parva interdum 2.5 m. alta; ramis ascendentibus; foliis coriaceis, persistentibus, planis vel paululo revolutis, obovatis, 3.5–4.5 cm. (plerumque 4 cm.) longis, 1.5–2 cm. latis, leviter sinuato-spinosis, apice obtusis, basi acutis. Flores et baccae ignotae. A forma typica differt foliis obovatis plerumque duplo longioribus quam latis. SPECIMEN TYPICUM (in Herb. Univ. Mich.) *J. B. McFarlin* 4507, prope Lake Marion, Polk County, Florida.

ILEX ARENICOLA Ashe var. **paucidens** var. nov. A small tree or shrub 3 to 4 m. high, with ascending branches. Leaves coriaceous, persistent, flat or sometimes slightly revolute, obovate to elliptic or sometimes oblong, 3 cm. (usually 4 cm.) to 4.5 cm. long and 1 cm. to 2.5 cm. wide; margin essentially entire, sometimes bearing one or two small teeth near the apex; apex mucronate; base acute or rounded; petiole stout, about 8 mm. long. Flowers as in the typical form of the species. Fruit spherical, red, slightly smaller than in typical *Ilex arenicola,* usually 6.5 mm. to 7 mm. in diameter. Differs from the typical form in the generally quite entire leaf. It grows in the scrub with typical Ilex arenicola Ashe. TYPE (in Herb. Univ. Mich.) *J. B. McFarlin* 4501, Lake Marion, Polk County, Florida. PLATE 227.

Frutex vel arbuscula parva 3–4 m. alta, ramis ascendentibus. Foliis coriaceis, persistentibus, planis vel paululo revolutis, obovatis vel ellipticis vel aliquando oblongis, 3–4.5 cm. (plerumque 4 cm.) longis, 1–2.5 cm. latis, integris, saepe cum dentibus duobus (vel uno) parvis prope apicem mucronatum, basi acutis vel rotundatis; petiolis plerumque 8 mm. longis, crassis. Flores ut in forma typica. Baccae sphaericae rubrae aliquantum parviores quam eae formae typicae *Ilicis arenicolae,* diametro plerumque 6.5–7 mm. A forma typica differt foliis integris. SPECIMEN TYPICUM (in Herb. Univ. Mich.) *J. B. McFarlin* 4501, prope Lake Marion, Polk County, Florida.

ILEX ARENICOLA Ashe var. **transiens** var. nov. A compact shrub or small tree up to 2 m. high, with ascending branches. Bark of trunk and branches grayish brown. Leaves coriaceous, persistent, dark green above, yellow-green beneath, glabrous throughout, flat, scarcely revolute, elliptical or obovate, 2.5 cm. to 5 cm. long, and 1.8 cm. to 3 cm. wide; margin strongly sinuate-spinescent; apex acute or obtuse; base acute or cuneate; petiole short and stout. Flowers and fruit essentially the same as in the typical form, from which it differs in the strongly sinuate-spinescent leaf margin. Common in the scrub growing with typical *Ilex arenicola.* TYPE (in Herb. Univ. Mich.) *J. B. McFarlin* 5174, Deer Lake, Winter Haven, Florida. PLATE 228.

Frutex compactus vel arbuscula parva 2 m. alta; ramis ascendentibus; cortice trunci et ramorum griseo-brunneo; foliis coriaceis, persistentibus, superne atroviridibus, inferne luteo-viridibus, glabris, planis vel paululo revolutis, ellipticis vel obovatis, 2.5–5 cm. longis, 1.8–3 cm. latis, valde sinuato-spinosis, apice acutis vel obtusis, basi acutis vel cuneatis; petiolis brevibus et validis. Flores et baccae eis formae typicae similes. SPECIMEN TYPICUM (in Herb. Univ. Mich.) *J. B. McFarlin* 5174, Deer Lake, Winter Haven, Florida.

ILEX PYGMAEA McFarlin var. **subedentata** var. nov. A shrub or small tree 2.5 to 3 m. high. Leaves coriaceous, persistent, flat or revolute, obovate or occasionally elliptical, 2.5 cm. to 3 cm. long and 1 cm. to 1.5 cm. wide, margin entire or sometimes bearing a few lateral teeth; apex rounded with a strong mucronate tip; base acute. Flowers not seen. Fruit subglobose, red, about 7 mm. to 9 mm. in diam., seeds prominently ribbed, about 6 mm. long. Differs from the typical form in its distinctly obovate entire leaves. It was found growing in the same scrub with *Ilex pygmaea* McFarlin. Type (in Herb. Univ. Mich.) *S. F. Poole* 5, Lake Marion, Polk County, Florida. Plate 230.

Frutex vel arbuscula parva 2.5–3 m. alta; foliis coriaceis, persistentibus, planis vel paululo revolutis, obovatis vel ellipticis 2.5–3 cm. longis, et 1–1.5 cm. latis, integris vel aliquando dentes paucos ferentibus, apice rotundatis valde mucronatis, basi acutis. Flores ignoti. Baccae subglobosae, rubrae 7–9 mm. latae; seminibus 6 mm. longis prominenter costatae. A forma typica differt foliis integris obovatis. Specimen typicum (in Herb. Univ. Mich.) *S. F. Poole* 5, Lake Marion, Polk County, Florida.

Ilex caroliniana (Walt.) Trelease var. **jejuna** var. nov. A small compact shrub 1 m. high, with numerous short gray branches, twigs usually terminating in short spurs 3 mm. to 10 mm. long, bearing many small leaves. Blade elliptical to ovate-elliptic, 2 cm. to 3 cm. long and 1 cm. to 1.5 cm. wide, glabrous, short petioled, margin serrulate; apex acute or abruptly acuminate; base acute. Flowers and fruit not seen. Differs from the typical form in its compact dwarf habit, abundance of spurs and smaller foliage. Type (in Herb. Univ. Mich.) *J. B. McFarlin* 5550, rare in the scrub, Lake Marion, Polk County, Florida. Plate 231.

Frutex compactus parvus prope 1 m. altus; ramis numerosis brevibus griseis, virgis plerumque desinentibus in breves calcares 3–10 mm. longos multifoliosos; foliis ellipticis vel ovato-ellipticis 2–3 cm. longis, 1–1.5 cm. latis, glabris, serrulatis, apice acutis vel breviter acuminatis, basi acutis; petiolis brevibus. Flores et baccae ignotae. A forma typica differt foliis parvis, ramis multicalcaratis et habitu denso. Specimen typicum (in Herb. Univ. Mich.) *J. B. McFarlin* 5550, Lake Marion, Polk County, Florida.

NOTES ON THE FLORA OF THE STATE OF WASHINGTON—I

J. William Thompson

A satisfactory flora of any western state remains to be written. Botanically speaking, the flora of the State of Washington is still in the pioneer stage. A great amount of excellent work has been done, but there are large areas which have not been even visited by a botanist. Most of the Olympic, Wenatchee, and Okanogan Mountains have only had botanists pass through along well established trails. There is no region in the State that is in any sense "worked out," although Mr. Suksdorf has done very intensive work in Klickitat County over a long period of years. Dr. Harold St. John and Edith Hardin jointly worked the Mt. Baker region over a period of several years, listing 333 species and varieties; but the author found over forty species in two short visits which were not included in the "Flora of Mt. Baker."

The author travelled 8,000 miles about the State in 1931, many of them afoot with a heavy pack. Many new and interesting ranges were discovered, and a few new species. It is the purpose of this series to make known to botanists in general those things which may be of interest to a great number. This first paper is to report those species that are new to the State of Washington, and to describe one as new to science.

Carex stygia Fries. This Alaskan and British Columbian species was found in Clallam County in the Olympic Mountains in 1927 by *I. C. Otis* 1570. This seems to be the first record for the United States.

C. lívida (Wahl.) Willd. var. Grayana (Dewey) Fern. Found in a sphagnum bog between the Bogachiel and Hoh Rivers, 600 feet altitude, Olympic peninsula, *I. C. Otis* 1518.

Salix arctica Pall. Found by the author in Marmot Pass in the Olympic Mountains, at 6000 feet altitude, *Thompson* 7977. Both the staminate and pistillate plants were found near each other, each patch occupying an area as large as a city lot, and not rising as much as a foot above the earth. Dr. Ball informed me that this was a second record for the United States and a first for the State of Washington.

S. arctica Pall. var. subcordata (And.) Schn. Found growing all over the end of a high cliff on Skyline Ridge, Mount Baker, at an elevation of 6,000 feet; only the staminate plant found. *Thompson* 5661 is the first record for the United States.

S. petrophila Rydb. var. cespitosa (Kenn.) Schn. The author found this also on Skyline Ridge, Mount Baker, not far from the preceding, and intermingled with *S. nivalis* Hook. *Thompson* 8089 is the first record for the State.

S. caudata (Nutt.) Heller var. parvifolia Ball. Another first collection for the State, being from Okanogan County near Conconully, *Thompson* 7070.

Polygonum viviparum L. Lyall first reported this from latitude 49°. Some of his records have not been verified by any subsequent collection, and in a few instances there is some doubt if Lyall really collected certain species in this State. But the author found this growing abundantly near the two willows mentioned above, Skyline Ridge, Mount Baker, 6000 feet altitude, *Thompson* 8093. An amateur botanist also found it growing in the Okanogan Mountains and sent it to the author for identification, *Chas. B. Fiker* 380. These two collections remove all doubt as to its occurrence in the State of Washington.

Ranunculus acris L. This buttercup has been found several times in this State, but it has not been officially reported before. The author found it growing along the open banks of the Dosewallops River near its mouth, Jefferson County, *Thompson* 6549.

Lythrum salicaria L. Abundantly established in Seattle along the marshy shores of Lake Washington near the University, *Thompson* 8004.

Hyoscyamus niger L. Near a deserted ranch between Conconully and Loomis, *Thompson* 7074.

Antennaria microphylla Rydb. Moist open field between Tonasket and Republic, Okanogan County, *Thompson* 7108.

Erigeron **Thompsoni** S. F. Blake, sp. nov. Perennis simplex ca. 5 dm. altus subglaber paucifoliatus monocephalus, rhizomate elongato; caulis tenuis infra glaber supra subappresse pilosus; folia basalia 2–3 spathulato-oblanceolata integra 9–21 cm. longa (petiolo sparse ciliato 5–11 cm. longo incluso) 1–1.5 cm. lata obtusa basi longe acuminata firma laete viridia ciliolata ceterum glabra, caulina ca. 5 remota valde descrescentia, suprema bracteiformia; capitulum longe pedunculatum ca. 3 cm. latum; involucri ca. 4-seriati gradati 5–7 mm. alti phyllaria linearia vel interiora lineari-lanceolata acuminata ciliata eglandulosa apice laxa; radii ca. 30 albi ca. 2 mm. lati; achenia sparse hirsutula; pappus simplex.

Rhizome apparently ascending, 8 cm. long and more, about 3 mm. thick; stems solitary, erect from a short curved-ascending base, 4.5–5.5 dm. high, terete, purplish at least above, rather densely short-pilose above middle with mostly ascending or subappressed white hairs; petioles of basal leaves equalling or often exceeding the blades, sparsely ciliate chiefly above; blades of basal leaves 5–10 cm. long, obtuse or rounded, bluntly apiculate, ciliate below, ciliolate toward apex with somewhat thickened-based hairs, glabrous beneath, above glabrous or thinly and inconspicuously incurved-pilosulous especially on costa, the principal lateral veins obscure, about 3 pairs; lowest stem leaves similar, the uppermost reduced to sessile elliptic subclasping bracts 7–17 mm. long, 2–5 mm. wide; peduncle 8–10 cm. long, naked or with a minute bract; disk 7–9 mm. high, 1.2–1.5 cm. wide; phyllaries purplish toward apex, especially the inner, the outermost about 0.5 mm. wide; rays white, sometimes faintly purplish-tinged in drying, 1–1.2 cm. long, the tube 2 mm. long, sparsely pilosulous toward apex, the lamina linear-elliptic, 8–10 mm. long, 2.2–2.5 mm. wide, obscurely tridenticulate, 4-nerved; disk flowers numerous, their corollas yellow, sparsely pilosulous near base of throat, 4 mm. long (tube 1.2 mm., throat slender-funnelform, 2 mm., teeth ovate, with slight vertical apical crest, 0.8 mm. long); achenes obovate, compressed, 5-nerved, hirsutulous chiefly above, 2–6 mm. long; pappus of about 30 white subequal hispidulous bristles 3–8 mm. long; style tips deltoid, acutish.

WASHINGTON: In open sphagnum bog near Lake Quinault, Grays Harbor Co., 10 July 1931, *J. William Thompson* 7336 (TYPE no. 1,531,366, U. S. Nat. Herb.). Duplicates of the type collection were distributed to Kew, Missouri Bot. Gard.; Phila. Acad. Sci.; Gray, Stanford, and Univ. of Calif. herbaria.

This plant is a member of the group of *Erigeron salsuginosus* (Richards.) Gray, in which the species were inexcusably multiplied by Dr. Greene. Its nearest relative, probably, is *Erigeron Aliceae* Howell (with which *E. amplifolius* Howell is synonymous), in which the rays are colored and the involucre finely glandular as well as more or less densely villous, especially toward the base.

This sphagnum bog was one of a series once completely surrounded with a dense growth of timber which has been logged-off. The Erigeron was associated with *Aira cespitosa* L., *Comarum palustre* L., *Myrica Gale* L., *Caltha biflora* DC., *Kalmia polifolia* Wang., and a tall white *Anemone* of the *quinquefolia* group.

CLEVELAND HIGH SCHOOL, SEATTLE.

A NEW CYPRIPEDIUM HYBRID

J. T. CURTIS

NEAR Eagle Lake, Waukesha County, Wisconsin, is a station rich in Lady Slippers. Here may be found *Cypripedium parviflorum, C. parviflorum* var. *pubescens, C. candidum* and *C. reginae,* all within the limits of a few acres. The locality was visited in the spring of 1931 by C. P. Gale and the writer. Near a large colony of *C. parviflorum* var. *pubescens* a plant was found that appeared to be intermediate in size and shape between that variety and *C. candidum.* The lip, although white, had the dimensions of a Large Yellow Lady Slipper. The only explanation seemed to be hybridization, but since we were in doubt as to the possibility of such an occurrence, we removed a portion of the plant to our garden for further study. This year the plant bloomed with the same peculiar characteristics above mentioned.

The original plant was growing in the transitional zone between a meadow and a gravel knoll. The meadow is underlain with marl, and has an alkaline reaction (pH 7.5) while the side of the hill is distinctly acid (pH 6). Growing on the slope amongst *Corylus americana, Polemonium reptans,* and *Pteris aquilina* were about fifty plants of *C. parviflorum* var. *pubescens.* Not more than fifteen rods away, *C. parviflorum* and *C. candidum* were growing in abundance. In the latter group, three or four plants of *C. Andrewsii* were found. Associated with them were *Castilleja coccinea, Hypoxis hirsuta, Polygala Senega,* and *Phlox pilosa.*

Mr. A. M. Fuller's recent article[1] on the cross between *C. candidum* and *C. parviflorum* (*C. Andrewsii*) has settled the question as to the possibility of a native cypripedium hybrid. All conditions necessary for hybridization—proximity, structural resemblances, and coincidence of flowering time—were favorable in the present case. There was always the chance that the large size of the flower might be merely the result of a happy combination of chromosomes. However, a study of the measurements of typical plants of all species concerned has convinced us that the cross is with var. *pubescens* and not with *C. parviflorum.* A glance at the table will show that the hybrid is greater in every dimension than *C. parviflorum.* The clinching argument came with the discovery of another specimen from a station lacking in *C. parviflorum.* It was found by Mr. S. W. Faville, of Lake Mills, on a low rise in a prairie near the Crawfish River, Jefferson County, Wisconsin. *C. candidum* and *C. parviflorum* var. *pubescens* grew by the hundreds there, but *C. parviflorum* was totally absent. This plant, which has been growing in Mr. Faville's garden for two years, was mentioned in Mr. Fuller's article as being *C. Andrewsii,* but more detailed observation this year has shown it to be similar to the hybrid from Eagle Lake. At the time of the visit to the station last year, only a few *C. parviflorum* var. *pubescens* were in bloom and they were taken by Mr. S. C. Wadmond, of Delavan, to be *C. parviflorum.* However, both he and Mr. Fuller recognized the plants in our garden this year to be the same as those at Lake Mills. On June 6, 1932, another plant was located at a station near Swan Lake, Columbia County, Wisconsin. Again conditions were perfect, with *C. candidum* and *C. parviflorum* var. *pubescens* growing within short distances. We returned to the original station at Eagle Lake on June 3, 1932, when we found a plant with one flower. This flower was taken for the type specimen.

[1] Fuller, A. M., "A Natural Cypripedium Hybrid from Wisconsin," RHODORA, Vol. 34, June, 1932, p. 97.

One of the outstanding characteristics of the hybrid is the change in color of the lip from a bright yellow in the bud to a pure white in the mature flower. The lip still retains the color of the bud at anthesis. On the second day, the yellow begins to give place to a deep cream. This change continues until only a slight tinge of cream is present at the end of the lip.

The measurements in the following descriptions and table are from large numbers of both fresh flowers and herbarium specimens. Measurements of sepals, petals, and staminodes were a trifle greater from living flowers, but the lip lengths were greater on pressed specimens. Length of petal is the most variable of all characters, whereas length of lip remains so nearly constant as to be a rather positive identification mark for each species.

C. parviflorum in this region has the following characteristics: plants 1–2 flowered; sepals and petals madder-purple; lip yellow, 21–26 mm. long, striped inside with madder-purple; staminodium triangular, orange-yellow, 5 mm. wide, 8 mm. long; stigma elliptical, 3.5 mm. wide, 4.5 mm. long; seeds .85–.95 mm. long, with .91 mm. as the average.

C. parviflorum is found typically in tamarack bogs, but often reaches greatest numbers in the sunny meadows where tamaracks have once stood.

C. parviflorum var. *pubescens* in Wisconsin is very distinct from the type *C. parviflorum.* It possesses these characteristics: plants 2–7 dm. high, 1–2 flowered; sepals and petals yellow-green, sepals ovate, 38–60 mm. long, 13–25 mm. wide; petals linear, 55–72 mm. long; lip golden-yellow, 34–50 mm. long, 20–27 mm. wide, striped inside with maroon; staminodium triangular, bright yellow, 11–14 mm. long, 6–10 mm. wide; stigma ovate, 6 mm. wide, 8 mm. long; seeds 1.1–1.43 mm. long, average 1.27 mm.

C. parviflorum var. *pubescens* is typically an upland woods plant, loving an acid soil (pH 6–6.5). It is often found in hazelnut thickets bordering on meadows. Being a hardy plant, it sometimes outlives these protecting thickets. Most cases of *C. parviflorum* var. *pubescens* growing in open meadows may be thus accounted for. The extremely large specimens of *C. parviflorum* that are occasionally found are, in all probability, crosses between the type and the variety. As the table shows, the differences between *C. parviflorum* and *pubescens* are so great as to be almost specific. Color differences are also very noticeable, the petals and sepals of *C. parviflorum* being always suffused with madder-purple, while the same parts in var. *pubescens* are yellow-green with brown spots and stripes.

In Wisconsin, *C. candidum* has these characteristics: plants one-flowered; sepals and petals greenish-yellow, striped with lines of brown or madder-purple; lip white, 18–25 mm. long, striped inside with magenta lines; staminodium yellow, oblong-linear, 4 mm. wide, 8 mm. long, spotted with maroon; stigma roundish, 3.5 mm. wide, 4 mm. long; seeds .6–.9 mm. long.

C. candidum grows in meadows or moist prairies where the soil reaction is neutral to alkaline (pH 7–8).

Mr. Fuller's description of *C. Andrewsii* gives the following characteristics: "Plants 16–40 cm. tall, 1–2 flowered; leaves oval-lanceolate, acute; sepals and petals greenish, much suffused with madder-purple; sepals ovate-lanceolate, 25–37 mm. long; petals lanceolate, 30–40 mm. long; lip 20–25 mm. long, white to cream-colored, conspicuously striped on the interior with violet; staminodium orange-yellow, triangular to semi-triangular, 4 mm. wide and 9 mm. long, marked in the apical region with spots and blotches of purple-brown; stigma roundish."

The new hybrid is called *C. Favillianum* since Mr. S. W. Faville, a long time lover of orchids, was the first to find it and also one of the first to realize that it was a hybrid.

× **Cypripedium Favillianum**, hyb. nov. (*C. candidum* × *C. parviflorum* var. *pubescens*). Planta 28–40 cm. alta, 1-flora; foliis ovato-lanceolatis, acutis; sepalis petalisque subviridibus, fusco-striatis; sepalis ovatis, 26–40 mm. longis; petalis lanceolatis, 37–48 mm. longis; labello 27–34 mm. longo, 16–20 mm. lato, albo postquam maturitatem, intus violaceo-striato; staminodio flavo, triangulare vel oblongo-lineare, 5–7 mm. lato, 9–11 mm. longo, apice fuscopurpureo-maculato; stigmate elliptico, 4.5–6 mm. lato, 5–7 mm. longo; seminibus .95–1.2 mm. longis, peraeque 1.08 mm.

× *Cypripedium Favillianum*, hyb. nov. (*C. candidum* × *C. parviflorum* var. *pubescens*). Plants 28–40 cm. tall, 1-flowered; leaves ovate-lanceolate, acute; sepals and petals yellowish-green, striped with brown; sepals ovate, acute, 26–40 mm. long, 11–20 mm. wide; petals lanceolate, 37–48 mm. long; lip 27–34 mm. long, 16–20 mm. wide, white when mature, striped inside and spotted around orifice with magenta-violet; staminodium yellow, triangular to oblong-linear, 5–7 mm. wide, 9–11 mm. long, spotted at apex with maroon, stalk 4–5 mm. long; stigma elliptical, 4.5–6 mm. wide, 5–7 mm. long; seeds .95–1.2 mm. long, average 1.08 mm. The TYPE specimen is in the Carroll College herbarium, Cat. No. 1005, June 3, 1932, Eagle Lake, Waukesha County, Wisconsin. A co-type specimen and an autochrome photograph by Mr. G. L. Waite have been deposited in the Gray Herbarium.

CYPRIPEDIUM MEASUREMENTS

	C. parviflorum Average of 23 specimens	var. *pubescens* Average of 42 specimens	*C. candidum* Average of 18 specimens	*C. Favillianum* Average of 14 specimens	*C. Andrewsii* Average of 9 specimens
Sepal					
Length	30.5 mm.	47.5 mm.	27.5 mm.	33 mm.	31.5 mm.
Width	13 mm.	19 mm.	9.5 mm.	15.5 mm.	11.5 mm.
Petal					
Length	38.5 mm.	63.5 mm.	33 mm.	41 mm.	34 mm.
Width	4.5 mm.	6.5 mm.	3.5 mm.	5 mm.	4 mm.
Lip					
Length	23 mm.	42.5 mm.	21.5 mm.	30 mm.	21.5 mm.
Width	13.5 mm.	23.5 mm.	13 mm.	17.5 mm.	12.5 mm.
Depth	14 mm.	27 mm.	12.5 mm.	18 mm.	13 mm.
Staminodium					
Length	8 mm.	12.5 mm.	8 mm.	10 mm.	7.5 mm.
Width	4.5 mm.	8.5 mm.	4 mm.	5.5 mm.	4 mm.
Stigma					
Length	4.5 mm.	7.5 mm.	3.6 mm.	5.5 mm.	4.5 mm.
Width	3.5 mm.	5.5 mm.	3.4 mm.	5 mm.	3 mm.
Seeds					
Length	.91 mm.	1.27 mm.	.8 mm.	1.1 mm.	—

The writer is greatly indebted to Mr. A. M. Fuller of the Milwaukee Public Museum, Dr. R. S. Nanz of Carroll College and Mr. G. L. Waite.

CARROLL COLLEGE,
WAUKESHA, WISCONSIN.

RYDBERG'S FLORA OF THE PRAIRIES AND PLAINS.[1] During his later years Rydberg was working upon a handbook to cover the flora of the Great Plains region of North America and at his lamentable death he left the manuscript so nearly complete that, under the direction of Dr. Marshall A. Howe and with the assistance of other friends, it has now been issued. The book, a volume of more than 900 pages, with 600 text-figures, is neatly and compactly constructed and attractive in appearance. For the first time in one of Rydberg's major publications the International Rules of Nomenclature are followed (with very minor and unintentional infractions) and it is a joy to see maintained such familiar names as *Setaria, Glyceria, Luzula, Maianthemum, Carya, Barbarea, Oxytropis* and scores of other generic names which were long discarded by Rydberg.

The Great Plains and the Prairies or Prairie Plains of central North

[1] FLORA OF THE PRAIRIES AND PLAINS OF CENTRAL NORTH AMERICA. By Per Axel Rydberg. New York Botanical Garden, 1932. \$5.50, *postpaid*.

America form a vast area, in the west semi-arid and there abutting upon the Rocky Mountains, the latter region already covered by one of Rydberg's earlier Floras. The Great Plains have been much emphasized as having a distinctive flora; consequently, to one who has never seen a Great Plain or a Prairie Plain, but whose botanical explorations have been chiefly far to the east, in New England, New York, southeastern Canada and Newfoundland, the first perusal of the book comes as something of a surprise. Looking for the characteristic species of the Great Plains one starts at the beginning: *Ophioglossum vulgatum, Botrychium simplex, Lunaria, lanceolatum, neglectum, obliquum, dissectum, silaifolium, virginianum, Osmunda regalis, cinnamomea, Claytoniana, Onoclea sensibilis, Pteretis nodulosa, Woodsia ilvensis, alpina, glabella, scopulina, oregana*—all in New England or eastern Quebec. Trying again: *Lycopodium Selago, lucidulum, porophilum, inundatum, alpinum, obscurum, sitchense, annotinum, clavatum, complanatum, tristachyum*—again a good eastern list. Similarly with the Pondweeds, 30 of them, all of New England or eastern Quebec; or *Eleocharis*, 21 species, all but 5 familiar with us. In fact, checking through the Monocotyledons, three-fourths of the species prove to belong as much to New England and very humid eastern Quebec as to the semi-arid Plains; it actually requires hunting for the botanist of the Northeast to find in the Flora the distinctive plants of the Great Plains.

This submergence of the Great Plains flora by the flora of mesophytic and other areas is due in large part to the diverse country included, following state boundaries rather than physiographic limits, in part to lack of clarity as to just what area is actually covered by the book, in part to the inclusion of many species which probably do not occur at all within the region defined. In the Preface the area covered is stated with some precision: "the states of Kansas, Nebraska, Iowa, Minnesota, South Dakota, and North Dakota, and . . . southern Manitoba and southeastern Saskatchewan. It includes also most of the species occurring in the prairie regions of Illinois, southern Wisconsin, and northern Missouri, and on the plains of eastern Colorado, eastern Montana, and southern Saskatchewan." This area, as defined, well conforms with the Great Plains and Prairie Plains of the physiographers.

By the inclusion, however, of all of Minnesota, with its boreal flora of the Superior Highlands, and of the Black Hills, which are phytogeographically and physiographically an eastern extension of the Rocky Mountains, very many species are brought in which do not belong either ecologically or floristically on the "Prairies and Plains": such arctic or arctic-alpine types (using Rydberg's names) as *Woodsia glabella, Polystichum Lonchitis, Dryopteris fragrans, Poa alpina, Carex supina, Bistorta vivipara, Empetrum nigrum, Chamaenerion latifolium, Epilobium alpinum, Vaccinium uliginosum, Veronica Wormskjoldii, Euphrasia arctica, Erigeron trifidus*, etc., etc. By occasionally reaching out to the Superior Highlands of northern Michigan (outside the area stated) still other boreal species which are not ecologically a part of the flora of the "Prairies and Plains" are drawn in: for instance, *Polystichum Braunii, Piperia unalaschensis, Goodyera decipiens, Moehringia macrophylla, Vaccinium ovalifolium*, etc. If it be urged that the Superior Highlands are an integral part of the Plains and that it is hypercritical to object to plants localized in northern Michigan being included in the Flora, the question naturally arises, why are not other specialties of northern Michigan included: *Festuca occidentalis, Sagina nodosa, Ceanothus sanguineus*, etc.?

The most extreme reaching out to the northeast to add to the number of species of the "Prairies and Plains" is in the case of *Salix argyrocarpa*. This species is definitely known only from the eastern part of the Labrador Peninsula and the highest mountains of the Gaspé Peninsula and of New Hampshire. Sir John Richardson, in about 1826, collected at Fort Franklin, at the outlet of Great Bear Lake, a staminate willow which was identified in Hooker, Fl. Bor.-Am. as the European *S. fusca* L. Subsequently, William Oakes, having the then unpublished *S. argyrocarpa* from Mt. Washington, misidentified that, also, as *S. fusca*. In 1867, in publishing *S. argyrocarpa* as a new species, Andersson, basing it primarily on the Mt. Washington shrub, included also the *S. fusca* of Hooker from Fort Franklin. Subsequently, the latter record was discredited by Bebb (see Bebb in Macoun, Cat. Can. Pl. ii. 356), and two sheets of the Fort Franklin shrub (belonging to the New York Bot. Gard.) before me show that Richardson's material is quite different from true *S. argyrocarpa*. The scales of the ament in the latter are dorsally densely white-villous, those of the Fort Franklin shrub only sparsely pilose to subglabrous except for the ciliate margin. Even if Rydberg felt that the Fort Franklin plant belongs with that of Mt. Washington, Fort Franklin is roughly 1000 miles north of "the plains of . . . southern Saskatchewan."

Another reason why the true flora of the Great Plains and the Prairie Plains of the United States and adjacent southern Canada is somewhat lost among extra-limital species is the frequent extension, without explanation, of the limit from the stated "southern Manitoba" to extreme northeastern Manitoba, thus adding to the list many (but by no means all) of the arctic plants which reach southern limits (at least east of the Rocky Mts.) on or near the bleak shores of Hudson Bay: *Sparganium hyperboreum, Carex incurva, Juncus castaneus, Salix arbusculoides, Arabis arenicola, Dryas integrifolia, Hippuris tetraphylla, Ledum decumbens, Cassiope tetragona, Primula stricta, P. egaliksensis, Amarella propinqua, Pleurogyne rotata, Pedicularis lapponica, P. euphrasioides, P. sudetica, Arnica alpina*, etc., etc.

Again, by failing in many cases to stop at the western border of "the plains of eastern Colorado, eastern Montana, and southern Saskatchewan," the book takes in a large number of alpine and subalpine species which, apparently, do not belong in the "Flora of the Prairies and Plains:" such species as *Lycopodium alpinum*, "Alaska—B. C."; *Draba nivalis*, "Greenl. —Lab.—Utah—Alaska . . . *Arct.—Subalp.—Alp.*"; *D. fladnizensis*, "Greenl.—Que.—Colo.—Utah—B. C. . . . *Arct.—Subalp.—Alp.*"; *Saxifraga cernua*, "Greenl.—Lab.—N. M.—Utah—Alaska; . . . *Arct.—Alp.—Subalp.*"; *Leptasea Hirculus*, "Greenl.—Colo.—B. C.—Alaska; . . . *Arct.—Alp.—Subalp.*"; *Sibbaldia procumbens*, "Greenl.—N. H.—Man.—Colo.—Calif.—Alaska; . . . *Arct.—Alp.—Subalp.*"; *Dryas octopetala*, "Greenl.—Colo.—Wash.—Alask.; . . . *Arct.—Alp.—Subalp.*"; and *Oxytropis foliolosa*, "High mountains: Alta.—Colo.—Yukon, *Subalp.*" Here, just as in the cases of the floras of Hudson Bay and of the Superior Highlands of northern Michigan, if it be urged that the alpine flora of the Rocky Mountains was meant to be included, one simply notes that a large proportion of the alpine species are omitted (*Kobresia Bellardi, Carex Engelmanni, Lloydia serotina, Salix nivalis, Oxyria digyna, etc.*).

Still another series of species which appear as part of the flora of the "Prairies and Plains" is that extensive group occurring west of Rydberg's limits, in the Rocky Mountains or thence to the Pacific, and again east of his limits in eastern Canada or the Northeastern States, species with well-known disrupted ranges. Until they are found in the area of the "Prairies and Plains" defined it seems unfortunate to include them, unless by so doing some one is induced to discover stations for them in the region. Of such are *Polystichum scopulinum* and *Cryptogramma densa*. The former, one of the rare ferns of North America, occurs on rocky slopes in the mountains from southern California to southern British Columbia, with an outlying station on the Teton Mts. of Idaho, one on the Mission Mts. of Montana, one near Great Salt Lake, and, more than 2000 miles to the east, a single isolated area in the Shickshock Mts. of the Gaspé Peninsula. The latter species (*Cryptogramma densa*) is peculiarly characteristic of the Sierra Nevada of California and the Cascades and ranges northward into British Columbia. Across Washington and Idaho it extends eastward to the Rocky Mts., where it has rare stations. About 1400 miles to the east of its Rocky Mt. stations it occurs on Bruce Peninsula, extending into Lake Huron; 500 miles farther east it is in Megantic Co., Quebec; and 350 miles farther to the northeast, it is on the Shickshock Mts. of Gaspé. In these (as in many other) cases the ranges given as the bases for considering the plants as growing in the Great Plains or the Prairies are "Que.—B. C.—n. Utah—Cal." and "Que.—N. M.—Calif.—B. C." One is reminded of the novice's first experience in the London tube: seeing the sign, "The next train passes Russell Square," he boards the train and on reaching Russell Square suddenly realizes that the train does *pass*, and he rides on to King's Cross. So in the above and similar ranges, "Que.—N. M.," if translated to fit the verified facts, must be given the unintended significance: the plant *passes* the intermediate region between Quebec and New Mexico.

By the inclusion of hundreds of species which, apparently, do not occur in the area as defined, the truly characteristic flora of the Great Plains and the Prairie Plains, as already sufficiently pointed out, becomes wholly masked by extra-limital species. The Prairie and Great Plain plants are included among the others, however; and those who have become familiar with Rydberg's attitude toward generic and specific segregations will find the treatments true to form. The groups which many others consider as subgenera or sections are largely maintained as genera: *Pinus Strobus* appears as *Strobus Weymouthiana*, *P. flexilis* as *Apinus flexilis;* the members of the aggregate-genus *Habenaria* appear as mostly monotypic genera, with *H. clavellata* now becoming the new Rydbergian genus *Denslovia;* all the segregates of *Arenaria*, of *Oenothera* and of *Vaccinium* are marshalled with the dignity of full-fledged genera. But, singularly enough, the intense consistency and the dislike of aggregate-genera, of which Rydberg often made a fetish, did not lead him to dissever *Carex*, while he left as congeners the Red Oaks and the White Oaks (with at least eight fundamental morphological differences); the subgenera of *Alnus*, which have several real differences; and the strikingly different sections of *Betula*, § *Costatae* Asiatic and temperate eastern North American, § *Excelsae* circumpolar and essentially boreal. *Carya*, with its two well marked subgenera, *Apocarya* and *Eucarya*, is also left intact. Furthermore, *Vulpia*, which Rouy, Hegi, Holmberg and many other European taxonomists maintain as a genus, and *Zerna*, which Panzer, Lindman and some others in Europe have defended, are, with almost ultra-conservatism, left in *Festuca* and in *Bromus* respectively.

In many groups, notably the *Pteridophyta*, *Gramineae* (as *Poaceae*), *Cyperaceae*, *Salix*, *Viola*, etc., the treatment of species is comparatively conservative and largely in accord with the conclusions of those who have more thoroughly studied the groups. In many others Rydberg's once very insistent attitude reappears, of treating as species minor variations which show little if any morphological differentiation. Thus, following some others, he maintains as species, with differences in texture of leaves and length of petioles, *Boehmeria Drummondiana* and *B. cylindrica*. Many others, who have looked into them, have found every conceivable transition in texture and harshness of leaves and length of petiole. Again, *Stellaria laeta* and *S. stricta* (at any rate as *Stellaria*, not as *Alsine*) are kept apart from *S. longipes* as if they are species on a par with *S. media*, *crassifolia* and *borealis*. However, many botanists who have had years of field-experience with the group long ago gave up trying to recognize them, even as varieties. In the key *S. laeta* is separated by "Stem 3–15 cm. high, usually 1–3-flowered, rarely 4–6-flowered," the others (*S. stricta* and *longipes*) coming under "Stem 2–3 dm. high, many-flowered" but in a further subdivision of the key defined as "few-flowered"; while in the descriptions *S. longipes* is said to have the stem "1–3 dm. high; . . . calyx 4–5 mm. long; . . . petals slightly exceeding the sepals," the stem of *S. laeta* being up to "20 cm. long" and its "petals about 5 mm. long." Let those who gain satisfaction thereby try to distinguish the "species."

The book, then, like much of the earlier work of its author, is highly variable, in some features conservative, clear and accurate, in others radical, vague and inaccurate. Unfortunately, the user has no way to differentiate. Keen sympathy has been felt by all for a coworker whose later years were handicapped by weakness and ill-health. In part, these regrettable conditions may explain the striking irregularity of the work. If the book stimulates botanical activity in the area it ostensibly covers we shall all be grateful. If the activity is keen enough a few of the hundreds of extra-limital species which now appear may sometime justify their inclusion in the pages.—M. L. F.

BETTER HERBARIUM SPECIMENS

J. Franklin Collins

During 1931 and 1932 the writer has been using sheets of sponge rubber as cushions in his plant press. He began using them on the theory that they might improve the quality of the herbarium specimens, particularly when portions of a specimen were thick or bulky and other portions thin and delicate. Actual results have far surpassed theoretical expectations, and this article is written with the idea that other collectors might like to learn of some of the possibilities and limitations of such sponge rubber cushions. It has been possible with these cushions in the press to get unusually smooth and well-pressed leaves of oak closely adjoining half-grown acorns on the same branch, or well-pressed flowers of Redbud close to the thick branch from which they often grow; and, moreover, practically all parts of specimens are smooth and free from wrinkles. The rubber cushions also improve the quality of specimens that are not particularly bulky.

Several years ago the writer attempted to get some sheet sponge rubber for experimental purposes along the lines mentioned, but the only available material located at that time was the regulation sponge rubber sold in rubber-goods stores. It was learned that one sheet three-quarters of an inch thick, and large enough to cover a standard sized drier, would cost approximately $7.00. This price discouraged any experimentation at that time. Within the last two years, however, there has appeared on the market, in at least two well known "Five and Ten Cent" stores, a sponge rubber "Kneeling Pad" or "Comfort Seat" which measures 15 x 9 x ¾ inches, with straight sides and rounded corners, which costs 20 cents. By trimming off an inch and a half from each end of this "Kneeling Pad"[1] the rounded corners are removed and a sheet rubber cushion is obtained that is exactly half the size of a standard drier (viz., 12 x 9 inches). Two of these placed side by side will just cover a standard sized drier (12 x 18 inches). This makes a full-sized cushion, in two pieces, cost 40 cents. The joint between the two halves is tightly closed when pressure is applied to the press, due to the spreading of the rubber under pressure. This type of rubber cushion is what the writer is using at the present time (August, 1932).

These pads have been used in various ways. The method now most generally used by the writer is to put one of the cushions on the top and another on the bottom of the press, between the driers and the frame or lattice-work in the built-up press, and others as needed *between driers* adjoining particularly bulky or irregularly thickened specimens elsewhere in the press. With these cushions it is possible, and advisable, to use a much greater pressure than with the ordinary press. There is little danger of crushing overlapping or crossed thick stems, fruits, flower-clusters, etc.; the cushions also tend to equalize the pressure throughout an unevenly built-up press. Of course, these pads prevent evaporation from the sides of the press, and make it more bulky; moreover, driers adjoining bulky specimens commonly show temporary deep impressions of the thicker portions.

[1] This can be done with an ordinary large pair of shears, following pencil lines made on the rubber at the proper places.

Ordinary corrugated ventilators have been tried in the press, but the writer has been able to get his best specimens by using the ventilators only after two or three days, when the thin parts of the specimens are dry and less pressure is needed. Ventilators are constantly used, however, to dry moist driers by building up a press (without specimens or specimen sheets) of damp driers alternating with ventilators, and the whole press loosely tied with cords or straps and placed edgewise over artificial heat until dry and warm, in which condition they are used to replace moist driers in the press containing specimens. This change to warm driers is usually made once or twice a day, as seems necessary, for the first two or three days.

U. S. Bureau of Plant Industry

Vol. 34, no. 407, including pages 213 to 232 and plates 222 and 223, was issued 12 November, 1932.

ERRATA

Page 70, line 5, *for* Lawrence, *read* St. Lawrence
" 117, " 36, *for* wo, read wo
" 156, " 32, for *clavulifera* f. *pleurocarpa*, read CLAVULIFERA f. PLEUROCARPA
" 178, " 8, *for* character, *read* characters
" 196, " 7, *for* nudos etiforme, *read* nudo setiforme
" 199, " 22, *for* 220, *read* 221
" 200, " 32, *for* 220, *read* 221
" 202, " 4, *for* 220, *read* 221
" 202, " 42, *for* 220, *read* 221

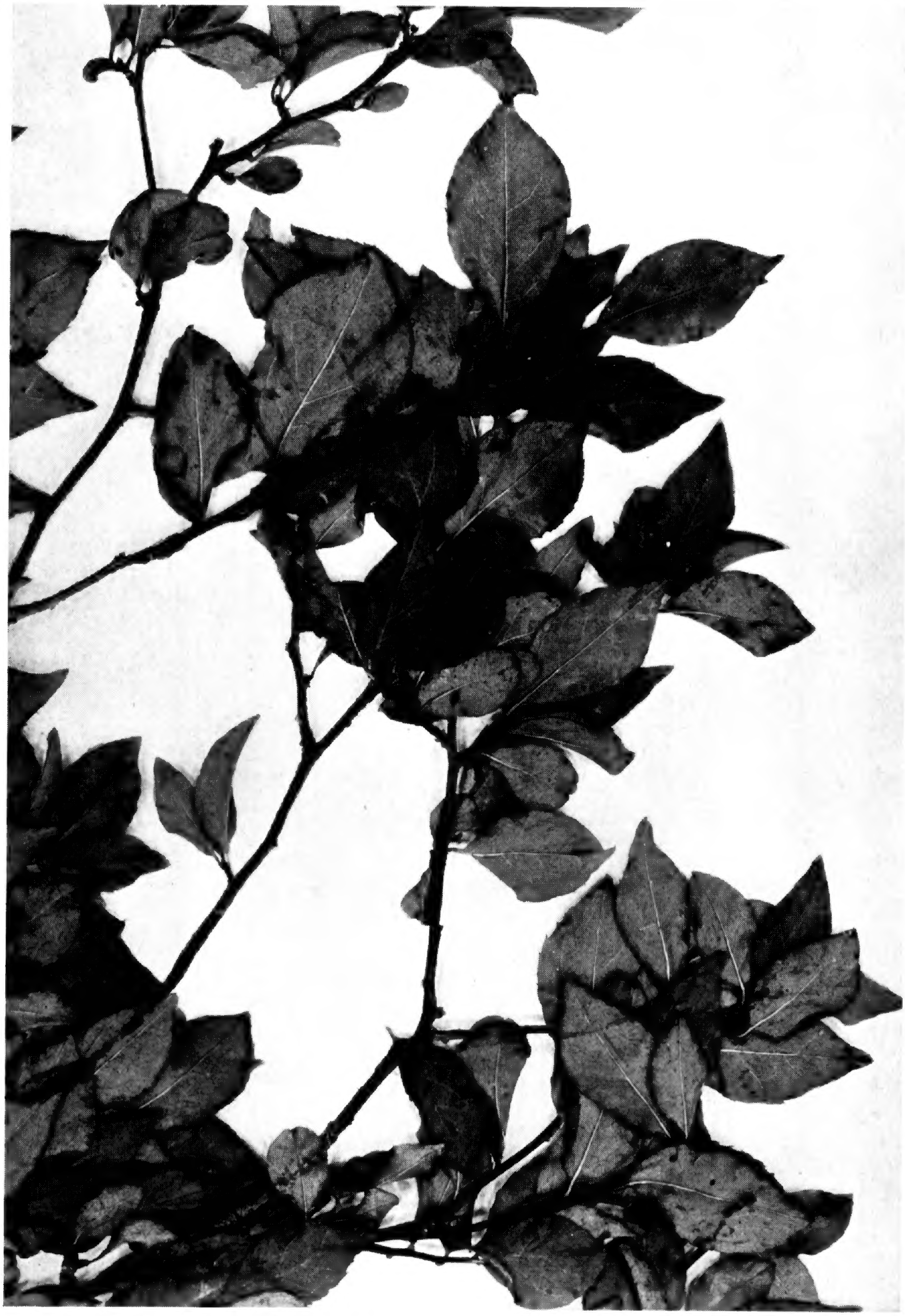
INDEX TO VOLUME 34.

New scientific names are printed in full-face type.

ILEX ARENICOLA Ashe, var. TRANSIENS McFarlin.

Ilex pygmaea McFarlin.

Ilex pygmaea, var. subedentata McFarlin.



ILEX CAROLINIANA (Walt.) Trelease, var. JEJUNA McFarlin.