Rhodora

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RHODORA.— A monthly journal of botany, devoted primarily to the flora of New England. Price, *$1.50* per year (domestic and foreign); single copies 15 cents. Prices of Volumes 1 and 2 (1899 and 1900) on application. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY.

New Series.— No. LVII.

M. L. Fernald.

I. THE UNITY OF THE GENUS ARENARIA.

It seems wisest to maintain the genus *Arenaria* in its broad sense, although the great majority of European authors and some in America distinguish from *Arenaria* proper (with the valves of the capsule notched or cleft at apex, and seeds numerous and reniform) the following genera which occur in boreal America: *Alsine* Wahlenb. or *Minuartia* L. similar to *Arenaria* but with uncleft valves; *Ammodenia* Gmel. or *Honkenya* Ehrh., with unusually developed disk, globose capsule, and few obovoid seeds; *Moehringia* L., with well developed disk and with the seeds strophiolate; and *Merckia* Fisch., with 3–5 celled ovary and inflated capsule.

Although in a limited area, like Europe or like northeastern America, the lines usually indicated for the separation of these genera are fairly definite, an examination of species from a broad range of territory at once shows that no two of the traditional characters are concomitant throughout a long series of species.

In order to test the value of these genera it is well to tabulate the characters depended upon by those who maintain the segregated genera as distinct from *Arenaria;* and even in this it is difficult to find authors in entire agreement. Thus, some authors state that the seeds of the monotypic *Ammodenia* or *Honkenya* are "numerous," others "few," while Pax, in Engler's *Naturlichen Pflanzenfamilien,* retains under *Alsine* with "Discusschuppen meist kurz" *Ammodenia*

	Habit and foliage	Inflorescence	Disk	Ovary and capsule	Seeds
Arenaria L.	Annual or perennial: mainly tufted: leaves not fleshy	Terminal, rarely axillary.	Perigynous or subhypogynous.	Ovary 1-celled, many-ovuled; capsule dehiscent at tip into 3 cleft or notched valves.	Numerous, reniform or compressed, with the hilum marginal, estrophiolate.
Minuartia L. = Alsine Wahlenb., not L.	As above.	As above.	Obscurely perigynous, more or less glandular-lobed.	As above, but valves of capsule entire.	As above.
Ammodenia Gmel. = Honkenya Ehrh.	Succulent perennial with fleshy leaves.	Flowers axillary or in leafy cymes.	Well developed, with 10 glandular lobes.	Ovary more or less completely 3- or 5-celled (1-celled according to Pax); capsule fleshy or bladdery, with 3 or 5 entire valves.	Few, pyriform or obovoid, with the hilum obliquely basal, estrophiolate.
Moehringia L.	Flaccid herbs with spreading usually flat leaves.	Terminal, often becoming lateral by prolongation of axillary branches, or axillary.	Well developed, nearly hypogynous.	Ovary 1-celled (but in *M. lateriflora* distinctly 2, 3, or 4-celled); valves of capsule twice as many as the style.	Seeds reniform, lustrous, strophiolate.
Merckia Fischer	Similar to *Ammodenia* but less fleshy.	As *Ammodenia*.	Obscure or very narrow.	Ovary 3–5-celled; capsule bladdery, membranaceous.	Seeds lustrous, estrophiolate.

which is separated by others because it has "a conspicuous 10-lobed and glandular slightly perigynous disk." Again Pax defines *Alsine* (including *Ammodenia*) as having a 1-celled ovary, while *Merckia* is distinguished by its 3–5-celled ovary; yet Gray, in his *Genera*, described (correctly) the ovary of *Ammodenia* as 3–5-celled. The tabulation on the opposite page, however, presents the significant characters most relied upon in the separation of these five genera.

When these so-called differential characters are checked by examining species from remote areas of the world we get the following results.

Most species of *Arenaria* (in the strict sense) and of *Minuartia* have a tufted habit, with terminal inflorescences and numerous reniform seeds. But the common *A. lanuginosa* (Michx.) Rohrb. of South America, Mexico and the southern United States has elongated stems with broad leaves and axillary pedicels, thus in habit strongly simulating the European *Moehringia trinervia* (L.) Clairv. The latter plant, on account of its habit and its lustrous strophiolate seeds, is unquestionably a species of *Moehringia*. Yet the seeds of *Arenaria lanuginosa*, a plant which in habit belongs to *Moehringia*, are quite like those of *M. trinervia* in form and lustre, but they lack the strophiole; i. e. only by its lack of a strophiole does *Arenaria lanuginosa* find a place in *Arenaria*, not in the habitally similar *Moehringia*.

Between *Arenaria* proper and *Minuartia* the only distinction is in the valves of the capsule, cleft in *Arenaria*, entire in *Minuartia*, the species of these so-called genera otherwise so closely simulating one another as to be often nearly inseparable. Thus, *Arenaria paludicola* Robinson, which has the entire valves of *Minuartia*, is habitally close to *A. lanuginosa*, a true *Arenaria*, and to species of *Moehringia*. Furthermore, it is by no means easy to determine whether some of our American species belong with *Arenaria* or with *Minuartia*, some species having the valves so slightly cleft that in their capsules they lie between the most characteristic species of the two groups. Thus *A. sajanensis* and the species related to it (and discussed below, pp. 12–17) have emarginate valves as does *A. laricifolia* of Europe, beautifully illustrated by Reichenbach (Ic. Fl. Germ. v. t. 292, fig. 4933) with notched valves, although these plants are universally placed in the so-called genus which is distinguished by having entire valves!

From all the segregate-genera *Ammodenia* is supposed to be separated by the highly developed glandular-lobed disk, by its bladdery capsule and by the few pyriform seeds with nearly basal hilum, and, of course, by its succulent stems. Yet Pax correctly states that *Merckia* has the habit of this plant, Pax separating *Merckia* because it has the ovary and fruit "mehr oder weniger vollkommen 3–5 fächerig" and because of its obsolete disk. *Ammodenia* is left by Pax in *Alsine* or *Minuartia*, a genus distinguished by 1-celled ovary and the entire valves of the capsule, and he states under *Merckia* that that monotypic genus perhaps belongs also with *Alsine*. Nevertheless, *Ammodenia*, as already pointed out by Asa Gray, has the ovary "more or less completely three–five-celled, the dissepiments soon breaking away from the walls and adhering to the more persistent columella;"[1] i. e., the supposed ovary-difference between *Ammodenia* and *Merckia* is not constant. Furthermore, the seed of *Merckia* is exactly intermediate in outline between the seed of *Ammodenia* and the most typical seeds of *Arenaria* and *Minuartia*, i. e., it is suborbicular to obovate-orbicular, with the hilum nearly basal. The development or obsolescence of the stamineal disk is certainly not constant in the group, for, although *Merckia physodes* as a species is readily distinguished from *Ammodenia peploides* by its obscure disk, it should be noted that some species referred to true *Arenaria* and to *Minuartia* (*Alsine*) have highly developed disks, while the disk of *Moehringia* is well developed. The American *Arenaria macradenia* Wats., for example, is the best kind of *Arenaria* in its cespitose habit, acicular leaves, terminal inflorescence, capsule and seeds, but its stamineal disk and glands are quite as conspicuous as in *Ammodenia*. *Ammodenia* is supposed to be distinguished from *Arenaria*, furthermore, by its few obovoid seeds in contrast with the many reniform seeds of the latter genus; yet *Arenaria Hookeri* Nutt., a characteristic cespitose species with acicular leaves and terminal cymes, has but 3 seeds to a capsule, these obovoid and with a basal hilum as in *Ammodenia*.

Moehringia is distinguished by its habit, well-developed disk, 1-celled ovary, capsule-valves as in *Arenaria*, and reniform, lustrous, strophiolate seeds. But as already pointed out *Moehringia* is exactly simulated by species of *Arenaria* which differ merely in having the

[1] Gray, Gen. ii. 31 (1849).

seeds estrophiolate, and it does not require great experience with the seeds of *Moehringia* to assure any investigator that the strophiole is readily deciduous and therefore likely not to be found at all on the ripe seeds. The American *Moehringia lateriflora* (L.) Fenzl is a member of this genus in habit, disk, and seeds, but unfortunately for the constancy of the genus, as long ago pointed out by Asa Gray, the ovary is "plainly divided in M. lateriflora into as many cells as there are styles by manifest dissepiments: STYLES 3....sometimes 2 or 4."[1] In other words, although a *Moehringia* in everything else, *M. lateriflora* is a *Merckia* in its 3-celled ovary!

It would be easy to point out in our North American flora many other species which in one character or another break down the differences which have been relied upon to separate as genera *Arenaria, Minuartia, Ammodenia, Moehringia* and *Merckia,* but the above notes should suffice to demonstrate that these are not true genera but are, rather, freely confluent subgenera of the single genus *Arenaria.*

In organizing the material of *Arenaria* in the Gray Herbarium it has been found necessary to make the following nomenclatorial changes.

ARENARIA **arenarioides** (Crantz), n. comb. *Stellaria Arenaria* L. Sp. Pl. 1196 (1753). *Cerastium arenarioides* Crantz, Inst. ii. 402 (1766). *Ar. cerastioides* Poir. Voy. Barb. ii. 166 (1789). *Ar. spathulata* Desf. Fl. Atlant. i. 358 (1798).

ARENARIA **bryophylla,** n. nom. *Ar. musciformis* Edgew. & Hook. f. in Hook. f. Fl. Brit. Ind. i. 237 (1872), not Triana & Planch. Ann. Sci. Nat. ser. 4, xvii. 150 (1862).

Edgeworth & Hooker ascribe their *A. musciformis* to Wallich, Cat. no. 6401 as does also *Index Kewensis;* but Wallich's no. 6401 is a *Buddleia* and at best the names in Wallich's Catalogue are *nomina nuda.*

ARENARIA **Funkii** (Jord.), n. comb. *Alsine Funkii* Jord. Pugill. 36 (1852).

ARENARIA **cymifera** (Rouy & Fouc.), n. comb. *Alsine cymifera* Rouy & Fouc. Fl. Fr. iii. 275 (1896).

ARENARIA **iberica,** n. nom. *Minuartia dichotoma* L. Sp. Pl. 89 (1753), not *Ar. dichotoma* Krock, Fl. Sil. ii. pt. 1, 55 (1793).

ARENARIA **caucasica** (Boiss.), n. comb. *Alsine caucasica* Boiss. Diagn. ser. 2, fasc. 1, 87 (1853), not *Ar. caucasica* Adams ex Ledeb.

[1] Gray, Gen. ii. 35 (1849).

Fl. Ross. i. 354 (1842), the latter merely a name published in synonymy. *Minuartia montana* L. Sp. Pl. 90 (1753), not *Ar. montana* L. Amoen. Acad. iv. 272 (1759). *M. campestris* DC. Prodr. iii. 380 (1828), not L. Sp. Pl. 89 (1753) nor *Ar. campestris* All. Fl. Ped. ii. 114 (1785).

ARENARIA **anatolica** (Boiss), n. comb. *Alsine anatolica* Boiss. Diagn. ser. 1, fasc. 8, 97 (1849).

ARENARIA **Thevenaei** (Reut.), n. comb. *Alsine Thevenaei* Reut. Exs. 1855 (name only); Loret, Bull. Soc. Bot. Fr. x. 381 (1863). *Al. verna,* var. *Thevenaei* Loret, l. c. (1863).

ARENARIA **attica** (Boiss. & Sprun.), n. comb. *Alsine attica* Boiss. & Sprun. Diagn. ser. 1, fasc. 5, 84 (1844).

ARENARIA **sphagnoides** (Froel.), n. comb. *Sabulina sphagnoides* Froel. in Reichenb. Fl. Germ. Exc. 790 (1832).

ARENARIA **aizoides** (Boiss.), n. comb. *Alsine aizoides* Boiss. Diagn. ser. 1, fasc. 1, 47 (1842).

ARENARIA **decipiens** (Fenzl), n. comb. *Alsine decipiens* Fenzl, Pugill. Pl. Nov. Syr. 12 (1842).

ARENARIA **dianthifolia** (Boiss.), n. comb. *Alsine dianthifolia* Boiss. Diagn. ser. 1, fasc. 8, 99 (1849).

ARENARIA **intermedia** (Boiss.), n. comb. *Alsine intermedia* Boiss. Fl. Orient. i. 685 (1867).

ARENARIA **leucocephala** (Boiss.), n. comb. *Alsine leucocephala* Boiss. Diagn. ser. 1, fasc. 1, 45 (1842).

ARENARIA **pulvinaris** (Boiss.), n. comb. *Alsine pulvinaris* Boiss. Diagn. ser. 1, fasc. 1, 46 (1842), fasc. 5, 84 (1844).

ARENARIA **makmelensis,** n. nom. *Alsine libanotica* Boiss. Diagn. ser. 1, fasc. 8, 98 (1849), not *Ar. libanotica* Kotschy in Boiss. Fl. Orient. i. 699 (1867). Known only from the alpine region of Makmel, Lebanon, at 2590 m.

ARENARIA **rimarum** (Boiss. & Balansa), n. comb. *Alsine rimarum* Boiss. & Balansa in Boiss. Fl. Orient. i. 678 (1867).

ARENARIA **Schimperii** (Hochst.), n. comb. *Alsine Schimperii* Hochst. in A. Rich. Tent. Fl. Abyss. i. 47 (1847).

ARENARIA **stellata** (Clarke), n. comb. *Cherleria stellata* Clarke, Trav. iv. 211 (1816). *Alsine parnassica* Boiss. & Sprun. Diagn. ser. 1, fasc. 1, 46 (1842).

ARENARIA **diversifolia** (Dolliner), n. comb. *Moehringia diversifolia* Dolliner ex Koch, Flora, xxii. 2 (1839).

ARENARIA **Grisebachii** (Janka), n. comb. *Moehringia Grisebachii* Janka, Oesterr. Bot. Zeitschr. xxiii. 194 (1873).

ARENARIA **Jankae** (Griseb.), n. comb. *Moehringia Jankae* Griseb. ex Janka, Oesterr. Bot. Zeitschr. xxiii. 195 (1873).

ARENARIA **dasyphylla** (Bruno), n. comb. *Moehringia dasyphylla* Bruno in Balbis, Misc. Bot. in Mém. Acad. Turin Sc. Phys. i. 391 (1804).

ARENARIA DASYPHYLLA, var. **sedoides** (Cumino), n. comb. *Moeh-*

ringia muscosa β. sedoides Cumino in Balb. Mém. Acad. Turin Sc. Phys. i. 391 (1804).

ARENARIA **Tommasinii** (Marches.), n. comb. *Moehringia Tommasinii* Marches. Bull. Adr. Soc. Sc. Nat. Trieste, v. 327 (1880).

ARENARIA **glaucovirens** (Bertol.), n. comb. *Moehringia glaucovirens* Bertol. Fl. Ital. vi. 626 (1844).

ARENARIA POLYGONOIDES Wulf., var. **obtusa** (All.), n. comb. *A. obtusa* All. Fl. Pedem. ii. 114, t. 64, fig. 4 (1785). *Moehringia ciliata* (Scop.) Dalla Torre, var. *obtusa* (All.) Gürke, Pl. Eur. ii. 280 (1899).

ARENARIA **papulosa** (Bertol.), n. comb. *Moehringia papulosa* Bertol. Fl. Ital. iv. 363 (1839).

ARENARIA **platysperma** (Maxim.), n. comb. *Moehringia platysperma* Maxim. Bull. Acad. Petrop. xviii. 373 (1873).

ARENARIA **Cossoniana**, n. nom. *Moehringia stellarioides* Coss. Bull. Soc. Bot. Fr. ix. 170 (1862), not *Ar. stellarioides* Willd. in Schlecht. Ges. Naturf. Fr. Berl. Mag. vii. 209 (1813).

II. THE TYPE OF THE GENUS ALSINE.

As published by Linnaeus *Alsine* consisted of two species as follows:

ALSINE.

media. 1. ALSINE petalis bipartitis, foliis ovato-cordatis. *Fl. lapp.* 186. *Fl. suec.* 369. *Hort. cliff.* 173. *Gron. virg.* 161. *Roy. lugdb.* 449.
Alsine media. *Bauh. pin.* 250.
Alsine minor. *Dod. pempt.* 29.
Habitat in Europae *cultis.* ⊙

segetalis. 2. ALSINE petalis integris, foliis subulatis.
Spergula foliis filiformibus unum latus spectantibus, stipulis membranaceis vaginantibus, pedunculis umbellatis. *Guett. stamp.* 299. *Dalib. paris.* 133.
Alsine segetalis, gramineis foliis unum latus spectantibus. *Vaill. paris.* 8. t. 3. f. 3.
Habitat Parisiis. ⊙ [1]

By many scholarly European botanists, Hiern,[2] Britton & Rendle,[3] Schinz & Thellung,[4] Briquet,[5] and others, *A. segetalis* is taken with-

[1] L. Sp. Pl. i. 272 (1753).

[2] Hiern, Journ. Bot. xxxvii. 317, 318 (1899).

[3] Britten & Rendle, List Brit. Seed-Pl. 6 (1907).

[4] Schinz & Thellung, Bull. Herb. Boiss. sér. 2, vii. 402, 404 (1907).

[5] Briq. Fl. Corse, i. 529 (1910).

out question as the type of the Linnean *Alsine*, and since *A. segetalis* belongs to the genus known variously as *Spergularia* Pers. (1805), *Tissa* Adans. (1763) or *Buda* Adans. (1763) it is obvious that *Alsine* is synonymous with them. By the International Rules *Spergularia*, being a *nomen conservandum*, is retained over all competitors, but by those who attended the International Congress at Vienna as regular Commissioners or as delegates but who have felt no obligation to accept the majority rulings of that representative convention[1] and by those who prefer the provincial American Code to an international agreement, the name *Alsine* L. should be used for *Tissa*, *Buda*, or *Spergularia*.

It is not clear upon what ground followers of the American Code apply the name *Alsine* to *Stellaria* L. The American Code is explicit as to the type of a Linnean genus, and by its ruling the type of *Alsine* is unquestionably *A. segetalis*. The portions of the American Code bearing upon this point are in Canon 15:

"The nomenclatorial type of a genus or subgenus is the species originally named or designated by the author of the name. If no species was designated, the type is the first binomial species in order eligible under the following provisions:

. . . .

"(*b*) A figured species is to be selected rather than an unfigured species in the same work. In the absence of a figure, preference is to be given to the first species accompanied by the citation of a specimen in a regularly published series of exsiccatae. In the case of genera adopted from prebinomial authors (with or without change of name), a species figured by the author from whom the genus is adopted should be selected. [Capitalization of the last sentence ours.]

Examples.— *Lespedeza* Michx. Fl. Bor. Am. **2**: 70 (1803), is typified by *L. procumbens* Michx. *loc. cit. pl. 39*, the species first figured."

Now, referring to *Alsine* L., there were but two species: 1st, *A. media*, which is *Stellaria media* Vill. and 2d *A. segetalis*, which is

[1] Even the most painstaking students sometimes fail to view international agreements subjectively. Thus, Dr. Witmer Stone, writing in September, 1911, finds it "quite impossible to accept certain of the features of these codes [the International Rules and the American Code]" — Plants So. N. J. 34 (1911); and, therefore, as a zoölogist making a temporary excursion into the botanical field, adopts in his botanical writing methods which are quite at variance with those sanctioned by either the International Rules or the American Code. Nevertheless, when certain zoölogists proposed alterations of their International Code of Nomenclature, Dr. Stone felt, in May, 1912, as most of us do, that, "if we are to shift back and forth to accommodate the views of now one coterie of investigators, now another, we might as well abolish all codes and lapse into nomenclatural chaos" — Science, n. s. xxxv. 818 (1912).

Spergularia segetalis Don. The references under the 1st species, *Alsine media,* indicate no figure, but the 2d species, *A. segetalis,* goes back to "*Alsine segetalis, gramineis foliis unum latus spectantibus.* Vaill. paris. 8. t. 3. f. 3," which shows a beautifully clear illustration. By the American Code, therefore, the type of *Alsine* is *A. segetalis.*

The definition of *Alsine* in the *Genera Plantarum,* ed. 5, 132 (1754) likewise indicates *A. segetalis* in the character "Cor. *Petala* quinque aequalia, calyce longiora," for in *A. segetalis* the petals are, as described by Rouy & Foucaud, "une fois plus longs que les sépales"[1] while the petals of *A. media* are, as defined by Britton in his key to species, "shorter than the calyx."[2] Incidentally, it is unfortunate for Dr. Britton's argument that *A. media* is the type of *Alsine* that he should have selected for his artist a flower of the latter which so beautifully shows 10 stamens (Ill. Fl. fig. 1752), for both in the *Genera Plantarum* and in the *Species Plantarum* the genus *Alsine* was placed in the *Pentandria Trigynia* and in the definition of the genus Linnaeus distinctly said "*Filamenta* quinque." In *A. media* plants with 5 stamens do sometimes occur, but in *A. segetalis* this number is tolerably constant.

It should be sufficiently clear, then, that Hiern, Britten & Rendle, Schinz & Thellung, and Briquet are correct in making *Alsine segetalis* the type of the genus, and that in not so doing the professed followers of the American Code are violating Canon 15 *b* of that code.

III. THE EARLIER NAMES FOR ALSINOPSIS.

Very recently Small has rechristened *Alsine* Wahlenb., not L., as *Alsinopsis,*[3] transferring to it many eastern American species, *Alsinopsis groenlandica, A. glabra, A. stricta, A. caroliniana,* etc. but designating no type except "Alsine Wahl., not L.," and more recently others, content to follow Small without looking into the validity of his work or into the literature which he has so obviously ignored, have given us the new combinations *Alsinopsis verna* (L.) Cockerell, based on *Arenaria verna* L., *Alsinopsis propinqua* (Richardson) Rydberg, based on *Arenaria propinqua* Richardson, *Alsinopsis sajanensis*

1 Rouy & Foucaud, Fl. de France, iii. 301 (1896).
2 Britton in Britton & Brown, Ill. Fl. ed. 2, ii. 42 (1913).
3 Small, Fl. S. E. U. S. 419, 1330 (1903).

(Willd.) Cockerell, based on *Arenaria sajanensis* Willd., *Alsinopsis arctica* (Stev.) Heller, based on *Arenaria arctica* Stev., etc. etc.

Nevertheless, had they looked into the standard works of reference, without study of which no taxonomist should allow himself to publish, they would have found that the plants which made up the original *Alsine* Wahlenb.[1] and the species which are universally placed with them have already had more than a grocer's dozen of generic names most if not quite all of which are clear from duplication! The sounder European botanists reduce *Alsine* Wahlenb. to the Linnean *Minuartia* (1753), but if *Minuartia* is held to be distinct there are still plenty of names from which to select. *Leptophyllum* Ehrh. Beitr. iv. 147 (1789),[2] was based on *Arenaria tenuifolia* L. which is placed by Pax

[1] Wahlenb. Fl. Lap. 127 (1812).

[2] The International Rules of Botanical Nomenclature wisely state that "The mere indication of species as belonging to a new genus...does not allow us to accept the genus...as characterized and effectively published"; but the so-called "American" Code rules that a genus *is* published by "a reference to a specific description, which is associable by citation with a previously published binomial species," the authors of the American Code regarding the retention by the International Congress of *nomina conservanda* as "in the highest degree arbitrary, as controverting a cardinal principle [priority of publication]" — Am. Code of Bot. Nom. in Bull. Torr. Bot. Cl. xxxiv. 167, 168 (1907). As an illustration of such publication of a genus the American Code states that: "*Dryopteris* Adans. Fam. Pl. **2**: 20 (1763), is published with a reference to a specific description associable by citation with the previously published *Polypodium Filix-mas* L. Sp. Pl. 1090 (1753), inasmuch as both Adanson and Linnaeus cite *Filix mas* of Fuchs." (Canon 10, Examples). However, when one turns to the page in Adanson stated in the American Code which was devised "To reach greater precision" (p. 167), he finds no mention, as is stated in the Code, of *Filix mas*; merely the following:

"*Dryopteris*	Id. [referring to the characterization of *Filix*].	Id. [Enveloppe] enparasol.	Id."

In other words, on page 20 there is no mention of *Filix mas*, and the only word of diagnosis "enparasol" describes the *peltate* indusium of *Polystichum*, not the reniform indusium of *Filix mas*. The American Code would have won more respect for its "precision" if it had stated the fact, that the only reference to *Filix mas* is on p. 551, in the index or "table," where it is placed not under "*Dryopteris*" but under "*Druopteris*."

But surely if *Dryopteris* satisfies the American Code as good publication of a genus, *Leptophyllum* Ehrh. Beitr. iv. 147 (1789) based, as stated, on *Arenaria tenuifolia* L., is admirably published. Some other generic names similarly published on the same or adjacent pages, which by the American Code, but not by the International Rules, should be taken up are

PHAEOCEPHALUM Ehrh. l. c., 146 (1789), based on *Schoenus fuscus* L. = RYNCHOSPORA Vahl (1806).

HYDROPHILA Ehrh. l. c. (1789), based on *Tillaea aquatica* L., which was also the type of TILLAEASTRUM Britton (1903).

TRICHOPHYLLUM Ehrh. l. c. 147 (1789), based on *Scirpus acicularis* L. = ELEOCHARIS R. Br. (1810).

MONANTHIUM Ehrh. l. c. 148 (1789), based on *Pyrola uniflora* L., which was the type of MONESES Salisb. (1821).

HELICTONIA Ehrh. l. c. (1789), based on *Ophrys spiralis* L., which was also the type of IBIDIUM Salisb. (1812).

AETOPTERON Ehrh. l. c. (1789), based on *Polypodium aculeatum* L. = POLYSTICHUM Roth (1799).

Is it possible that these are all of Ehrhart's names the neglect of which, by those whose code calls for priority of publication at all costs, is likely to seem "in the highest degree arbitrary"?

under the subgenus *Eualsine* and should therefore be a fairly typical member of the genus. *Somerauera* Hoppe, Flora, ii. 26 (1819) with the single species *S. quadrifaria* is identified by all modern European botanists as *Arenaria octandra*[1] or *Alsine octandra* (Sieb.) Kern. while *Siebera* of the same author, l. c. 24 (1819) with a single species *S. cherlerioides* is likewise considered inseparable from *Arenaria octandra. Sabulina* Reichenb. Fl. Germ. Excurs. 785 (1832) contained 25 species, the first one, *S. tenuifolia,* based upon the same *Arenaria tenuifolia* L. which was the sole type of Ehrhart's *Leptophyllum.* Some other species were *S. verna,* based upon *Arenaria verna* L., one of the original species in Wahlenberg's genus *Alsine* and the plant now renamed *Alsinopsis verna* (L.) Cockerell, Am. Nat. xl. 864 (1906); *S. laricifolia,* based on the Linnean *Arenaria laricifolia,* one of the species which later formed the basis of the genus *Wierzbickia* Reichenb. Ic. Fl. Germ. v. 30 (1841), and which now appears as *Alsinopsis laricifolia* (L.) Heller, Muhlenbergia viii. 96 (1912); *S. stricta,* based upon *Spergula stricta* Swartz, which was the first species of Wahlenberg's *Alsine,* the type of Small's genus *Alsinopsis,* and *S. biflora,* based upon *Stellaria biflora* L., which was the basis of *Alsine biflora* (L.) Wahlenb. Fl. Lapp. 128 (1812) and therefore one of the types of *Alsinopsis* Small, which afterward appeared as a type of the genus *Alsinanthe* Reichenb. Ic. Fl. Germ. v. 29 (1841) and which is identical with *Arenaria sajanensis* Willd., which has now taken on another alias, *Alsinopsis sajanensis* (Willd.) Cockerell, Am. Nat. xl. 864 (1906). Reichenbach had still more generic names for members of the genus *Alsine* Wahlenb., not L. For instance *Tryphane,* Reichenb. l. c. 28 (1841), which included *T. verna,* based on *Arenaria verna,* which had already been one of the original species of *Alsine* Wahlenb., and which, as above pointed out, has been rechristened *Alsinopsis verna* by Cockerell; or *Facchinia* Reichenb. l. c. 29 (1841), based on *Arenaria lanceolata* All., which is the *Alsine rupestris* (Scop.) Fenzl; or *Neumayera* Reichenb. l. c. 30 (1841) with the two species *N. austriaca* and *N. Villarsii,* which are *Ar. austriaca* Jacq. or *Alsine austriaca* (Jacq.) Wahlenb. Fl. Lapp. 129 (1812) and therefore belonging with *Alsinopsis* Small; and *Ar. Villarsii* Balbis or *Alsine Villarsii* (Balbis) Mert. & Koch.

As if Reichenbach had not already provided enough generic names for *Alsine* Wahlenb. not L., Gay in 1845 published the genus *Greniera*

[1] Arenaria **octandra** (Sieb.), n. comb. *Cherleria octandra* Sieb. Fl. Austr. Exs. n. 149 (1813) *Alsine octandra* (Sieb.) Kern. Sched. Flor. Exs. Austro-Hung. ii. n. 564 (1882).

J. Gay, Ann. Sci. Nat. sér. 3, iv. 27 (1845) with the two American species, *G. Douglasii* and *G. tenella* based on *Alsine Douglasii* Fenzl and *Arenaria tenella* Nutt.; but, disregarding the name *Greniera*, which had never been published for a genus prior to Gay's use of it, Heller enriches the synonymy with the names *Alsinopsis Douglasii* (Fenzl) Heller, Muhlenbergia, viii. 20 (1912) and *Alsinopsis tenella* (Nutt.) Heller, l. c. 96 (1912). There are still other names which might be discussed, *Xeralsine* Fourr., etc.; but it is sufficiently clear that even if we keep *Alsine* Wahl. distinct from *Arenaria*, there are plenty of well published names for it which antedate by many decades *Alsinopsis* Small; and, furthermore, the three species which were formally described by Wahlenberg under his *Alsine*, the basis of *Alsinopsis*, are members of the following so-called genera:

Alsine stricta (Swartz) Wahlenb. belongs to Alsinella Swartz (1814), a name antedated by *Alsinella* Moench (1794); to Sabulina Reichenb. (1832), a name which had not been previously used for a genus; and to Alsinanthe Reichenb. (1841), again a perfectly valid generic name.

Alsine biflora (L.) Wahlenb. belongs likewise to Alsinella Swartz (1814); to Sabulina Reichenbach (1832); and to Alsinanthe Reichenb. (1841).

Alsine rubella Wahlenb. belongs likewise to Alsinella (1814) and to Sabulina (1832); while *A. verna*, to which *A. rubella* is so closely related as often to be considered conspecific, was one of the original species of Tryphane Reichenb. (1841), again a name which had not been previously used.

There is, then, no possible need for the generic name *Alsinopsis* Small.

IV. THE AMERICAN REPRESENTATIVES OF ARENARIA SAJANENSIS.

The plants which were included by Robinson in the *Synoptical Flora* under *Arenaria sajanensis* Willd. prove, when better understood, to be four quite definite species, which may be distinguished by the following characters:

The few short filiform herbaceous or subherbaceous basal shoots bearing obscurely keeled leaves: petals 0.5–1 mm. wide, shorter than to barely exceeding the glabrous or puberulent sepals: anthers 0.2–0.3 mm. long: capsule 4–6 mm. long, with membranaceous pale valves: seeds smooth, reniform-orbicular, not obviously beaked, 0.6–0.8 mm. in diameter. *A. sajanensis.*

The crowded trailing freely forking subligneous branches densely clothed with highly marcescent thick-ribbed leaves: petals 1.5–2.5 mm. broad, conspicuously exceeding the pilose or hirsute sepals: anthers 0.5–1 mm. long: capsule 6–10 mm. long, with firm stramineous valves: seeds reniform-obovate, with the micropyle prolonged into a beak, 0.7–1.2 mm. long.

Leaves round-tipped.

Leaves oblong, ciliolate, pale-green, 1–5 mm. long, about 1 mm. broad, very densely imbricated: calyx glandular: seed rugose or papillose . . . . *A. obtusiloba.*

Leaves linear, glabrous-margined, deep green, 4–8 mm. long, 0.3–0.5 mm. broad, loosely imbricated: calyx not glandular: seed smooth or obscurely pebbled . . . . *A. marcescens.*

Leaves sharp at apex . . . . *?A. laricifolia.*

A. SAJANENSIS Willd. in Schlecht. Berl. Gesell. Nat. Fr. Mag. vii. 200 (1816); Seringe in DC. Prodr. i. 408 (1824). *Stellaria biflora* L. Sp. Pl. 422 (1753), not *Arenaria biflora* L. Mant. 71 (1767). *Cerastium biflorum* (L.) Crantz, Inst. ii. 402 (1766). *Alsine biflora* (L.) Wahlenb. Fl. Lapp. 128 (1812). *Alsinella biflora* (L.) Swartz, Summ. Veg. Scand. 17 (1814). *Ar. occulta* Fisch. ex Seringe in DC. Prodr., i. 408 (1824). *Ar. polygonoides, β occulta* Ser. in DC. l. c. (1824). *Ar. scandinavica* Spreng. Syst. ii. 402 (1825). *Sabulina biflora* (L.) Reichenb. Fl. Germ. Excurs. 790 (1832). *Ar. stenopetala* Turcz. Bull. Soc. Nat. Mosc. (1838) 89. *Ar. alpina* Porter & Coult. Syn. Fl. Colo. 14 (1874), chiefly. *Ar. biflora* Watson, Bibl. Ind. 94 (1878), not L. *Alsinanthe biflora* (L.) Reichenb. Ic. Fl. Germ. v. 30. t. 209 fig. 4939 (1842). *Ar. sphagnoides* Thomas ex Koch, Syn. Fl. Germ. ed. 2, 123 (1843). *Alsinopsis sajanensis* (Willd.) Cockerell, Am. Nat. xl. 864 (1906).— Arctic regions, south with us to the Torngat Mts., Labrador, the Shickshock Mts., Gaspé Co., Quebec, and alpine regions of Arizona and Oregon. The following specimens belong here. GREENLAND: Baals Revier, *J. Vahl*; Pilekrat ved S. Kangerdluarksuk Fjord, Holsteinsborg Distr., August 5, 1884, *Warming & Holm.* HUDSON STRAITS: Nottingham Island, August 24, 1884, *R. Bell.* LABRADOR: Rama, July 15–August 30, 1894, July-August, 1899, *A. Stecker*, nos. 208, 355, August 20–24, 1897, *J. D. Sornborger*, no. 286 (distributed as *A. verna*, var. *hirta*); Kangalaksiorvik Bay, September 1–10, 1908, *Owen Bryant;* Hebron, *Mentzel;* Okkak, *Fratres Morav.* QUEBEC: Mt. Albert, Gaspé Co., July 25–27, 1881, *J. A. Allen;* crevices and detritus of serpentine, barrens and brook-ravines, alt. 700–1050 m., Mt. Albert, August 8–15, 1905, *Fernald & Collins*, no. 77; July 25, 1906, *Fernald & Collins*, no. 550. ALBERTA: meadows above Banff, July 8, 1907, *Butters & Holway*, no. 91; Elbow River, June, July, 1897, *J. Macoun*, no. 18,-286; Silver City, August 6, 1885, *J. Macoun* (distributed as *A. arctica*); Mt. Molar, alt. 1980 m., July 9, 1904, *J. Macoun*, no. 64,-688; Lake Louise, alt. 2200 m., July 20, 1904, *J. Macoun*, no. 64,687; Pipestone Creek, alt. 1980 m., July 7, 1904, *J. Macoun*, no. 64,689; summit of Otterhead Pass, alt. 2135 m., August 10, 1904, *J. Macoun*, no. 64,690. Montana: Upper Marias Pass, alt. 2440 m., August 4, 1883, *W. M. Canby*, no. 44; Old Hollowtop, near Pony, alt. 2745 m., July 7, 1897, *Rydberg & Bessey*, no. 4041. Wyoming: Teton Mts., August 21, 1894, *Aven Nelson*, no. 1009. Colorado: Gray's Peak, alt. 3965 m., August 15, 1885, *Letterman;* high mountains, Gray's Peak and vicinity, alt. 3350–4270 m., 1885, *Patterson;* Twin Lakes, 1875, *Brandegee;* South Park, *Wolf & Rothrock*, nos. 343, 344; Mt. Ouray, alt. 3660 m., August 20, 1901, *C. F. Baker*, no. 841. Utah: Uinta Mts., alt. 3350 m., August, 1869, *Watson*, no. 173. Arizona: summit of Mt. Agassiz, August, 1884, *Lemmon*, no. 3289. Oregon: cliffs of Wallowa Mts., alt. 2745 m., July 31, 1899, *Cusick*, no. 2301a. Washington: Cascade Mts. near Mt. Baker, July 16, 1898, *J. B. Flett*, no. 860; Engel Creek near Mt. Stewart, 1883, *Brandegee*, no. 672. British Columbia: mountain summits, alt. 2290 m., Kicking Horse Lake, July, 1885, *J. Macoun;* summits of Selkirk Mts., alt. 1675–2440 m., August 2–4, 1890, *J. Macoun*, nos. 13, 16; summit of Rocky Mts., alt. 2135 m., August 18, 1890, *J. Macoun*, no. 15; small peak above timber line, alt. 2285 m., Selkirk Mts., July 26, 1905, *C. H. Shaw*, no. 1037; summit of Mt. Arrowsmith, Vancouver I., July 16, 1887, *J. Macoun.*

A. **obtusiloba** (Rydberg), n. comb. *A. obtusa* Torr. Ann. Lyc. N. Y. ii. 170 (1826) not All. Fl. Pedem. ii. 114 (1785). *A. arctica* γ Torr. & Gray, Fl. i. 181 (1838). *A. biflora*, var. *obtusa* (Torr.) Watson, Bibl. Ind. 94 (1878). *Alsinopsis obtusiloba* Rydberg, Bull. Torr. Bot. Cl. xxxiii. 140 (1906), as to first citation, *Ar. obtusa* Torr., but only in small part as to other citations (see discussion below).—Alberta to New Mexico. The following belong here. Alberta: Sheep Mt., Waterton Lake, July 28–31, 1895, *J. Macoun*, no. 10,094. Montana: Bridger Mts., August 21, 1902, *W. W. Jones;* Spanish Peaks, 1901, *J. Vogel;* Old Hollowtop, near Pony, alt. 2440 m., July 7, 1897, *Rydberg & Bessey*, no. 4039. Wyoming: stony subalpine parks, Brooklyn Lake, Albany Co., August, 1909, *Aven Nelson*, no. 9235; open hillsides, Telephone Mines, Albany Co., August 3, 1900, *Aven Nelson*, no. 7951; Little Bald Mt., Bighorn Mts., July 13, 1900, *J. G. Jack.* Colorado: high mountains, Gray's Peak and vicinity, alt. 3350–4270 m., July and August, 1885, *H. N. Patterson*, no. 11; alpine, Pikes Peak, August 27, 1895, *Canby;* alpine ridges east of Middle Park, 1861, *Parry*, no. 141; barren rocky places above the limit of trees on James Peak, August 18, 1870, *E. L. Greene;* Sierra Blanca, 1877, *Hooker & Gray;* South Park, 1873, *Wolf & Rothrock*, no. 364; among rocks at 3660 m., mountain northwest of Como, July 31, 1895, *Crandall & Cowen*, no. 82; Mt. Garfield, alt. 3800 m., July 25, 1901, *F. E. & E. S. Clements*, no. 496; near Pagosa Peak, alt. 3500 m., August, 1899, *C. F. Baker*, no. 310 (distributed as *A. verna*). Utah: moist soil, alt. 3810 m., La Sal Mts., Grand Co., July 15, 1912, *E. P. Walker*, no. 279. New Mexico, northern New Mexico, 1867, *Parry*, no. 17.

According to *Index Kewensis, Arenaria alpina* Porter & Coulter, Syn. Fl. Colo. 14 (1874) is *A. obtusa* Torr., but it is in every way inadvisable to take up the name. Porter & Coulter obviously supposed they were listing a Linnean species, although Linnaeus had no *A. alpina.* They cite *Alsine biflora* Wahl, as a synonym, i. e. *Arenaria sajanensis* Willd; their description of the leaves as "narrowly linear, 3″–3½″ long" belongs clearly to *A. sajanensis,* not *A. obtusa* Torr. and their citation, *Hall & Harbour* 77 is inconclusive, since no. 77, at least in the Gray Herbarium, is a mixed number, consisting mostly of *A. sajanensis.*

The name *Alsinopsis obtusiloba* Rydberg is not much clearer in its application, although it may be fairly inferred that Rydberg was changing the name of *Arenaria obtusa* Torr. on account of Allioni's earlier species of that name. But the other citations given by Rydberg are not helpful: *Ar. biflora* Wats. was based definitely on *Alsine biflora* Wahl. and is, therefore, *Ar. sajanensis* Willd; while "*Arenaria sajanensis* Robinson, Proc. Am. Acad. **29**: 304. 1894. Not *A. sajanensis* Willd. 1816" *was* largely *A. sajanensis* Willd, but with all the species here discussed, *A. obtusiloba, A. marcescens* and *A. laricifolia?* confused with it. Only through inferring, then, that Rydberg's *Alsinopsis obtusiloba* was intended as a renaming of *Ar. obtusa* Torr. does Rydberg's name become definite.

A. **marcescens**, n. sp., dense caespitans, caudiculis epigaeis lignescentibus ramosissimis 0.5–2.5 dm. longis, foliorum remnantibus marcescentibus rigidis imbricato-tunicatis; foliis coriaceis viridibus glaberrimis lineari-setaceis obtusis 4–8 mm. longis 0.3–0.5 mm. latis, nervo crasso; cauliculis adscendentibus 2–5 cm. altis 1-floris glanduloso-pilosis remote bracteatis, bracteis 2–4-jugis lanceolato-subulatis; pedunculo 0.6–1.5 cm. longo; calycibus purpurascentibus vel fuscis turbinato-campanulatis 3.8–5 mm. longis basi plus minusve pilosis, sepalis oblongis vel oblongo-lanceolatis obtusis valde carinatis plerumque nerviis lateralibus; petalis spathulatis vel spathulato-obovatis albis vel lilacinis basi luteis 6–8 mm. longis 2–2.5 mm. latis; antheris albidis 0.5–1 mm. longis; capsula subcylindrica 0.6–1 cm. longa; valvis coriaceis stramineis lineari-oblongis apice emarginatis; seminibus olivaceis vel brunneis reniformi-obovatis, laevissimis 0.8–1.2 mm. longis apice radiculari rostellata.

Densely cespitose, with the trailing and freely forking lignescent branches 0.5–2.5 dm. long and closely covered with the rigid marcescent remnants of the leaves: leaves coriaceous, bright green, strictly glabrous, linear-setaceous, obtuse, 4–8 mm. long, 0.3–0.5 mm. wide, with a thick midrib: flowering stems ascending, 2–5 cm. high, 1-flowered, glandular-pilose, remotely bracted, with 2–4 pairs of short lance-subulate bracts: peduncle 0.6–1.5 cm. long: calyces purplish or fuscous, turbinate-campanulate, 3.8–5 mm. long, more or less pilose at base; the oblong or oblong-lanceolate obtuse sepals strongly keeled and usually with 2 lateral nerves: petals spatulate or spatulate-obovate, white or lilac, yellow at base, 6–8 mm. long, 2–2.5 mm. wide: anthers whitish, 0.5–1 mm. long: capsule subcylindric, 0.6–1 cm. long; its coriaceous stramineous linear-oblong valves emarginate; seeds olive or brown, very smooth, reniform-obovate, 0.9–1.2 mm. long, with the tip of the radicle prolonged into a beak.— Serpentine and magnesian limestone ledges and gravel, western Newfoundland and Gaspé Co., Quebec. NEWFOUNDLAND: serpentine tablelands, altitude about 380 m., Bonne Bay, August 27, 1910, *Fernald, Wiegand & Kittredge,* no. 3366; serpentine and magnesian limestone barrens, northeastern bases and slopes of Blomidon ("Blow-me-down") Mts., July 24, 1910, *Fernald, Wiegand & Kittredge,* no. 3365 (TYPE in Gray Herb.), August 21, 1910, *Fernald & Wiegand,* no. 3365a (ripe seeds of no. 3365); Blomidon Range, July 3–5, 1911, *C. C. Stewart,* no. 13; sandy plains, Serpentine (or Coal) River, July 16, 1896, *Waghorne* no. 6 (distributed as *A. verna*). QUEBEC: Mt. Albert, Gaspé Co., July 31, 1881, *J. A. Allen,* no. 4 (distributed as *A. groenlandica* or *A. arctica*); Shickshock Mts. (presumably Mt. Albert), 1882, *J. Macoun;* crevices and detritus of serpentine, barrens and brook-ravines, alt. 900–1058 m., Mt. Albert, August 8, 1905, *Fernald & Collins,* no. 78, July 23, 1906, *Fernald & Collins,* nos. 551, 552.

The *Fernald & Collins* and *Fernald & Wiegand* material has been distributed as *A. arctica* Stev.; but *A. arctica* has broader leaves, glandular calyx and very large broadly obovate petals.

?A. LARICIFOLIA L. Sp. Pl. i. 424 (1753). *Ar. striata* L. Amoen. Acad. iv. 315 (1756) in part, not All. *Alsine laricifolia* (L.) Crantz, Inst. ii. 407 (1766). *Stellaria laricifolia* (L.) Scop. Fl. Carn. ed. 2, i. 317 (1772). *Sabulina striata* (L.) Reichenb. Fl. Germ. Excurs. 789 (1832). *Alsine striata* (L.) Gren. Mem. Soc. Doubs (1841) 33, t. 1, fig. 1. *Wierzbickia striata* (L.) Reichenb. Ic. Fl. Germ. v. 30, t. 211, fig. 4932 (1842). *Alsinopsis laricifolia* (L.) Heller, Muhlenbergia, viii. 96 (1912).— The plant which is passing in America as *Arenaria laricifolia* is more western and northern than *A. obtusiloba,* occurring from Yukon and Alaska to northwestern Wyoming, Nevada and Oregon. There is doubt as to just what Linnaeus had as *Ar. laricifolia* and a further doubt as to whether our American plant is identical with the European. The material seen by the writer is all fragmentary and until it is better known may pass as *A. laricifolia.* It is highly important to secure abundant flowering and fruiting specimens for critical study. The following specimens are tentatively referred here. YUKON: Yukon River, August 15, 1887, *Dawson;*

Bonanza Creek, Dawson, June 12, 1914, *Eastwood*, no. 204; Dawson Slide, Dawson, June 12, 1914, *Eastwood*, no. 207. MONTANA: Bald Mt., alt. 3050 m., July 22, 1880, *S. Watson*, no. 54; plains near Cutbank Creek, August 5, 1883, *Canby*, no. 45. WYOMING: high mountains, Yellowstone Park, August 13, 1893, *J. N. Rose*, no. 483. NEVADA: East Humboldt Mts., alt. 3050 m., August, 1868, *Watson*, no. 173. OREGON: on cliffs at 2440 m., Eagle Creek Mts., 1881, *Cusick*, no. 969. WASHINGTON: rocky ridges near snow, at 2440 or 2740 m., Mt. Paddo, September 15, 1883, *Suksdorf*, no. 175.

V. THE SPECIFIC IDENTITY OF ARENARIA GROENLANDICA AND A. GLABRA.

It has been customary to treat the boreal *Arenaria groenlandica* (Retz.) Spreng. and the more southern *A. glabra* Michx. as distinct species, the former extending from Greenland to the higher granitic mountains of New England and New York and locally southward along the Alleghenies to the mountains of North Carolina, the latter confined to the mountains of North Carolina, Tennessee and Georgia. The characters as stated by those who maintain the two as species are as follows: [1]

A. GROENLANDICA. Stems 2–8 in. long, 1–5-flowered (*Robinson*); 3–20 cm. tall, sparingly forked (*Small*): leaves linear, $1\frac{1}{2}$–7 lines long, the basal in a dense cluster (*Robinson*); leaf-blades filiform to subulate, 0.3–1.5 cm. long, the basal in a dense cluster (*Small*): pedicels 0.5–1.5 cm. long (*Small*): sepals broadly ovate, $1\frac{1}{2}$–2 lines long (*Robinson*); sepals oblong or oblong-lanceolate, 3–4 mm. long (*Small*): petals obovate (*Robinson, Small*): capsule subglobose to oblong (*Robinson*); capsule ovoid, or rarely subglobose or nearly oblong, 5–6 mm. long (*Small*).

A. GLABRA. Stems 6–12 in. high (*Robinson*); stems 0.5–3 dm. tall, often bushy (*Small*): leaves narrowly linear, equaling or exceeding the internodes (*Robinson*); leaf-blades narrowly linear or nearly filiform, 1–2.5 cm. long (*Small*): pedicels elongated (*Robinson*); pedicels 1–4 cm. long (*Small*): sepals ovate-oblong, $1\frac{1}{2}$ lines long (*Robinson*); sepals oblong or ovate-oblong, 2.5–3 mm. long (*Small*): petals spatulate (*Small*): capsule ovoid (*Robinson*); capsule ovoid, 3 mm. long (*Small*).

That the specific lines between the two are not satisfactory has long been evident from the fact that plants referred by one author to *A.*

[1] These characters are taken from the treatments by Robinson in Gray, Synop. Fl. i. 243 (1897) and by Small, Fl. S. E. U. S. ed. 2, 420 (1913).

glabra have been referred by others to *A. groenlandica;* and examination of herbarium-material shows at once that the characters depended upon are far from constant. Thus material of most typical *A. groenlandica* from Greenland and Labrador and the highest New England mountains shows sepals varying from 3–5 mm. in length, while plants of good *A. glabra* from the South (for example, *Biltmore Herb.* no. 664 from North Carolina; *Curtiss,* no. 304 from Nashville, Tennessee; and sheets from Lookout Mountain, near the line between Tennessee and Georgia), with pedicels up to 4.5 cm. long and with cauline leaves up to 3 cm. long, have sepals 3–5 mm. long, i. e. with the same variation in length as those of *A. groenlandica.* Similarly with the capsules: the material from Lookout Mountain, with long leaves and pedicels, has capsules up to 5.5 cm. long, while fully ripe material from Table-Top Mt., Gaspé, has the capsules less than 4 mm. long. The stems of the boreal plant may be as freely forking as the austral, having 1–30 flowers, while characteristic southern plants with long leaves and pedicels may have the stems subsimple or with only few flowers. The Lookout Mt. material collected by Judge Churchill has the petals as long and as broad as much of the northern material; and the seeds of the northern and southern specimens are quite alike.

Nevertheless in spite of the absence of good specific characters in the seeds (which usually display the best of specific differences in *Arenaria),* in the capsules, petals and sepals, there is a "look" about the two extremes which indicates that they are not strictly identical. The boreal *A. groenlandica* is more tufted and lower, usually with more developed basal leafy shoots; its cauline leaves are shorter; its pedicels become less elongate, and its petals are inclined to be longer. This typical *A. groenlandica* is confined in New England and New York to the very highest mountains, descending along brooks in the White Mountains only to 885 m. and occurring on the summit of Mt. Monadnock, New Hampshire, above 915 m.; in Vermont it is only on the summits of Mansfield and Camel's Hump; in New York only on the summit of Whiteface.

On the siliceous or granitic rocks of the Kittatinny Mts. in New Jersey, the Shawangunk and Catskill Mts. in New York, and exposed granitic ledges of Connecticut and southwestern Rhode Island occurs a plant which has always been referred to *A. groenlandica.* The writer had never had a field-acquaintance with this plant of southern

New England, southern New York and northern New Jersey, until the past June, when at the invitation of Mrs. Orra Parker Phelps, he visited with her an extensive area in Charlestown, Rhode Island, where she had found the *Arenaria* abundant in the dry *Cladonia* carpet on exposed granite ledges. At Charlestown the plant was passing out of flower and with much mature fruit. It had taller, more forking and more brittle stems than in the familiar alpine *A. groenlandica,* no tufted basal foliage, but the flowers and fruits were quite like those of *A. groenlandica.* The habitats at Charlestown, either exposed sunny ledges in the pastures where the plant mingled with *Krigia virginica, Hypericum gentianoides, Juncus secundus,* and other Carolinian plants, or crevices of ledges in the dry oak woods, were so far from boreal stations that it seemed highly improbable that this Rhode Island plant could be identical with the arctic-alpine *A. groenlandica.* Abundant material was collected and it proves to be identical with the plant from Middletown and North Guilford, Connecticut, and the specimens from the Catskills which have always passed as *A. groenlandica* and it is probable that the plants from the Shawangunk and Kittatinny Mts. (as well as from the mountains of Pennsylvania), which the writer has not seen, are the same; and in no point does this material from southern New England and southern New York differ from true *A. glabra* from North Carolina and Tennessee.

Furthermore, perfectly typical *A. glabra* occurs northward into New Hampshire and Maine; in New Hampshire found on the lower granite mountains with *Paronychia argyrocoma,* var. *albimontana* and other plants of austral affinity or occasionally on ledges in oak woods. It is on Welch Mt., a dry warm granitic mass south of the Franconia Range, and when Professor A. S. Pease found it in oak woods of Carroll Co., he was so impressed with the fact that this was not the proper habitat for *A. groenlandica* that he specially commented on "*A. groenlandica* (Retz.) Spreng., which is not uncommon on the mountains of the Montalban Range, but which is perhaps seldom found in so incongruous a situation as here, growing under the shade of red oak trees!"[1] In Maine *A. glabra* is found on the lesser granitic mountains (Streaked Mt., Oxford Co., Alamoosook, Hancock Co., Peaked Mt., Penobscot Co., etc.), and on ledges near the mouth of

[1] Pease, Rhodora, xvii. 233 (1915).

the Kennebec. Eastward, on Mt. Desert Island as well as at Halifax, Nova Scotia, the plant in stature and habit is perplexingly transitional to the boreal *A. groenlandica,* being usually more tufted and lower than in *A. glabra* but with the very bushy habit of the latter and with pedicels intermediate in length, and petals shorter than in most arctic-alpine plants. Similarly, on some of the secondary mountains of Maine and New Hampshire (White Cap, Rumford, Maine, Mt. Hope, Coös Co., New Hampshire, etc.) the plant is so transitional between the arctic-alpine and the Alleghenian plant that specimens might pass for either; while the plant from the summit of Roan Mt., North Carolina, has the habit of *A. groenlandica* but the longer leaves and slightly shorter petals of *A. glabra.*

In brief, there seem to be no absolute lines by which *A. groenlandica* and *A. glabra* can be distinguished, although the plants of arctic-alpine and those of Alleghenian range have certain tendencies of habit and foliage which in extreme colonies are well marked, though in transitional areas these tendencies break down. At best, then, *A. glabra* is a geographic variety of *A. groenlandica.* The characters and ranges of the two varieties are stated below.

A. groenlandica (Retz.) Spreng. Syst. ii. 402 (1825). *Stellaria groenlandica* Retz. Fl. Scand. ed. 2, 107 (1795). *Alsine groenlandica* Gray, Man. ed. 2, 58 (1856). *Alsinopsis groenlandica* Small, Fl. S. E. U. S. 420, 1330 (1903).— Tufted, forming dense mats of short leafy basal shoots 1–13 cm. broad: stems few to very numerous, filiform, depressed, decumbent or suberect, simple to freely forking 2–10 (rarely –15) cm. high, 1–30-flowered: leaves linear, obtuse, soft, often flaccid, or the basal narrowly oblanceolate; the basal 3–15 mm. long; the uppermost cauline (below the first forking) 2–9 mm. long: pedicels erect or spreading becoming 0.6–2.3 cm. long: calyx 3–5 mm. long, campanulate; the ascending essentially nerveless oblong to oval scarious-margined sepals obtuse: petals broadly to narrowly obovate, usually retuse, white, 6–10 mm. long (sometimes smaller or wanting): capsule globose-ovoid to slender-conical, slightly exserted: seeds reddish-brown, 0.7–0.8 mm. long.— Greenland and Labrador, south to Table-top Mt., Gaspé Co., Quebec, the higher mountains of Maine, New Hampshire, Vermont and New York, and in uncharacteristic form to the coast of southern Nova Scotia and eastern Maine.

Var. **glabra** (Michx.), n. comb. *A. glabra* Michx. Fl. Bor.-Am. i. 274 (1803). *Alsine glabra* Gray, Man. ed. 2, 58 (1856). *Alsinopsis glabra* Small, Fl. S. E. U. S. 420, 1330 (1903).— Similar: less tufted, usually with few if any short leafy basal shoots: stems solitary–few, erect or strongly ascending, simple to freely forking, 0.7–2.7 dm. high, 1–50-flowered; the uppermost cauline leaves (below the first forking) 0.8–3 cm. long: pedicels becoming 1.2–4.5 cm. long: calyx 3–5 mm. long: petals 4–8 mm. long.— Mountains of Georgia, Tennessee and North Carolina, locally north on exposed siliceous rocks to the Catskill Mts., New York, central Connecticut, southwestern Rhode Island, central New Hampshire, and central Maine.

VI. THE AMERICAN VARIATIONS OF ARENARIA VERNA.

In 1906[1] it was felt by the present writer that the variations of *Arenaria verna* with petals shorter than or barely equaling the calyx could be separated as three varieties: var. *propinqua* (Richardson) Fernald, a glandular-pubescent plant with the rather tall flowering branches (up to 1.5 dm.) 2–5-flowered, and with the fruiting calyx 2.5–3.5 mm. long; var. *hirta* (Wormskj.) Watson, similar but with fruiting calyx 4–5 mm. long; and var. *rubella* (Wahlenb.) Watson, glabrous or nearly so, with branches 1 (rarely 2)-flowered and with calyx 3–4 mm. long. Since that time the writer has collected the plants extensively in Labrador, Newfoundland and Quebec and material from other regions has been sent him for study. As a result of reconsidering his former attitude it may now be stated that these variations are so freely confluent as to be practically unrecognizable.[2] They should be merged as one North American variety which is also in boreal Eurasia, and the earliest varietal designation seems to have been that of Chamisso & Schlechtendal, in 1826, when they distinguished *Arenaria hirta α. glabra* (the same as *A. verna*, var. *propinqua*, forma *epilis* Fernald) and *β. pubescens* (which covers vars. *hirta* and *propinqua* of later authors). This variety should, then, be known as

Arenaria verna L., var. **pubescens** (Cham. & Schl.), n. comb. *Ar. Gieseckii* Hornem. Fl. Dan. ix. t. 1518 (1816). *Ar. hirta* Wormskj. Fl. Dan. x. t. 1646 (1819) excl. syn. *Ar. propinqua* Richardson in Frankl. Journ. 738 — reprint 10 (1823). *Ar. hirta β. pubescens* Cham. & Schlecht. Linnaea i. 56 (1826). *Alsine hirta* (Wormskj.) Hartm. Handb. Skand. Fl. ed. 3, 104 (1838). *Als. verna, η. hirta*

[1] Rhodora, viii. 32 (1906).

[2] Fenzl well understood the situation when he spoke of *A. verna* with "varietatum limitibus difficillime coërcenda, synonymia taediosa ac inextricabili fere modo confusa, botanicorum omnis aevi cruciamentum." — Fenzl in Ledeb. Fl. Ross. i. 348 (1842).

(Wormskj.) Fenzl in Ledeb. Fl. Ross. i. 349 (1842). *Als. hirta, a. foliosa* Hartm. Handb. Skand. Fl. ed. 6, 149 (1854). *Ar. verna*, var. *hirta* (Wormskj.) Watson in King, Rep. 41 (1871). *Als. propinqua* (Richardson) Lange, Fl. Dan. xvii. 7, 8 (1877) as to Greenland plant. *Als. verna, δ. propinqua* (Richardson) Grönl. Isl. Fl. 33 (1881) as to name. *Als. rubella*, var. *hirta* (Wormskj.) Gürke, Pl. Eur. ii. 258 (1899). *Ar. verna equicaulis* A. Nelson, Bull. Torr. Bot. Cl. xxvi. 352 (1899). *Ar. verna*, var. *propinqua* (Richardson) Fernald, Rhodora, viii. 32 (1906). *Alsinopsis propinqua* (Richardson) Rydberg, Bull. Torr. Bot. Cl. xxxiii. 140 (1906). *Alsinopsis hirta* (Wormskj.) Cockerell, Am. Nat. xl. 864 (1906).

A. verna, var. pubescens, forma **epilis** (Fernald), n. comb. *Alsine rubella* Wahlenb. Fl. Lapp. 128, t. 6 (1812). *Alsinella rubella* (Wahlenb.) Swartz, Summa Veg. Scand. 17 (1814). *Ar. quadrivalvis* R. Br. in Parry, 1st Voy. App. 271 (1824). *Ar. hirta a. glabrata* Cham. & Schlecht. Linnaea, i. 56 (1826). *Ar. rubella* (Wahlenb.) Sm. Engl. Bot. Suppl. i. t. 2638 (1831). *Alsine verna, ϑ. glacialis* Fenzl in Ledeb. Fl. Ross. i. 350 (1842). *Alsine verna, β. rubella* (Wahlenb.) Hartm. Handb. Skand. Fl. ed. 6, 149 (1854). *Ar. verna*, var. *rubella* (Wahlenb.) Wats. Bibl. Ind. 99 (1878). *Ar. verna*, var. *propinqua*, forma *epilis* Fernald, Rhodora, viii. 32 (1906). *Alsinopsis quadrivalvis* (R. Br.) Rydberg, Bull. Torr. Bot. Cl. xxxiii. 140 (1906).

NARDUS STRICTA IN THE WHITE MOUNTAINS.

Annie Lorenz.

At Waterville, New Hampshire, the past season, the writer's attention was caught by a peculiar and unfamiliar tufted grass. It grew abundantly, perhaps a hundred tufts, on a dry, sterile bank below the Crawford cottage at the edge of the golf-links, and bore abundant spikes, which, however, were considerably past maturity.

With the aid of Britton & Brown's Flora it was found to be *Nardus stricta* L., a European grass, the only American localities cited in the work mentioned being Newfoundland and Amherst, Mass. (Tuckerman).

The species is indigenous in Greenland and eastern Newfoundland. In the Gray Herbarium are specimens from two stations in the United States. One is Tuckerman's original collection from Amherst, Massachusetts, and its label bears the following note: "has appeared in poor grassland (undisturbed 19 years) adjoining my garden. Amherst, 1871. E. T." The other is labelled: "Andover, New Hampshire, August 29, 1901. A. A. Briggs."

Batchelder's Flora of Manchester, New Hampshire, and Vicinity reports the species as very rare at Andover, New Hampshire. There is also a report of it from Gill, Massachusetts, in Stone's Flora of Franklin and Hampden Counties.

In Europe it has a fairly wide range throughout the western part of the continent and as far east as the Caucasus. Apparently it frequents the more hilly regions, not getting into the steppe country of Russia. It is reported as growing in the mountain pastures, heaths, moors and sterile places. In Switzerland and Italy it is found in the subalpine regions, through the Apennines, Corsica and Sardinia.

As Waterville is subalpine, and the golf-links have a sterile acid soil, forming a habitat much like that which it frequents in its European home, the colony may become permanently established here. It must have existed for a number of years, if one may judge by the size and vigor of the tufts, but it had been previously overlooked by the writer. This grass (wire-bent or mat-grass) is rather noticeable in appearance, growing in tufts with tough, closely matted culm-bases, fine wiry dark-green leaves a foot or more long, and curious secund spikes with a double row of single-flowered spikelets. The attention of collectors is called to it. Specimens have been deposited in the Gray Herbarium.

Hartford, Connecticut.

A Distinction between two Carices.— *Carex laxiculmis* Schweinitz and *C. digitalis* Willdenow are well-marked species of sedges which can, as a rule, be easily separated by any one of the half-dozen characters given in the manuals. These diagnostic features are all somewhat variable, however, so that occasional plants are puzzling and nearly connect the two species. The one recognized variety, *C. laxiculmis copulata,* was originally described by Prof. Bailey as *C. digitalis* var. *copulata,* and was treated as a variety of the latter species by Kükenthal in 1909. Any additional mark of distinction between these two species is therefore welcome, particularly if constant. Such a character seems to be found in the nature of the pistillate spikes. In both species there are normally from one to three minute scales at the tip of each pistillate spike; these are usually empty but, in *C. digitalis,* at least, sometimes contain stamens. With this exception the female spikes of *C. digitalis* are strictly pistillate. In *C. laxiculmis,* however, at least one, usually a majority or all, of the pistillate spikes in each culm bear from one to three staminate flowers at the base.

Mr. K. K. Mackenzie has called my attention to Kükenthal's description of the latter species (under the name *Carex retrocurva* Dewey) in the Pflanzenreich. Here this peculiarity is noted in the following words but is not emphasized as a distinctive character: "Spiculae laterales 3–4 ♀ (basi floribus paucis ♂ vel squamis sterilibus instructae)." As no mention of this character is made in Britton & Brown's Illustrated Flora, nor in Gray's Manual, it seems desirable to direct attention to it.— W. DeW. Miller, Plainfield, New Jersey.

Galax aphylla introduced in Massachusetts.— In the fall of 1917 while walking through woods in the northeastern part of Swampscott, Massachusetts, the writer found two clusters of round-heart-shaped, crenate-toothed, long-petioled shining leaves. Some of the leaves were sent to the Gray Herbarium where they were identified as "*Galax aphylla* L., the foliage of which is extensively used by florists." *Galax aphylla* is not native north of Virginia and in reference to the Swampscott plants which have established themselves among oak trees on dryish upland, Mr. M. L. Fernald writes, "I know of no other record of its attempting to become naturalized in New England." Several investigations since finding the *Galax* show the plants in thrifty condition as regards leaves, but no sign of bud or blossom has been seen.— Martha E. Ward, Lynn, Massachusetts.

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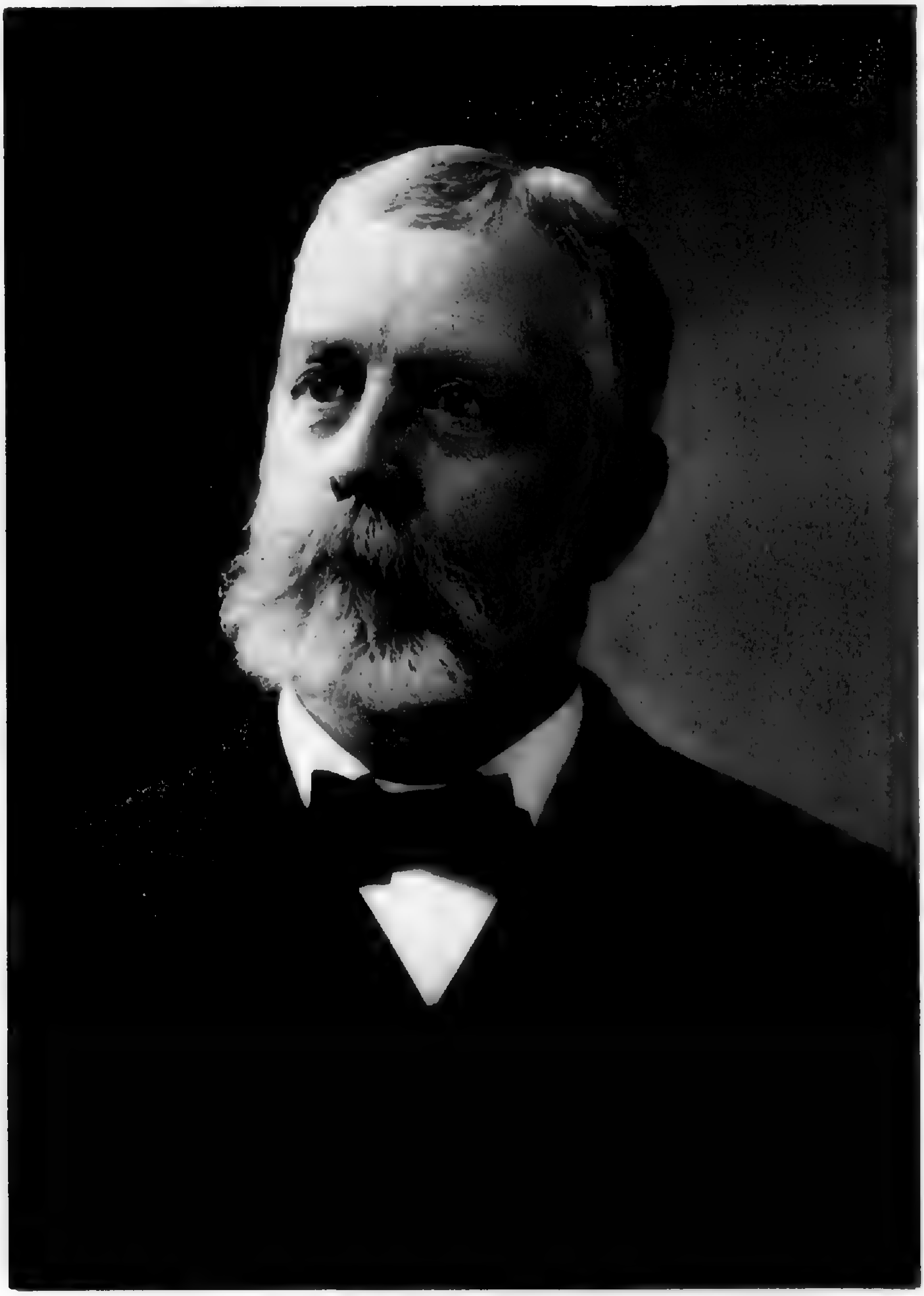

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Geo. G. Kennedy

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GEORGE GOLDING KENNEDY.

Emile F. Williams.

(With portrait).

Dr. George Golding Kennedy died at his home in Milton on Sunday, March 31, 1918. He was born in Roxbury, now a part of Boston, on October 16, 1841, and was the son of Donald and Ann Colgate Kennedy.

Donald Kennedy was born April 2, 1812, in Glen Moriston in the Scottish Highlands. He was the son of John and Isabella (Sinclair) Kennedy. In this rugged and unfruitful glen where he spent his early years Donald acquired the habits of industry and thrift which later enabled him to accumulate in this country a large fortune. Though the Kennedys, like most of their neighbours, were poor in a worldly sense, they were rich in energy and courage, and possessing, like most of their race, a great respect for learning and a craving to acquire it, they made many sacrifices in order to educate their children.

"Frugal living and high thinking," Dr. Kennedy often said had been the rule of life of his ancestors and he inherited and continued the family tradition to the end of his life. When Donald was still a youth his father and the rest of the family emigrated to Canada leaving the son under the care of an uncle in Scotland where he received a good education including a fair knowledge of the classics. In 1833 Donald came to Boston with no capital other than a clear head and a large stock of perseverance. On December 23, 1835, he was married by Father Taylor, the noted pastor of the Seamen's Bethel in Boston, to Ann, daughter of William and Celia (Golding) Colgate, born in Hastings, England. Of this union there were born one son, the subject of this memoir, and four daughters. In 1843, Donald bought a small farm in Roxbury and established himself in the comfortable house on Warren Street which remained the family homestead until his death. The fields and pastures adjoining this farm have long ago been cut up into building lots which are now well covered with houses and stores, and it is difficult to realize that less than fifty years ago this was open country.

The son, George G. Kennedy, attended the Roxbury Latin School then under the able direction of Augustus H. Buck. In 1860 he entered Harvard College, graduated in 1864 with the degree of A. B. and in 1867, having completed the courses of the Harvard Medical School, he received the degree of Doctor of Medicine.

After practising his profession for only a short time, he retired and found ample occupation in managing his father's business and in the care and administration of a growing estate. He was now able also to devote a large part of his time to those scientific and literary pursuits which had taken a strong hold on his nature while he was yet a student at Harvard. While there he attended the courses in botany given by Dr. Asa Gray and the enthusiasm for nature, and particularly for plant life, which was Dr. Kennedy's ruling passion, was undoubtedly developed and nurtured by the inspiration of sitting in the classes of this gifted man. The earliest specimen in Dr. Kennedy's herbarium which he started while yet at college, is dated 1862. His herbarium remained during his life the object of his constant solicitude and attention. On January 21, 1864, Dr. Asa Gray writes to Charles Wright then in Cuba, "By the steamer of Saturday, which takes this, a good young fellow, Mr. Kennedy, a member of our Senior class, goes to Cuba to look after business of his father, and, when he can, to botanize, only four or five weeks. That is, in vacation. He is very fond of botany, and bids fair to be a botanist some day, if he does not take to money making instead."[1] Young Kennedy made money but he, nevertheless, became a botanist.

On February 28, 1865, Dr. Kennedy was married by the Rev. James Reed, pastor of the Bowdoin Street Church in Boston, to Harriet White Harris, daughter of Benjamin Clark Harris and Harriet (White) Harris. Their children were Edith Golding, Donald, who died in infancy, Harris, Sinclair and Mildred.

Mrs. Kennedy was a very remarkable woman. She combined in

[1] Letters of Asa Gray, edited by Jane Loring Gray. Houghton, Mifflin & Co., 1893, Vol. 2, page 517.

an unusual degree a deeply religious nature, sweetness of disposition and a boundless sympathy for every one she met. She had clearness of vision, great discernment, judgment, and capacity for management. To these qualities were added a genius for hospitality. Every visitor at the Kennedy home was welcomed by her with such genuine cordiality and interest as instantly won his confidence and friendship. To know Mrs. Kennedy was to love her and with this congenial helpmate Dr. Kennedy spent a long and happy life. She died in 1910 and with her death the light went out of her husband's life.

In 1879, Dr. Kennedy purchased of Judge John Oakes Shaw the large estate in Milton, Massachusetts, known as "The Pines" and here he built a fine commodious house which gradually displaced the old family home in Roxbury and is now the residence of his eldest son Dr. Harris Kennedy. Situated on the high land at the foot of big Blue Hill, the house commands a noble view of the Neponset valley. Near by are the extensive woods and glades of the Blue Hills range which include every kind of natural feature favorable to the development of a rare and varied flora and it was in this beautiful home surrounded with every opportunity for indulging his taste for botany that Dr. Kennedy spent most of his time when he was not travelling.

He visited Europe in 1872, 1880, 1886, 1887 and in the spring of 1894 he went to Egypt, the Holy Land, Constantinople and Athens. In May, 1900, we find him at Virginia Beach with Charles E. Faxon to observe a total eclipse of the sun. In 1903 he spent the summer with his family in Devonshire, Scotland, and by the English Lakes. In 1905 he was in Europe for the last time.

His journeys in the eastern part of this country from Canada to Florida were frequent, and when, about 1896, the New England Botanical Club took up the study of the botany of New England, he was one of its most indefatigable explorers. Sometimes alone, but more often in the company of enthusiastic collectors like Edwin Faxon, Walter Deane, Charles E. Faxon, Joseph R. Churchill, Jesse M. Greenman, and many others including the writer, repeated trips were made to Mt. Washington, Mt. Mansfield, and Smuggler's Notch, Willoughby Notch, the Otter Creek valley in Vermont, Western Massachusetts and other localities. Most of these regions are now well known botanically and Dr. Kennedy contributed not a little to our knowledge of them through his extensive collections.

It was always his object to enrich the Gray Herbarium which he considered had the first claim to any of his specimens. Later under the inspiration of Merritt L. Fernald, Maine became a field of his active operations. Nor were the other New England States neglected. Many were the collecting trips in Vermont with Ezra Brainerd, and in Rhode Island with J. Franklin Collins and William Whitman Bailey.

An especially notable expedition was that to Mt. Katahdin in 1900. The mountain had never been systematically botanized. Dr. Kennedy had a log cabin built in the Basin, a great ravine in the heart of the massif at an elevation of over 3000 ft. and from this base for two weeks with Joseph R. Churchill, Merritt L. Fernald, J. Franklin Collins, Emile F. Williams and five guides, explored the mountain as thoroughly as weather and time permitted, many rarities being discovered.

It has been my privilege to read the botanical journals that Dr. Kennedy kept religiously from 1896 to 1915. There may have been earlier journals but these are not now available.

It is clear that plants were ever in Dr. Kennedy's thoughts. He noted with extreme minuteness everything he gathered and particularly any specimen that seemed to depart in any particular from the type. Also extraordinarily full were his memoranda as to locality. His journals of European travel are equally interesting and wherever he went the plant life was foremost in his observations. In 1900, as has been said before, he went to Virginia Beach with Charles E. Faxon to observe the total eclipse of the sun on May 28th. This phenomenon impressed him exceedingly and the European trip of 1905 was undertaken principally to see the eclipse of August 30th. This was total at Burgos in Spain and thither he went with his family, visiting Holland and France on the way. He writes on August 30th:

"We drove in an omnibus along the dusty and much frequented highway to the astronomical station we visited yesterday, on the high, wide plain about two miles south of the city. Mounted cavalry were scouring about the boundaries to keep people off the space reserved for the foreigners and the astronomers and we were soon installed as amateurs.... There were no trees except at the edge of the highway. Everywhere else extended the broad high plain with what little vegetation there was trampled down by horses and men.

"A small Agrostis, a minute Plantago with very narrow leaves and woolly bases, a few Dipsaceous looking plants and a yellow composite and very small Leguminosae, a slender Hieracium with conduplicate recurved leaves and a purple Cuscuta on a gorse and a small bit of minute moss in patches over the ground. First contact at 11:46 not visible for rolling clouds which coming from the westward had been threatening for an hour but the sky was very blue and clear at 11:56 when the eclipse was well on.

"What an hour of hopes and fears! At 12:30 the sun was in bright blue sky though all about lie dark clouds. Three beautiful balloons, one a real black pearl, have gone up from near the citadel and a big elephant of another is fast by a cord though floating in the air.

"Ten minutes before the eclipse rain begins to fall and we all hasten to protect instruments by umbrellas. At six minutes before the clouds are breaking and at one minute before the sun is again in blue sky. We watch with eager happy eyes. The shadow sweeps across — the sun is a pale corona around a black disk — the darkness not so intense as in Virginia and the clouds at the horizon reflect the sunlight, making a beautiful spectacle. Even just before the totality when the clouds cleared away, one remained under and close to the sun and was a beautiful prism in color and in light. The length of the eclipse too seemed very great and I thought, "What if it should not end?" No such idea came to me in 1900.

"There was a purple color in the landscape rather than the iron gray of 1900."

In passing through Paris on the way to Burgos Dr. Kennedy visited the Jardin des Plantes. It is interesting to read in the journal, "Saw the old and much supported acacia planted there in 1636, and then to the beautiful green hill under the Cedar of Lebanon, planted 1735, where the cool shade delighted me.

"The two forty foot palms set out in the warm sun to rejoice, like two centenarians, gave me a real thrill as if I had seen the *Grand Monarque* himself. The card showed that they were:

Chamaerops Humilis
Donné à Louis XIV par Charles III, margrave de
Bade Dourbach

"The small and feeble heads on the tall trunks were held by braces joined to four iron rods from the tub in which they were planted. Long may they enjoy the summer sun of the garden!"

Here it may be well to quote an interesting account in the 1903

Journal of a visit while in London on September 4th to the Nestor of English botanists, Sir Joseph Hooker. It will also show Dr. Kennedy's terse and direct style of writing, very particular and precise as to details which escape most of us.

"Fernald and I left Waterloo station at 11:05 and arrived at Sun-ingdale at 12:17. Sir Joseph Hooker's little victoria was at the station and we rode about a mile to the house, beautifully situated among pine trees in a moorland sort of district. Lady Hooker received us very kindly in a little hallway near the front door and Sir Joseph came in after we were seated in the parlor. He was dressed in a Scotch plaid of quiet pattern, a gray and purplish stripe. He is eighty-six years old and has yet the alertness that always characterized Asa Gray. His beard is worn in a large fringe about his face and I never before saw that way of trimming the beard suit the face; his eyebrows are enormously large and shaggy and as I have noticed that my own are growing perceptibly the past three years I wonder what reversion of type it may indicate. His manner and something about the face, a certain placid benignity, reminded me of Samuel H. Scudder, the writer on Butterflies. He is now getting rather deaf so that we all talked in a loud tone. He made us feel quite at home by showing much pleasure in our call.

"When Fernald gave him Mr. George Murray's message, that he had good news from Capt. Scott on the Discovery now in the Antarctic region, he quickly said, "How can that be? How can he have news of Capt. Scott who is locked in the ice?" As Fernald could not answer this question he laughingly added, "Well, tell Murray I thank him for the good news." Lady Hooker's mother, a dear and seemingly very old lady, came in with a younger lady and we all went out in the dining room at about 1:30. The meal was evidently dinner, for hot roast beef and vegetables and fine boiled rice served in one course were followed by........and a cup of coffee. Very choice Asti wine was offered me, while Fernald and Hooker kept to the red wine or at least Fernald did. We were placed at table as follows:

	Lady Hooker who carved the meat	
Fernald		G. G. K
Sir Joseph		Lady Hooker's mother
	The lady whose name I do not recall	

Our talk was on American *children* and on botany only slightly.

"After dinner Sir Joseph proposed we should take a stroll about the place and after lighting very good cigars in his study we went forth. The study had a few bundles of plants as if he had not wholly given up his regular work and there hung near the outer door leading to the wooded hill a press and also a stout digger which he said Ward of Wardian Glass Case fame had given him. We walked through beautiful paths in these piney woods, Sir Joseph constantly showing us trees and shrubs which he had planted; he bought the place on leaving Kew twenty years ago and had done all the planting; all his own except the original pines and it was wonderful to see what twenty years will do in England. Sequoias and Douglas pines and Colorado spruces and New England oaks, the rubra and tinctoria and also what appeared imbricaria; two beautiful patches of Linnaea looked flourishing and very fine *pink* Daboecia, which we saw *white* in the Grasmere Garden. He took us to the edge of his land next the Golf course where we looked across to the Great Windsor Forest; all the land in the region belongs to St. John's College, Cambridge, a gift from Henry VIII and just now is quite in the fashion, as many new wealthy people are coming out from London, which indeed is not to be wondered at, the situation is so beautiful. The paths lead in many directions in these perhaps twelve acre grounds and there is a beautiful vista from the house looking down a green turf avenue quite a distance. When I said I wished I had brought my camera to take such a pretty view Sir Joseph urged me to come again and bring the camera, thus being as gracious as was Lady Hooker when she expressed regret she had not known Mrs. Kennedy was in London that she might have had the pleasure of seeing her with us.

"The maid came to say that Lord Thring and his daughter had come to call but Sir Joseph did not hasten us from our interesting walk, but led us to the end of that path and then we returned to the house; in the parlor were several ladies and Lord Thring, a very old looking pale faced gentleman seated in a low armchair and not rising when shaking hands with Sir Joseph and us. He is a year younger than Sir Joseph but has pored over law books instead of much outdoor life. I had quite a chat with him on American law, which he has largely studied especially of Colonial or rather our Federalist period from 1790–1810. He has lately been at work on the Laws passed in the Commonwealth period which were almost wholly repealed when Charles II returned. He also said few people recognized the fact that the English monarchy was elective, the Act of Succession being regulated by Parliament. Tea was served to all of us and soon Lady Hooker announced that the carriage was ready to take us back to the station, she and Sir Joseph both accompanying us out of doors to say good bye."

The temptation is great to quote extensively from these interesting diaries but it is not possible within the limits of this paper.

Dr. Kennedy had a very extensive acquaintance and his many friends belonged to every vocation. He had the faculty of adapting himself readily to his surroundings and he enjoyed impartially the society of professional men, of business men or of those engaged in the humbler occupations of life. Quick to perceive merit and sterling worth wherever he found it, he counted many of his warmest friends among those whom fortune had not favored and his truly democratic spirit endeared him to these and made him the recipient of their devoted services. A striking instance of the long enduring friendships which he established early in life was the monthly Dining Club which he and some of his classmates founded on their graduation from Harvard in 1864. This club included men who distinguished themselves in after life — Dr. William L. Richardson, George Glover Crocker, Henry H. Sprague, William A. Monroe, Frank W. Wildes and Prentiss Cummings — and except when abroad Dr. Kennedy never willingly missed a meeting and often travelled many miles in this country for the sole object of dining with the Club. His acquaintance among botanists was very large and for many years a visit to the Pines and its hospitable hosts was enjoyed by most of the botanists who came to the Gray Herbarium for work or study.

If it be true that a man's friends are an index to his character, it is no less true that a man's books are an index to his intellect and Dr. Kennedy's library was truly representative in this respect. The botanical works which were many he fittingly left to the Gray Herbarium. Several volumes were of great rarity, perhaps the most notable work, which Dr. Benjamin L. Robinson, the curator, had long coveted, was Sowerby's English Botany with the exceedingly rare five supplementary volumes. The Shakespeariana were extensive and well selected and included many very valuable editions. In forming this part of his library Dr. Kennedy had the invaluable help and advice of Edwin Faxon, a profound scholar no less ardent in hunting rare books than in collecting rare plants. From 1892 till

Mr. Faxon's death in 1898, except during the summer vacations, Dr. Kennedy and the writer spent every Tuesday evening at the house on Lamartine Street in Jamaica Plain where Edwin lived with his brother Charles. These frequent meetings, jestingly referred to by us as The Faxon Club, were at first entirely botanical in character but later were quite as often devoted to books and it was here that the great erudition of Edwin Faxon and the Doctor became known to me. Unlike many collectors these two book lovers read their books and knew them from end to end. It was a revelation to me to be initiated into the mysteries of judging the points of books in which these two bibliophiles were so deeply versed.

Another notable feature of the Kennedy library was the large number of volumes of classical literature. Dr. Kennedy read Latin easily and also Greek. A copy of the Greek Testament was his constant companion. There were numerous volumes of travel and exploration, some well selected volumes of poetry, of which Dr. Kennedy was very fond, an unusually good collection of Harvardiana and works relating to the history of New England, a fine set of works of reference, notable among which were ornithological books and full sets of the works of the standard authors. Another special department consisted of books relating to the Swedenborgian religion to which sect the Doctor belonged.

Dr. Kennedy was a member of the Union Club, the St. Botolph Club and the Art Club, the Harvard Clubs of Boston and New York, the New England Botanical Club, the Vermont Botanical Club and the Sullivant Moss Society of New York, the Boston Society of Natural History, the Bostonian Society, the American Association for the Advancement of Science, the American Geographical Society of New York, and at the time of his death he was a Trustee of the Massachusetts Medical Benevolent Society, a highly prized honor which came to him entirely unsought and a striking testimonial to his worth and character.

Of these many associations the dearest and most highly valued was his membership in the New England Botanical Club, of which he was a charter member and to whose welfare and extension he devoted unstinted time and money. The many activities of the Club owe much to his generous and unfailing support which lasted until his death. For many years he was a regular attendant at its meetings, until a slight deafness and trouble with his eyesight, from which at various times during his life he had suffered, compelled him to give up this pleasure.

In 1896 he became a member of the Committee to visit the Gray Herbarium. He never faltered in his zeal to work for this institution and he contributed very largely to its development. The fine library wing was erected solely through his generosity and every undertaking of the Herbarium requiring financial support was sure of a liberal contribution from the Doctor. Nor were the Gray Herbarium and the Botanical Club the sole recipients of his benefactions. Both he and Mrs. Kennedy were constant in their support of many public and private charities. Few persons were aware during his life of the extent of his gifts, for the Doctor was most averse to publicity and the consciousness that he had done the right thing was a sufficient reward to him.

Dr. Kennedy's herbarium was essentially personal. Started in his college days, its carefully directed growth was continued until the year before his death. It was his daily companion and was kept in his spacious study together with his most used books of reference. Although he might have purchased sets of rare plants from dealers and professional collectors more freely than most amateurs, he rarely did so, preferring to build up his collection by his own application, thereby gaining personal familiarity with the floras and groups in which he was particularly interested. When he subscribed for sets it was because he desired to aid some worthy piece of exploration rather than he might himself possess the specimens.

He was careful and painstaking in his methods and his beautifully mounted sheets of well made specimens would serve as models of their kind. He often lingered long over their identification, but having reached his decision wrote the label with businesslike dispatch in his clear round hand.

His moss collection he gave some years before his death to the Cryptogamic Herbarium of Harvard University together with many valuable works relating to the group. In November, 1917, he gave his flowering plants and ferns, amounting to 13,490 sheets, to the Gray Herbarium. By far the greater part of his plants were from New England. When traveling elsewhere he always observed and often collected plants but he made no serious attempt to secure for his herbarium plants from beyond the limits of New England and adjacent portions of Canada.

Noteworthy was his local collection of the flora of the Willoughby Lake region. This portion of his herbarium, including 1547 sheets, was given to the Gray Herbarium with the understanding, now carried into effect, that it might be transferred to the herbarium of the New England Botanical Club, which in recent years has become the recipient of similar collections in which the local element is more detailed than can be symmetrically introduced into a world collection like the Gray Herbarium. Many of Dr. Kennedy's plants have been cited in published work and his specimens are subject to frequent reference. There is a pleasant sentiment in their safe housing, ready accessibility, and promise of long-continued usefulness in the establishment for which Dr. Kennedy did so much.

Dr. Kennedy's name is commemorated in American Botany by *Carex vestita*, var. *Kennedyi* Fernald and by *Sabatia Kennedyana* Fernald; the latter beautiful species, whose identity was established by Mr. Fernald in 1917, is a fitting monument to the Doctor who devoted so much of his life to the study of plants. So far as I can learn he published only one species; this was in the days when his eyesight permitted him to work intensively on the mosses. His new species which is accepted by all bryologists is *Pottia Randii* Kennedy, published in Rhodora, i. 78, pl. 5, 1899.

Dr. Kennedy wrote a number of botanical articles for Rhodora and other publications, but his principal effort as an author was the publication in 1904 of a Flora of Willoughby, Vermont — a most excellent piece of work that may well serve as a model for publications of this character. He became acquainted with this interesting station for rare and unusual plants probably in the early eighties and he seldom after that let a year go by, without making at least one trip to Willoughby. When he began to get together his material for publication he visited the locality repeatedly at different seasons of the year for several years before finally issuing the Flora.

After all, the remarkable and striking characteristic of Dr. Kennedy's life was his personality. It is not so much what he did as what he was that endeared him to all his friends and associates. His unfailing good humour and quiet dignity, his vast and varied knowledge of books and of men, his large sympathy so freely given to all, impressed every one who came in contact with him and made one feel as if he were better and stronger for having known Dr. Kennedy. What he has done will remain to his lasting credit, and what he was will be lovingly remembered by all who knew him.

HELIANTHEMUM BICKNELLII AND H. PROPINQUUM.

M. L. Fernald.

Helianthemum **Bicknellii**, nom. nov.— *H. majus* Bicknell, Bull. Torr. Bot. Cl. xxi. 259 (1894), not *H. majus* (L.) BSP. Prel. Cat, 6 (1888), which was merely a nomenclatorial transfer of *Lechea major* L. Sp. Pl. i. 90 (1753). Since Bicknell cites no type the following may stand as type: fruiting material from gravelly bank, Bangor, Maine, August 7, 1908, *Fernald* in Gray Herb.

Dr. S. F. Blake has recently shown,[1] as had already been suspected, that the Linnean *Lechea major* is identical with *Cistus canadensis* L. Sp. Pl. i. 526 (1753) and *Helianthemum canadense* (L.) Michx, Fl. Bor.-Am. i. 308 (1803). Consequently the name *H. majus* can no longer be applied to the stout and erect hoary-canescent plant to which, following Bicknell's clear discrimination, it has for a quarter-century been applied. Blake consequently has taken up for Bicknell's *H. majus* the name *H. propinquum* Bicknell in Britton, Man. ed. 2, 1069 (1905), stating that from the herbarium material he was unable "to discover any characters which seem to justify the separation of the plant as a species distinct from the *H. majus* of our present-day manuals — a conclusion in which I have the support of Prof. Fernald."

Had Dr. Blake, however, accompanied the present writer and Mr. Bayard Long during the summer of 1918 in a somewhat intensive study of the flora of Cape Cod he would at once have seen that *H. propinquum* has little in common with "*H. majus* of our present-day manuals," the plant here proposed as *H. Bicknellii*. *H. Bicknellii* is a coarse plant, the coarsest of our species, with the erect slightly cespitose stems 3–6 dm. high; *H. propinquum*, as well characterized by Bicknell, is lower, with much more slender, flexuous stems 1–3 dm. high, these sometimes arising separately (sometimes at intervals of 1 dm. or more) from the often slender rootstock. In *H. Bicknellii* the petaliferous flowers, on pedicels 0.3–1 cm. long, expand on Cape Cod as on Nantucket[2] from the 10th of July to the 10th of August, but *H. propinquum*, with pedicels becoming 1–1.6 cm. long, was in con-

[1] Rhodora, xx. 49 (1918).
[2] See Bicknell, Bull. Torr. Bot. Cl. xl. 614 (1913).

spicuous flower on June 20th, the capsules were well formed on the 30th and the last petaliferous flowers were gone and the seeds of the early capsules fully grown by the 4th of July. In other words *H. propinquum* had mature vernal fruit before the first petaliferous flowers of *H. Bicknellii* began to show, and the present writer, misled by Blake's identification of *H. propinquum* with *H. majus* Bicknell, supposed he was collecting an undescribed and remarkably distinct species. There are other characters, some of which have been brought out by Bicknell, but these await more detailed inspection. On Cape Cod as farther south *Helianthemum* is a critical genus, and the past summer's observations indicate that there are other species or well-marked varieties to be recognized. So striking are some of these plants that the present writer felt it important to make as thorough collections as possible and in this genus alone (aided for a happy month by Mr. Long and for one memorable day by Mr. Weatherby) he consequently collected 850 sheets for future consideration.

Although *H. propinquum* has been referred by Dr. Britton [1] to *H. georgianum* Chapman it does not seem to be quite identical with it. Bicknell (l. c. 616) has noted one important difference; and such material of *H. georgianum* as the writer has seen shows very much smaller anthers than in *H. propinquum* and the pubescence of the calyx much shorter, while the plant has a tendency to form winter-rosettes of basal leaves, a character not seen in our northern plants.

Gray Herbarium.

[1] Britton in Britton & Brown, Ill. Fl. ed. 2, ii. 540 (1913).

AMSINCKIA IN NEW ENGLAND.

Walter Deane.

The plants belonging to the genus *Amsinckia*, at home in western North and South America, show a decided tendency to wander from their native haunts, establishing themselves as permanent weeds in near locations, and even appearing at intervals in eastern United States, while they have been recorded from Denmark and Australia.[1] An account of the occurrence of the genus in New England may prove of interest.

Amsinckia barbata Greene is a native of British Columbia and includes *A. lycopsoides* of Gray's Manual, 7th edition, 1908,[2] not Lehm., the latter being a species of the state of Washington and not yet recorded as an escape. *A. barbata* has been found in Southington, Connecticut, by Luman Andrews and is recorded in the Catalogue of Flowering Plants and Ferns of Connecticut 328 (1910). The specimen has been determined at the Gray Herbarium. To this species has been doubtfully referred[3] a specimen in the Herb. N. E. Bot. Club from Lowell, Massachusetts. It is a fragmentary bit and is apparently abnormally developed.

I was much pleased to find a single plant of *A. barbata* on July 3, 1918, in Shelburne, Coös Co., New Hampshire. It was growing in a narrow strip of grass by the railroad near the station and was just beginning to flower. As the species could not be determined without fruit I reluctantly left it for a while. Its close proximity to freight cars with the accompanying men and horses moving about made the spot a dangerous place to leave a plant. All, however, went well till July 11, when I discovered to my sorrow that the grass all about had been eaten by horses, and my plant was nowhere to be seen. On the next day, however, July 12, I found the *Amsinckia* in good fruit, quietly resting under a large inverted cask that a strange chance had turned over it. It is an interesting record for Shelburne and for New Hampshire. The specimen has been identified at the Gray Herbarium, and is in my own collection.

[1] J. F. Macbride, Contrib. Gray Herb. xlix. 1 (1917).
[2] J. F. Macbride, Rhodora xviii. 27 (1916).
[3] J. F. Macbride, l. c.

There is a single instance of the occurrence of *A. arenaria* Suksd. in New England, the species having been recorded from Nantucket by Mr. E. P. Bicknell under the name of *A. intermedia* F. & M. in Bull. Torr. Bot. Club xlii. 39 (1915). He says there were "a number of plants in scattered growth. . . . near Surfside, in full flower and fruit, July 4, 1912." Later in Bull. Torr. Bot. Club xlv. 382–383 (1918) he states that he had submitted specimens to Mr. Macbride who refers them, "perhaps not without some uncertainty," to *A. arenaria* Suksd.

The occurrence in New England of *A. intactilis* Macbr. makes another record of the first appearance of an *Amsinckia* outside its native home. This is a species described in Contrib. Gray Herb. xlix. 13 (1917). It was known only from Glen Co., California, and Washoe Co., Nevada. It has handsome yellow flowers, 15 mm. long, and a long fruiting calyx. My cousin, Miss Grace Deane Williams, sent me on May 22, 1918, a fragment of this species from Shelburne, Franklin Co., Massachusetts, where she had found the plant in a sheep pasture near a chicken yard. It was the only specimen seen. I received on June 2 another fragment in full flower, and the entire plant was carefully protected until it was in good fruit when it was collected on July 16 and it is now in my herbarium. Mr. Macbride calls it "seemingly an introduced state." The specific characters, however, fix it in this species, and it makes an interesting addition to our New England flora.

Yet another species has been definitely recorded from New England. Through the kindness of Mr. Robert Scoville and Mrs. J. R. Sanford of Salisbury, Connecticut, an *Amsinckia* has been sent for determination to the Gray Herbarium. It was collected on June 16, 1903, at "Grasslands," Mr. Scoville's estate in Salisbury, by Mrs. Orra Parker Phelps, and was recorded in the Connecticut Flora, above mentioned, as *A. lycopsoides* Lehm. It proves to be *A. Menziesii* (Lehm.) Nels. & Macbr. This species has also been collected on waste ground in Hartford, Connecticut, by Mr. C. H. Bissell, on June 30, 1903. It also was recorded in the Connecticut Flora as *A. lycopsoides* Lehm. before Mr. Macbride's revision of the genus. Further study at the Gray Herbarium has settled its identification.

Dr. Chas. B. Graves of New London, Connecticut, has recently sent to the Gray Herbarium specimens of an *Amsinckia* collected "by Mr. E. F. Burleson of Jewett City, Connecticut, on June 14 and

July 5, 1917, in Griswold, Connecticut." This, too, proves to be *A. Menziesii* (Lehm.) Nels. & Macbr. This species is a native of Vancouver Island and western United States, and has been found as an introduction in Missouri and Illinois, which is a stepping stone to New England.

There have been now recorded for New England *A. barbata* Greene, *A. Menziesii* (Lehm.) Nels. & Macbr., *A. arenaria* Suksd. and *A. intactilis* Macbr. In addition to these mention may be made of two other species, *A. spectabilis* F. & M. and *A. intermedia* F. & M. (Macbride, l. c.) which have not been investigated as there are apparently no specimens in existence. The above records bear out the statement made by Mr. Macbride in RHODORA cited above that "other species that are essentially weedy in character in their native habitats. . . are to be expected in the eastern States."

CAMBRIDGE, MASSACHUSETTS.

CAREX FLAVA, VAR. GASPENSIS IN VERMONT.— *Carex flava* L., var. *gaspensis* Fernald, RHODORA, viii. 200 (1906), originally described from the limestone valleys of the Gaspé Peninsula, was found by Fernald & Wiegand in 1909 in eastern Aroostook County, Maine, and in 1910 in the limestone valleys of western Newfoundland. It is, therefore, interesting to find a characteristic sheet of this variety in the herbarium of the late Dr. George G. Kennedy, collected at Second Bog, Willoughby, Vermont, September 4, 1896. This is apparently the first record of the variety, which is distinguished by the slender subulate perigynia, from Vermont.— M. L. FERNALD, Gray Herbarium.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY.—NEW SERIES, NO. LVIII.

LITHOLOGICAL FACTORS LIMITING THE RANGES OF PINUS BANKSIANA AND THUJA OCCIDENTALIS.

M. L. Fernald.

In the *Botanical Gazette* for December, 1918, Professor A. H. Hutchinson[1] discusses at length the factors which limit the northern ranges of various species of forest trees and presents maps and charts which at first glance may appear authoritative. When, however, one sufficiently examines the details to see that on the first map *Abies canadensis* (no. 9) is indicated as having a northern limit in Newfoundland, central Labrador and southern Keewatin, while *Picea canadensis* (no. 2) extends to northern Labrador, Ungava Bay, and the northwest side of Hudson Bay, he at once sees that this paper belongs in the same class as many other so-called phytogeographic and ecological articles which appear in our American journals. *Abies canadensis* and *Picea canadensis* are identical! The White Spruce was called by Miller (1768) *Abies canadensis* and by Link (1841) *Picea alba*, but on account of the earlier specific name of Miller's is now known as *Picea canadensis*. In 1803, to be sure, the name *Abies canadensis* was used by Michaux for the Hemlock, which since 1855 has been separated as a member of the genus *Tsuga*, but Hutchinson gives *Tsuga canadensis* a separate range, to the south of *Abies canadensis*. If he is using the name *Abies canadensis* in a novel sense it is unfortu-

[1] Hutchinson, Bot. Gaz. lxvi. 465–493 (1918).

nate that no explanation is given of the exact identity of the tree intended.

Hutchinson has drawn his statements of ranges chiefly from a few authors, Bell, Macoun, and Low, and states that "the records of the explorers mentioned have been even more accurate than has generally been conceded." Certainly these records are a good basis but, like other records, they cannot be safely copied without careful sifting; and, although Bell's personal observations seem to be accurate, his generalizations and deductions from others are woefully inaccurate. Thus, Bell's statement that the American Elm occurs in Newfoundland goes back to old records of superficial and self-confident English travellers who wrote with a disregard of precise taxonomy which could commend their publications only to that group of American "phytogeographers" who abhor both taxonomic accuracy and the painstaking and unending study necessary for its achievement. The Elm has been included in various journals of travel in Newfoundland through a system of "back-door" determinations but in this case, as in most others, the identification of the species merely by looking up the local name in the index of a manual has led to confusion. The situation is as follows: in Newfoundland Yellow Birch, *Betula lutea*, is known as Witch Hazel while in England the latter name has been used for *Ulmus montana*. Therefore, what more natural than for Sir Richard Bonnycastle, writing of Newfoundland trees from a "first-hand unfamiliarity" with them, to refer to "ulmus montana, the wych hazel, or elm, which . . . grows all over the island"? Bonnycastle's record was forthwith seized upon as proof that *Ulmus americana* grows in Newfoundland, although others, relying merely on indices of American manuals, have treated it as *Hamamelis virginiana*. Neither *Ulmus* nor *Hamamelis* is known in Newfoundland!

By too closely following the now almost ancient paper of Bell[1] and quite disregarding the scores of very accurate and detailed accounts by later Canadian explorers, Hutchinson has slipped into some errors which a few hours of intelligent search of literature would have prevented. Thus he states (p. 476) that "the irregularity of the limits of *Pinus Banksiana* may be explained by the fact that although temperature conditions have so changed that this species has migrated to 56° N. lat. in the highlands of northern Quebec, it has

[1] Robert Bell, Geol. Surv. Can. Rep. for 1879–80, 44–56C (1881).

been limited in its northward progress by the low lying lands south and westward from James Bay," quite overlooking the fact that W. J. Wilson of the Geological Survey of Canada found and recorded[1] *P. Banksiana* in the valley of the Kapiskau River which flows through "the low lying lands . . . westward from James Bay," 160 miles north of Hutchinson's northern limit in that longitude.

On the other hand, by *not* closely following the trustworthy records of that wonderful authority on the Labrador Peninsula, A. P. Low, he has unfortunately abbreviated the northeastern limits of many species: *Betula papyrifera* by 160 miles and *Picea mariana* (*nigra*) and *Larix* each by 75 miles; while failure to get at other sources of information has materially shortened others of Hutchinson's limits: thus *Populus balsamifera*, as shown by the representation in the Gray Herbarium, reaches Hebron in latitude 58°, on the outer coast of Labrador, 185 miles beyond Hutchinson's northeastern limit. In fact, from Hutchinson's map one would infer that north of Hamilton Inlet the whole Atlantic slope of Labrador is treeless, but of course this is not the case. Witness the statement of Low who intimately knew Labrador: "The tree-line" after skirting Ungava Bay turns south-southeast, then "southward to the neighbourhood of Hebron, in latitude 58°, where trees are again found in protected valleys at the heads of the inner bays of the coast. At Davis Inlet, in latitude 56°, trees grow on the coast and high up on the hills, the barren grounds being confined to the islands and headlands. . . . These barren islands and bare headlands of the outer coast . . . have caused a false impression to be held regarding much of the Atlantic Coast."[2] With this definite statement and warning by Low, whom Hutchinson says he is following, it is unfortunate that he should have perpetuated the false impression that Atlantic Labrador is treeless.

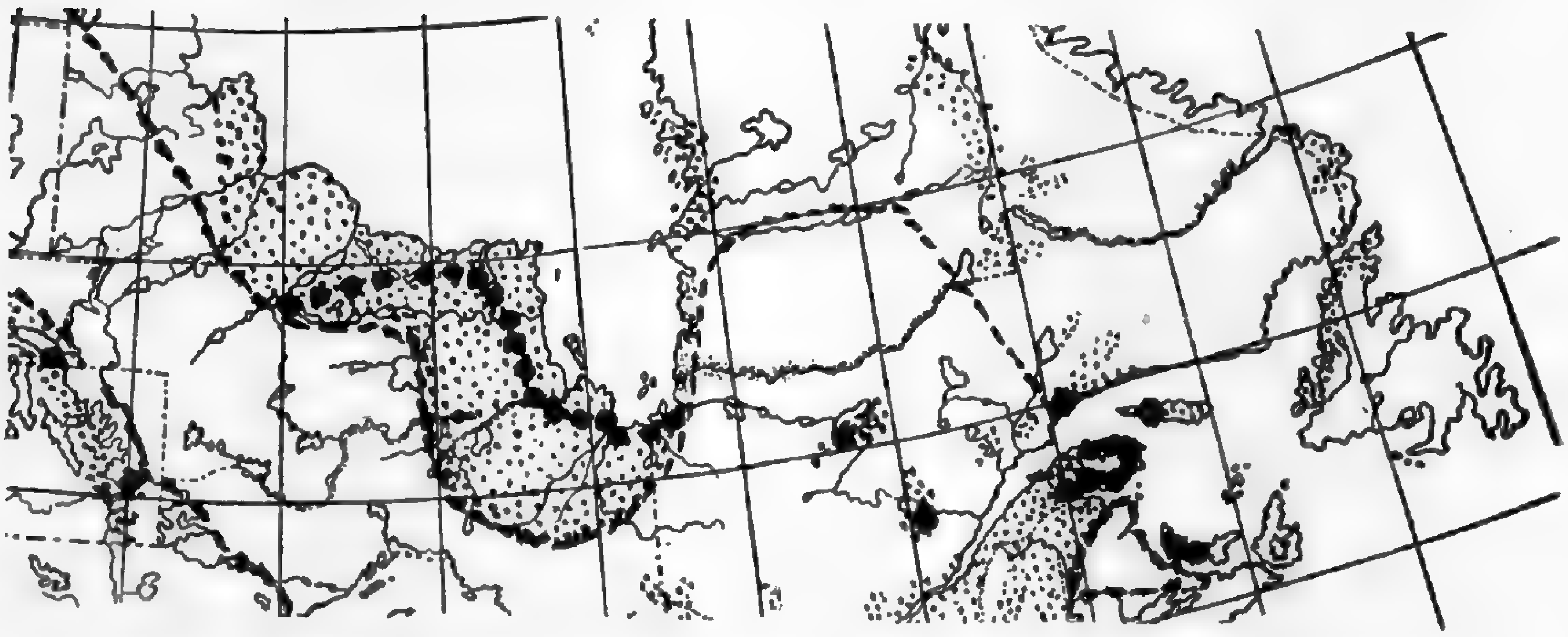
But, although for the sake of precision it is important to call attention to these inaccuracies in compilation which at once alter the premises, the chief object of the present notes is to emphasize one dominant factor in determining the limits of ranges of plants, the neglect of which has so obviously led Hutchinson into confusion. Repeatedly in his paper he refers to what are described as the "anomalous" distribution of *Thuja occidentalis* and the "irregularities" and "inconsistencies" in the distribution of *Pinus Banksiana;* and

[1] Geol. Surv. Can. Ann. Rep. n. s. xv. 226A (1903).
[2] A. P. Low, Geol. Surv. Can. Ann. Rep. n. s. viii. 31L (1896).

although the same perfectly elementary law of phytogeography could as well be brought out by contrasting the detailed ranges of many other species, such as *Picea mariana* and *P. canadensis, Castanea dentata* and *Juglans cinerea, Quercus Prinus* and *Q. Muhlenbergii,* we may appropriately take for this examination the "anomalous" and "irregular" or "inconsistent" ranges emphasized by Hutchinson.

Briefly, the "anomalies" or "irregularities" consist in the facts that, although the White Cedar, *Thuja occidentalis,* is "unusually large and fine in New Brunswick and the Gaspé peninsula," it is unknown in Newfoundland, Cape Breton, and Nova Scotia where, we are told, "the climate, soil, etc., are the same"; and that, although Banksian Pine "extends northward to 56° N. lat. on the dry uplands east of Hudson Bay," it is "practically eliminated from the low lying lands to the south and west of Hudson Bay and James Bay, water [so Hutchinson says] being the limiting factor." It is further stated that the "anomalous" distribution of *Thuja occidentalis* "defies explanation by regarding temperature, water, or soil as the limiting factors" and, furthermore, that "Cowles has shown that the composition of the rock from which any soil may be derived seldom acts in a limiting capacity with respect to the species which that soil may support. It is only in exceptional cases that a soil newly weathered, is deficient in the mineral constituents necessary for plant growth. This generalization is particularly applicable in Ontario, where the soil, whether it be glacial drift toward the south or the weathered deposits and exposed rocks farther north, is derived from the dominantly granitic rock of the Laurentian Plateau. The original composition of the soil is seldom a limiting factor, at least in so far as the forests of Ontario are concerned."

When we carefully study, however, the detailed ranges of these two species and take pains to discover the lithological character of each region where the species truly prospers and of all their outlying or extra-limital stations we shall find that, far from "defying explanation," the broad ranges and especially the outlying stations are readily explained by the chemical character of the soil, whether acid or basic. Pinus Banksiana *is confined to acid soils;* Thuja occidentalis *chiefly to basic soils and it reaches its maximum development and all its outlying stations only in positively calcareous areas.* The evidence upon which these generalizations are made is stated below.



Northern limits of *Pinus Banksiana* (broken lines) and of *Thuja occidentalis* (heavy spots): calcareous regions dotted.

Pinus Banksiana.

As Hutchinson states, on the Labrador Peninsula the Banksian Pine "extends northward to 56° N. lat. on the dry uplands east of Hudson Bay." This statement is supported by Low, from whom it was derived, and Low states with positiveness that "The soil of the greater part of the peninsula is derived from the underlying Archaean rocks," i. e. the acid granite-gneiss (Low, n. s. viii. 30L). West of the Labrador Peninsula the rocks on which the Banksian Pine grows are likewise invariably acid or neutral. The detailed accounts of the scores of areas described in the Annual Reports of the Geological Survey of Canada are replete with this evidence and a few brief but characteristic quotations are here included from the almost endless series of notes to the same effect, the name of the recorder and the number and page of the report being indicated in parentheses.

On the Noddoway River, emptying into Rupert Bay, an arm of James Bay, "Banksian pine is found, where suitable conditions exist, as far as Mattagami Lake, but its range towards James Bay is not restricted on account of the latitude, but by some other circumstance, for in a slightly more easterly longitude this tree ranges northward to Great Whale River, a distance of about 450 miles in a straight line from Mattagami Lake" (Robert Bell, n. s. viii. 79A). In the region southeast of Mattagami Lake "a considerable proportion of the area . . . consists of granitic rocks," but "from the above-mentioned point (about six miles northward of the narrows or outlet of Mattagami Lake), gneisses with some granitoid patches and occasional bands of micaceous and hornblende schists were the only rocks met with *in siu* all the way to Rupert's House." "The rocks consist principally of a variety of schists, such as dioritic, chloritic, hornblendic, and micaceous and also slatey arkose, alternating with massive greenstones" (Bell, l. c. 83, 84A). In other words, *Pinus Banksiana* stops in its northwestern range along the Noddoway as soon as it reaches the region of dioritic and hornblendic schists and greenstones, i. e. the calcareous region. Furthermore the drift of the region, derived from the shores of James Bay, contains a "certain proportion from the Manitounuck and Devonian rocks of James Bay, the percentage of these latter increasing as we went northward. Beyond Mattagami Lake this percentage became very considerable" (Bell, l. c.). The Manitounuck of James Bay is described as "made up mostly of limestones . . . sandstones and quartzites, shales, ironstones, amygdaloids and basalts" (Bell, Rep. for 1877–8, 11, 12C) while the Devonian rocks of James Bay consist "of dark grey bituminous limestone, interstratified towards the bottom with earthy drab limestone" (Bell, Rep. for 1875–76, 316). The drift material from Mattagami Lake northward, where the percentage of Manitounuck and Devonian fragments becomes "very considerable" is, therefore, also calcareous, and it is more than a mere coincidence that at this point the range of *Pinus Banksiana* along the Noddoway should abruptly end.

In the Nipissing and Temiscaming region "Jack-pine, called by some pitch-pine, or bastard spruce (*Pinus Banksiana*) is very often encountered in the more barren and rocky areas, and its presence seems an almost certain indication of the extreme poverty of the underlying soil" (Barlow, n. s. x. 34I). Somewhat farther west, in the area northeast of Lake Nipigon, "The height of land region . . . though level and swampy, is mostly of a sandy nature," "The timber in the height of land region is small spruce and tamarack with Banksian pine on the sand plains and higher land" (W. A. Parks, n. s. xv. 220A). Still farther west in Ontario, in the region west of Thunder Bay, "The greater part is occupied by Archaean rocks" (McInnes, n. s. x. 6H), and *Pinus Banksiana* is reported to be the most abundant tree of the region (McInnes, l. c. 11H).

Farther northwest, in Keewatin, in the valley of the Kanuchuan, "Everywhere, excepting on the muskeg areas, there is an open forest of banksian pine" and the country which is a "sandy flat, gradually rises southward for five or six miles, then it sharply rises to a ridge of gravel and boulders [gneiss]" (McInnes, n. s. xvi. 155A). Similarly in other regions of the upper Severn where "the whole area is occupied by rocks of Archaean age" (Camsell, n. s. xvi. 147A) "banksian pine and birch are found everywhere over the whole district" (Camsell, l. c. 151A); and so on through many other reports.

Hutchinson finds the range of *Pinus Banksiana* "irregular" because "It is practically eliminated from the low lying lands to the south and west of Hudson Bay and James Bay," naively adding, "water being the limiting factor." When, however, we look into the lithology of the "low lying lands to the south and west of Hudson Bay and James Bay" the remarkable *regularity* or *consistency* of the range of *Pinus Banksiana* is made apparent, for this vast region from which *Pinus Banksiana* is "eliminated" consists of Silurian and Devonian limestones. On the splendid Geological Map of North America, published in 1911 by the United States Geological Survey, this limestone region to the south and southwest of Hudson Bay is indicated as extending from Rupert Bay to the Churchill River, a distance (air line) of 850 miles, with a breadth at the southwest of more than 200 miles. Yet Hutchinson, finding the Banksian Pine "practically eliminated" from this region but abundant on acid Labrador and there extending north to latitude 56° says that "water" is "the limiting factor"; and he fails to detect the real factor because at the very outset he had somehow got an idea that "Cowles has shown that the composition of the rock from which any soil may be derived seldom acts in a limiting capacity with respect to the species which that soil may support."

And it is not merely Cowles who has thus argued, for this dogmatic assertion has been repeatedly made by other leading American ecologists. We thus find Clements writing: "Apart from the effect which excessive amounts of acids and salts may have in reducing the chresard, the chemical character of the soil is powerless to produce structural modification in the plant. Since Thurmann's researches there has been no real support of the contention that the chemical properties of the soil, not its physical nature, are the decisive factors in the distribution and adaptation of plants."[1]

[1] Clements, Research Methods in Ecology, 80 (1905).

Although *Pinus Banksiana* is, like other pronounced oxylophytes, "practically eliminated" from the vast limestone region to the south and southwest of Hudson Bay, it is important to note the adverb "practically," for where ridges of acid gravels or sands occur *Pinus Banksiana* is likely to occur with them. Thus, in ascending the Kapiskau River which flows through the limestones and calcareous clays into the west side of James Bay, W. J. Wilson (already referred to) left the river to explore an isolated ridge, which proved to be a kame "composed chiefly of gravel" (W. J. Wilson, n. s. xv. 226A) which was "covered with Banksian pine, canoe-birch and poplar."

All explorers agree that the Banksian Pine "does not touch either James' Bay or Hudson's Bay" (Bell, Rep. for 1879–80, 46C). Its essential absence from the region between the lower Noddoway and the Churchill River has already been sufficiently studied. How about the east side of James Bay? Low agrees with Bell that on the Labrador side it "does not come quite to the coast on Hudson or James Bay," adding the guess: "probably on account of the shore being generally low and swampy." Yet is it not significant that near the entrance of the East Main River into James Bay from the east, there should be bands of limestone "a few miles above its mouth, and along the coast of James Bay in the vicinity of that river" (Low, n. s. viii. 200L); that the next large river northward, the Big River, has its banks for several miles above its mouth "composed chiefly of bluish white clay" (Low, n. s. iii. 38J); and that, farther north, the lower stretches of the Great Whale River likewise flow through a "deposit of clay" which is full of "marine fossil shells" (Low, l. c. 53J)?

West and northwest of the calcareous "low lying lands to the south and west of Hudson Bay and James Bay," the region so generally avoided by *Pinus Banksiana*, occurs the great western Archaean barren region, extending from Lake Superior west to Lake Winnipeg, and north to the Arctic; and here, naturally enough, the Banksian Pine extends "north-westerly to the Athabasca River, . . . and northerly down the Mackenzie River to the arctic circle" (Macoun). The accounts of discerning explorers through this tremendous tract all emphasize the abundance of the pine on the most sterile areas: thus, throughout his extended report (n. s. viii. D) on the Athabasca Lake region, J. B. Tyrrell continually refers to the abundance of Banksian Pine on the sandy plains; and so on without seeming limit.

In fact, it is most difficult to comprehend how a phytogeographer, who must have seen a geological map of North America, can read Robert Bell's account of the broad northern range of *Pinus Banksiana* without suspecting the truth. Here is Bell's statement somewhat condensed: "from the head of the Bay of Chaleur," it extends north to Lake Mistassini, "from which it runs west to the Moose River, keeping about 100 miles south of James' Bay. . . . It does not touch either James' or Hudson's Bay. Southward it is common on the north shore of Lake Huron and around both shores of Lake Superior, whence it is met with all through the country to Lake Winnipeg." "From [the upper] Moose River it runs north-west to the Mackenzie, which it crosses about the Arctic Circle" (Bell, Rep. for 1879–80, 46C).

The southern outliers of *Pinus Banksiana*, too, are exclusively on acid and hopelessly barren rocks and sands or in acid bogs, for, although the species is commonly found on dry uplands, in the sterile southeastern area of New Brunswick it sometimes occurs on the acid bogs so that in that region at least "water" is not "the limiting factor." Although Bell has made the wholesale statement that *Pinus Banksiana* "occurs throughout Nova Scotia and New Brunswick" (Bell, Rep. for 1879–80, 46C), the Banksian Pine is, as a matter of fact, a highly localized tree in those provinces,[1] Fernow correctly stating that in Nova

[1] The loose and inaccurate generalization above referred to is an illustration of a type of statement which, when depended upon by others, at once leads to erroneous conclusions and which, most unfortunately, floods our so-called phytogeographic and ecological literature in America. Consequently those who have "a first-hand unfamiliarity" with the facts (for this apt phrase we are indebted to Dr. D. F. Jones's refreshingly straightforward review in Science for October 4, 1918) — consequently, those who are not in a position to weigh the values of statements are bound to be misled. Thus, in a recent sumptuously illustrated publication issued by the New York State College of Forestry and therefore bound to be considered "scientific," the state of New York is divided into a number of "Zones," the first the "*Zone of Willow Oak, Sweet Gum, Persimmon, etc.*" "continuing along the Connecticut coast" (to New Haven, as indicated on the accompanying map). This "Zone" which is said to occupy the western coast of Connecticut is reported by Bray to be characterized by the following

"*Indicator Species.*

Short-leaf pine	= (*Pinus echinata* Mill.).
Willow oak	= (*Quercus phellos* L.).
Oak	= (*Quercus pagodaefolia* (Ell.) Ashe).
Black-jack Oak	= (*Quercus marilandica* Muench.).
Laurel magnolia	= (*Magnolia virginiana* L.).
Sweet gum	= (*Liquidambar styraciflua* L.).
Hop tree	= (*Ptelea trifoliata* L.).
Mistletoe	= (*Phoradendron flavescens* (Pursh) Nuttall).
Virginia spiderwort	= (*Tradescantia virginiana* L.).
Day flower	= (*Commelina virginica* L.)."

Now, the disheartening features of this list of "*Indicator Species*" are that, while 6 out of the 10 are locally indigenous in southeastern New York, 3 of the others (*Ptelea, Tradescantia,* Scotia "it is found only in special localities on poorest sites in Colchester county."[1] In New Brunswick, too, the tree is localized and Robert Chalmers correctly understood the situation when he wrote of eastern New Brunswick the following accurate account:

"In New Brunswick, as indeed, in all glaciated countries, however, we cannot determine the exact limits of the areas of the forest growth affected by the geological formations. On the hills and ridges underlain by limestones, we meet with maple and birch groves, intermixed occasionally with spruce. The Cambro-Silurian and the old crystalline belts of rocks traversing the province from the Baie des Chaleurs to the Chiputnecticook Lakes, seem also to mark a boundary in the forest distribution. North of this lies the great area of Silurian limestones, south of it the Carboniferous sandstones. Owing to the larger extent of country which these formations occupy, the soil necessarily bears a closer relation to the underlying rock, and is less intermixed with extra-limital drift; consequently the vegetation and forest growth upon these areas ought to show the effect of each particular kind of soil upon the flora of the country. Have these districts any peculiar forms in their floral productions?

"On the Silurian limestones there is observable a paucity of ericaceous plants, of scrub pine [*P. Banksiana*] and black spruce, and an almost entire absence of hemlock, all of which are abundant on the Carboniferous sandstones, the latter tree, indeed, reaching fuller development on these as regards size and number than elsewhere in the province. White spruce, fir, white pine, the paper birch, and

and *Commelina*) are in southeastern New York usually considered merely garden-escapes and the 10th species (*Phoradendron*) is not known north of Monmouth County, New Jersey; furthermore, of the 10 "*Indicator Species*" only 1 (*Liquidambar*) is unquestionably indigenous in Connecticut, 2 (*Ptelea* and *Tradescantia*) are garden-escapes, though *Tradescantia* may be locally indigenous, and the remaining 7 are entirely unknown in the state of Connecticut!

Again, in Hawley & Hawes's *Forestry in New England*, a book now being freely quoted, we find such an amazing statement as that "Pitch Pine (*Pinus rigida*)... occurs throughout New England in the extreme northern part, and in the mountains"; whereas, as a matter of fact, the Pitch Pine is a coastal plain tree extending into New England from the south. In Vermont it is found only "in the northern portion of the Champlain Valley" and "in the Connecticut Valley as far north as Wells River" (Burns & Otis); but, although the "northern portion of the Champlain Valley" suggests northern New England, it should be borne in mind that the altitude is slight, that this sandy region has to a great extent a coastal plain flora and that northernmost New England is nearly 150 miles farther north than Lake Champlain. In New Hampshire Pitch Pine follows north "along the Merrimac valley to the [bases of the] White mountains and up the Connecticut valley to the mouth of the Passumsic" (Dame & Brooks); in Maine it is confined to the southwestern sixth of the state and the coastal granites east to Mt. Desert Island. It is quite unknown among the higher mountains.

[1] Fernow, Forest Conditions of Nova Scotia, 11 (1912).

beech appear also to be more abundant upon the Carboniferous area, though common also upon the Silurian uplands. But the striking features of the forests upon the latter are the groves and ridges of birch and maple occurring in almost every part. These are seldom met with on the sandstones except where Lower Carboniferous limestones prevail.

"The comparative abundance of ericaceous plants on the Carboniferous areas is doubtless due, in some measure, to the flat surface and consequent imperfect drainage, resulting in the formation of swamps, peat bogs, etc., where these forms of vegetation find a congenial habitat. But the difference in the sylvan growth occupying the drier grounds of the two regions in question is not explicable unless we admit that the geological formation has an influence upon it. On the sandstone area, the hemlock and scrub pine are most abundant trees compared with their distribution upon the Silurian uplands. Black birch, beech, and black spruce also appear to be more common and larger. These facts regarding distribution lead to the inference that the gravelly, siliceous soil overlying the sandstones is more favourable to the growth of these trees, or it may be that the limestones are unfavourable, or, perhaps, both causes operate." (Chalmers, n. s. vii. 140, 141M).

Although on the acid north shore of the lower St. Lawrence the Banksian pine "occurs abundantly" eastward to "the neighbourhood of the mouth of the Moisie River" (Low, n. s. viii. 34L), i. e. east to longitude 66° W., and although it is on thoroughly leached and consequently acid Permian sands of Prince Edward Island in longitude 64° W. and on the "poorest sites in Colchester county," Nova Scotia, to longitude 63° W., it is noteworthy that this species should be unknown on the calcareous Gaspé Peninsula which in latitude lies midway between the "north shore" and Nova Scotia and in longitude fails to reach eastward to the 64th meridian. In his account of the limestone region of northern New Brunswick and southern Gaspé (Bonaventure County) Chalmers enumerates the trees "in the order of their relative abundance" and, although, as would be expected in a calcareous tract, *Picea canadensis* with trunks 2–2½ feet in diameter and *Thuja occidentalis* with trunks 1–3 feet in diameter head the two lists, the first for "drier parts of the Silurian upland" the other for the "lower grounds," *Pinus Banksiana* is not mentioned at all in either list (see Chalmers, n. s. ii. 33, 34M). In an intensive study of the Gaspé Peninsula and the literature bearing upon it the present writer has found absolutely no evidence of the Banksian Pine in that vast Silurian and Cambrian region, the only known stations on the peninsula being on the leached crests of some of the intrusives at the southwest corner of the peninsula, while farther west the pine reappears on the quartzites of Rimouski County.

It is also noteworthy that along the north shore of the lower St. Lawrence, after "occurring abundantly" eastward to "the neighbourhood of the mouth of the Moisie," *Pinus Banksiana* should abruptly stop, for on the acid barren lands of northwestern Canada it extends north quite to the Arctic. Is it not significant, then, that in "the neighbourhood of the mouth of the Moisie" there should be a great mass of anorthosite 60 miles broad, and east of that another, for analyses[1] of 24 samples of anorthosite from different regions of Labrador, Canada and the Adirondacks, show it to contain an average of 9 % of calcium, the amount often reaching 18 %; and that east of these anorthosites lies the extensive limestone tract including the Mingan Islands and "the neighboring coast," for "a distance of forty-five miles," "the Mingan development of the Calciferous formation" having a thickness of 250 feet (see Logan, Geol. of Canada, 119–121)?

In Maine there is not a single known station for *Pinus Banksiana* which is not on granite or the most highly siliceous of rocks. In New Hampshire the species is only on Welch Mt., a sterile granite mass south of the syenitic Franconia Range; in Vermont it "is one of the rarest of our trees" growing on "sandy, sterile soil; rocky slopes."[2] Similarly in New York and the Great Lake States the Banksian Pine belongs to the most sterile habitats, and very recently Rosendahl & Butters have stated that in Minnesota and Wisconsin "The Jack Pine (*P. Banksiana* Lamb.) occurred most abundantly on sandy outwash plains . . . and in the great paleozoic sand plains."[3]

These facts and many scores of monotonously similar ones which the writer refrains from merely piling up are sufficient evidence that the Banksian Pine *is a pronounced oxylophyte.*

In spite of the fact that *Pinus Banksiana* is essentially absent from the great limestone region bordering the southwest side of

[1] Adams, Geol. Surv. Can. Ann. Rep. N. S. viii. 1305 (1896).
[2] Burns & Otis, Trees of Vermont, 31 (1916).
[3] Rosendahl & Butters, Pl. World, xxi. 107 (1918).

Hudson Bay north to Churchill, from the calcareous Gaspé Peninsula and from Nova Scotia (with the exception of Colchester county on the isthmus which connects with New Brunswick) Transeau, discussing the ranges of forest trees, has issued a map[1] which carefully includes in the area where this species (as *P. divaricata*) is said by him to be "dominant," the 850 miles of limestones along the southwest side of Hudson Bay, and his dotted lines, which form the boundaries, embrace between their eastern terminals all of Nova Scotia, New Brunswick and Gaspé, as well as all of central and nothern Maine. The absence of *Pinus Banksiana* from the west side of Hudson Bay, from Gaspé and from Nova Scotia has been sufficiently emphasized. Similarly in the region of Maine indicated on Transeau's map the species has but few limited areas, these all on the granites and quartzites of the upper Penobscot, Kennebec, and Androscoggin; but, although "Lumbermen call it a scarce tree in Northern Maine,"[2] *south* of Transeau's boundary it is truly dominant on some of the sterile regions of the Maine coast. Transeau's map, then, which has been accepted by other ecologists as authoritative, represents *Pinus Banksiana* as "dominant" on 150,000 square miles of country from which actually the tree is essentially unknown. To the ecologist this discrepancy may seem trivial. At least, when the present writer criticized[3] the inaccuracies of Harshberger's work, where he made *Anemone narcissiflora*, which is actually unknown east of the alpine regions of Colorado, and *Cassiope tetragona*, unknown nearer than northernmost Labrador, typical forest plants of the Great Lake region, and confused *Vallisneria spiralis* of fresh water with the salt-water Eel Grass, *Zostera marina*, Cowles characterized these and the hundreds of other similar cases which crowd the pages of Harshberger's work as errors which "to taxonomic specialists of local areas . . . loom large," while "to those of broader view-point, however, the numerous errors will be subordinate."[4] If such errors are merely "subordinate," how preposterous an error, one would like to know, would be required to "loom large" in the mind of an ecologist?

[1] Transeau, Am. Nat. xxxix. 875, fig. 1 (1905).
[2] Goodale, Prelim. Report Nat. Hist. and Geol. Me. 127 (1861).
[3] Rhodora, xiii. 213–224 (1911).
[4] Cowles, Bot. Gaz. liii. 181 (1912).

Thuja occidentalis.

Hutchinson says that, "The 'anomalous' distribution of *Thuja occidentalis* defies explanation by regarding temperature, water or soil as the limiting factors: . . . 'It is absent in Newfoundland, Cape Breton, Nova Scotia, and the east half of Prince Edward Island, but unusually large and fine in New Brunswick and the Gaspé peninsula, in which the climate, soil, etc., are the same as in the adjacent regions, where no trace of the species is to be found.'" It is certainly startling to read that the climate and soil of Newfoundland, Nova Scotia, New Brunswick, Prince Edward Island, and Gaspé are so uniform, for in sections of western Nova Scotia peaches are raised with great success, but he would be a foolish man indeed who would think of planting a peach orchard in Newfoundland or in Gaspé county; and in view of the remarkably spotted and pied colorings of a geological map of this region it is further obvious that the generalization quoted above is wholly inaccurate.

Bell and following him Hutchinson are correct, however, in stating that in the Gaspé Peninsula and at least in northwestern New Brunswick *Thuja occidentalis* attains an unusual development, and had they been familiar with the region they would have extended the limits of this area of "unusually large and fine" trees into northeastern Maine. Chalmers's statement that in this Silurian limestone region the trunks of *Thuja* range from 1–3 feet in diameter has already been noted. These figures are, however, by no means the maximum, for at many points in northern Maine the writer has measured Cedars with trunks 4–6 feet in diameter. In southeastern New Brunswick *Thuja occidentalis* is localized and there chiefly a swamp shrub or dwarfed tree, obviously not in a wholly satisfactory environment. This region, the Eastern Plain of Ganong,[1] is the extensive area of Carboniferous sandstones, already referred to under *Pinus Banksiana.* To the southeast of the Carboniferous plain lie the Southeastern Highlands, in the east chiefly of granites and felsites, and at the extreme southeast lies the extensive Permian sandstone region which continues for 100 miles along the northern side of Nova Scotia. Chalmers describes this region as having some excellent farms along the coast and in the

[1] Ganong, Bull. Nat. Hist. Soc. N. B. iv. 236 (1899).

river-valleys where Pleistocene clays have been deposited; but "Upon the higher grounds . . . we meet with different soils, and in many cases poorer farms. . . . Upon the Middle Carboniferous of Kent and portions of Westmoreland counties, . . . the surface is flat and the drainage deficient; hence the soils are cold, boggy, and in many places covered with a stratum of white or gray bleached sand. . . . Upon the rolling surfaces, however, there are, as already stated, fair arable soils, though deficient in lime. . . . In Cumberland County, Nova Scotia, above the limits of the post-glacial subsidence, we meet with soils and rocks differing somewhat from those of the Middle Carboniferous just described. Here the prevailing surface beds are reddish in color, . . . here, as in New Brunswick, there is a deficiency of lime in the soil." (Chalmers, n. s. vii. 136–138M). With this extensive region "deficient in lime" extending from calcareous northern New Brunswick into Nova Scotia, it is only natural that *Thuja* should be practically absent[1] from the latter province. The failure of *Thuja* to reach Newfoundland is evidently due to the fact that the plants which reached Newfoundland from the southwest were forced to migrate on the siliceous Tertiary continental shelf which formerly connected the North American continent with Newfoundland. This point has already been sufficiently discussed elsewhere.[2]

On Prince Edward Island *Thuja occidentalis* is, as Hutchinson says, unknown from the eastern half of the island, but it is frequent and often abundant from slightly east of Badeque Bay northwestward, the half of the island where "calcareous conglomerate, the pebbles being of red shale, and containing white calcite in considerable quantity, form a feature which can be easily recognized" (Ells, Rep. for 1882–83–84, 13E).

Throughout the glaciated regions of New Brunswick and Maine, for many miles south of the region of calcareous rocks but where the soils are chiefly drift material or glacial till from the north, *Thuja occidentalis* is frequent or often abundant, and on the lower levels of

[1] By the statements of Bell, Fernow, and Hutchinson *Thuja* is said to be absent from Nova Scotia; but there is good evidence that it occurs, although very rarely and only as an unsuccessful swamp shrub, near the New Brunswick border. Thus in Lindsay's *Catalogue of the Flora of Nova Scotia* (Proc. N. S. Inst. Sci. iv. pt. 2, 209) it is recorded from Cumberland, the county immediately adjoining New Brunswick; and Professor H. G. Perry of Acadia University assures me that, although very rare and obviously not at home, *Thuja* has been observed by him in swamps of west-central Nova Scotia.

[2] Fernald, Rhodora, xiii. 161 (1911) and Am. Journ. Bot. v. 238 (1918).

New Brunswick and Maine where the noncalcareous rocks are deeply buried in Pleistocene marine clays the Cedar is often found. The very great difficulty of deciding off-hand in a drift-covered area whether a given colony of plants is in a calcareous or a non-calcareous soil has already been referred to in a quotation from Chalmers. This difficulty is made clear by the following incident. The argillaceous rocks which occupy much of the lower valley of the Penobscot are essentially non-calcareous. Yet at a few points, such as the ledges near the ferry at Veazie, there occur good developments of Arbor Vitae, accompanied by such well-recognized calcicolous herbs as *Anemone canadensis*, *A. riparia* and *Juncus brachycephalus*, species which abound in the limestone region of Aroostook County but which are exceedingly local on the lower Penobscot. The present writer called this area to the attention to one of his friends at the University of Maine, a prominent chemist and mineralogist, who, after visiting the spot and taking rock-samples, reported that the rock itself was non-calcareous but that when tested with acid the surfaces gave a marked effervescence. Further study of the region showed that at this point along the river the ledges were stained by seepage from the steep banks of an esker which follows the valley, and that the calcareous waters from the esker had here converted the non-calcareous rock into a definitely calcareous habitat.

Similarly, a small vein of calcite intruded into an otherwise non-calcareous rock will materially effect the neighboring soil, while trap dikes, which are commonly calcareous, often alter the soil-conditions of a granitic region. Again, the average botanist is likely to pass as *granite* any of the granitic series or even hornblende diorite; but the syenites and diorites furnish a slightly calcareous soil. Consequently we are too apt to infer, because a country is composed of intrusive or metamorphic rocks, that it is granite and that, therefore, plants which delight in truly calcareous soils are not to be expected. On just this point we have the clear statement of the great soil-chemist, Hilgard:

"A soil-formation overlying limestone on the slopes of a range may be wholly derived from non-calcareous formations lying at a higher elevation, or may have been leached of its original lime-content by abundant rains. The feldspars constituting rocks designated as granite, may or may not be partially or wholly of the soda-lime instead of the potash series; the mica may or may not be partially replaced by hornblende, in which cases the soil would be calcareous to the extent of determining the character of the flora as calcifuge or calciphile, without its being at all evident in the physical character of the soil, which would still be 'granitic' or 'siliceous.' Such observations in order to be critically decisive, clearly require that the observer should be, not merely a systematic botanist, nor a mere geologist or chemist, but all these combined. There is good reason to believe that most or all of these supposed contradictions would disappear before a critical physical and chemical examination of both the soils and the rocks from which they are supposed to have been derived. Contejean himself, in placing so many of his long catalogue of plants into the doubtful groups, suggests many cases in which the above considerations may explain the apparent discrepancies.

"*What is a calcareous soil?* The definition adopted for this volume has been given in a previous chapter (chapter 19, page 367); viz, that *a soil must be considered calcareous so soon as it naturally supports a calciphile flora* — the 'lime vegetation' so often referred to above and named in detail. Upon this basis it has been seen that some (sandy) soils containing only a little over one-tenth of one per cent. of lime show all the characters and advantages of calcareous soils; while in the case of heavy clay soils, as has been shown, the lime-percentage must rise to over one-half per cent. to produce native lime growth."[1]

It is, therefore, premature to say that in the region of its almost continuous occurrence, from New Brunswick and adjacent Quebec across northern New England, northern and central New York, southern Ontario, Michigan, Wisconsin and Minnesota, *Thuja* confines itself to calcareous soils for, like many other plants in the area where they are dominant, *Thuja* may prove to be ubiquitous or somewhat indifferent to moderate differences of soil; but that its finest development in this region is in the calcareous tracts cannot be seriously questioned.

In New Brunswick and Maine *Thuja* likewise delights in the river alluvium and terraces along the principal streams, which have their upper sources in calcareous tracts for, as Hilgard clearly shows,[2] although in water draining from mixed but unmanured soils "lime is the ingredient most abundant," river waters show a marked diminution "especially of lime . . . indicating a deposition of lime carbonate

[1] Hilgard, Soils, 523, 524 (1907).
[2] Hilgard, Soils, 24 (1907).

in the river deposits or alluvial lands"; but in such valleys as that of the Saco, a river draining the granitic eastern White Mountains and consequently with alluvium deficient in lime, *Thuja* is apparently unknown.

In New Hampshire *Thuja* is abundant in the region north and northwest of the White Mountains and along the Connecticut Valley south to Hanover;[1] and it is "Common in northern and central Vermont, and as far south as Woodstock and Hartland in eastern Vermont, up to 1,000 feet altitude."[2] An examination of Hitchcock's Agricultural Map of New Hampshire[3] (the map overlapping into Maine and Vermont), shows that two-thirds of the region north and northwest of the White Mountains is indicated as having calcareous soil, partly derived from limestones, partly from calcareous slates and schists; and this calcareous area, which extends west to the granitic Green Mountains, follows south beyond Hanover, and on the Vermont side includes Woodstock and Hartland. At Hanover and at the southwestern border of Hartland and the southeastern border of Woodstock the limestone is shown as meeting regions of gneissic or granitic rock, although after skirting around these granitic masses the calcareous rocks continue southward along the Connecticut. In this calcareous area of northwestern New Hampshire and northeastern Vermont the primitive Arbor Vitae or White Cedar emulated the forests of northern Maine, northern New Brunswick and Gaspé, for in Dr. Kennedy's *Flora of Willoughby, Vermont*, we find the statement, that "Some stumps of old growth cedars, more than three feet in diameter, still remain."[4]

In Massachusetts *Thuja occidentalis* is confined to the calcareous upper Connecticut Valley and to the Stockbridge limestone region of Berkshire County.[5]

In Connecticut it is indigenous only in the limestone region of northern Litchfield county: "Canaan, on a limestone ridge and in a near-by swamp (C. K. Averill), Salisbury, rocky hillside and at another locality in a deep swamp (Mrs. C. S. Phelps)."[6]

In southern New York *Thuja occidentalis* was formerly known on

[1] Dame & Brooks, Handb. Trees of New Eng. 23 (1902).
[2] Burns & Otis, Trees of Vt. 51 (1916).
[3] C. H. Hitchcock, Geol. of N. H. i. 548 and map opposite (1874).
[4] Kennedy, RHODORA, vi. 103 (1904).
[5] See Dame & Brooks, l. c.
[6] Graves, Eames, and others, Cat. Fl. Pl. and Ferns Ct. 38 (1910).

the lower Hudson: "At Verplanck's Point . . . on . . . fine bluffs of palaeozoic limestone,"[1] where it was associated with other calcicoles, *Anemone canadensis, Arenaria stricta, Arabis lyrata,* etc.; and at other stations lower down the Hudson (now presumably extinct).

In New Jersey the only authentic records are from the lower Hudson, the old records from farther west, having been doubted.[2] In other words, in Connecticut and southeastern New York and adjacent New Jersey *Thuja occidentalis* occurs only in the localities indicated so clearly on Dana's map of limestone areas of the region (including the Palisade trap range), or as Dana concisely defines it "the belts of limestone . . . which extend southward in eastern New York and from Canaan and Salisbury in Connecticut"[3] (In Connecticut *Thuja* is known only from Canaan and Salisbury!).

In Pennsylvania, according to Porter, *Thuja* is "Generally escaped from cultivation, but not definitely known in the native state;"[4] and Long likewise emphasizes that the tree "appears to be quite unknown in a native state in the wide mountain area of Pennsylvania"[5]

In Virginia *Thuja occidentalis* seems to be confined to the calcareous valleys among the mountains. The records are few, as follows: at Natural Bridge "the great *Arbor Vitae* in Cedar Creek ravine;"[6] "Plentiful along the creeks in the Valley of the Middle Fork of the Holston River, especially where the banks are rocky and cañon-like";[7] "Alleghany Co., Steele."[8] Both Cedar Creek and the Holston River are in the Great Valley or the Valley of Virginia, where the "Valley limestone . . . occupies the greater part of the floor,"[9] and where, as described by W. B. Rogers, along the Holston Valley "Hills of limestone apparently arranged in rows . . . are stationed along the valley at nearly equal intervals."[10] In Alleghany County, too, although Tidestrom does not give Steele's precise locality, it is certain that *Thuja* is upon either the Silurian or Devonian calcareous rocks of which that county is composed.

[1] F. J. H. Merrill, Bull. Torr. Bot. Cl. xiii. 6 (1886).
[2] See Britton, Cat. Pl. N. J. 299 (1889), Taylor, Mem. N. Y. Bot. Gard. v. 74 (1915).
[3] Dana, Man. Geol, ed. 4, 529, 530 (1895).
[4] Porter, Fl. Penn. 3 (1903).
[5] Long, Rhodora, xv. 121 (1913).
[6] A. M. Vail, Mem. Torr. Bot. Cl. ii. 38 (1890).
[7] Small & Vail, Mem. Torr. Bot. Cl. iv. 167 (1893).
[8] Tidestrom, Elysium Marianum, ed. 2, 88 (1907).
[9] Bassler, Va. Geol. Surv. Bull. no. II-A, 36 (1909).
[10] W. B. Rogers, Geol. of Va. 140 (1884).

In West Virginia *Thuja* is known from but two localities, in the extreme Northeast: Knobly Mountain in Mineral County and near Petersburg in Grant County.[1] Knobly Mountain extends across Mineral and Grant Counties and consists, according to Darton & Taff, of Silurian limestones and calcareous sandstones,[2] while Petersburg is on the South Branch of the Potomac, which drains these and the calcareous Devonian sandstones and shales.

"This is about the rarest tree in North Carolina.... It is said to occur in only a few places, as on Cripple Creek and Linville River, on limestone soil"[3]; while in Tennessee it is only "along Holston River [see above] in the mountains,"[4] the Holston in Tennessee flowing through a highly calcareous region, the rocks, as indicated by Keith,[5] being chiefly Cambrian and Silurian limestones.

In Ohio *Thuja* is known only in "Champaign, Franklin, Greene, Highland, Adams" counties;[6] Orton, on his map of the Limestone Formations of Ohio,[7] showing Champaign and Greene Counties as wholly limestone, Highland and Adams almost wholly so, and the western half of Franklin County calcareous.

In Indiana *Thuja* is known only in Lake County,[8] which is Silurian, although thinly covered at the north by the wind-blown sand-dunes beside Lake Michigan. The "Tamarack-Arbor-vitae swamp is on the eastern boundary" of the sand dunes where *Pinus Banksiana* abounds, but not on the dunes themselves. Here, however, Nieuwland informs us, "The Arbor-vitae trees are not in the best of condition,"[9] although he ascribes their poor condition to the cutting of a ditch some distance away.

So much for the southern colonies of *Thuja occidentalis*. Now turning in the opposite direction we find a strikingly similar restriction to calcareous soils of the extreme northern colonies.

In Labrador, Low states that "*Thuja occidentalis* Linn. (Cedar) hardly enters the southern limits of the peninsula. It occurs just south of the mouth of the Rupert River, at the foot of James Bay,

[1] Millspaugh, Living Flora of W. Va. 199 (1913).
[2] Darton & Taff, Piedmont Folio (no. 28), Geol. Atlas U. S. (1896).
[3] Coker & Totten, Trees of N. C. 26 (1916).
[4] Gattinger, Flora of Tenn. 32 (1901).
[5] Arthur Keith, Morristown Folio (no. 27), Geol. Atlas U. S. (1896).
[6] Shaffner, Cat. Ohio Vasc. Pl. 136 (1914).
[7] Orton, Geol. Surv. Ohio, ser. 4, Bull. no. 4 (1906).
[8] Deam, Indiana State Bd. Forestry, Ann. Rep. xi. 110 (1912).
[9] Nieuwland, Am. Mid. Nat. ii. 165 (1912).

and does not cross that stream in the eastern course of its northern limit. It is only found about the southwestern bays of Mistassini Lake, from which it extends south-east, crossing the St. Lawrence to the westward of Seven Islands. No cedar trees were seen along the Manicuagan River from its mouth upward" (Low, n. s. viii. 33L).

In regard to the region of Seven Islands, Sir William Logan tells us that the whole north shore of the lower St. Lawrence is Laurentian, "with the exception of a narrow border of Silurian strata on the strait of Belle Isle, another at the mouth of the Mingan River, and a third near the Seven Islands."[1] The Manicuagan where "no cedar trees were seen" was explored from mouth to headwaters by Low, who writes "Rocks, of Archaean age alone, were met with along the various routes followed" (Low, l. c. 104A); but *Thuja* is found at the southern end of Lake Mistassini, for "The soil of the region about Lake Mistassini is made up of boulder-clay, derived from the disintegration of the neighbouring rocks. . . . The finer material of the soil is sandy clay, with a large percentage of finely divided and intimately mixed limestone, *especially* [italics ours] about the southern and eastern shores" (Low, l. c. 69L). It is noteworthy that in his long canoe trip — up the Saguenay to Lake St. John, thence up the Mistassini River, across to Lake Mistassini and down the Rupert to Hudson Bay — André Michaux passed *north* of the southern end of the lake and consequently did not see this northern colony of *Thuja* at the southern end of Lake Mistassini. Writing on August 21st, 1792, from "la Rivièrre ditte Mistassin," Michaux said, "Les Thuya cessent au Lac [St. Jean], dit-on, et je vis pas au long de cette riv."[2] This observation is significant for throughout its known length Mistassini River flows through acid country, but the northeastern, eastern and southeastern shores of Lake St. John are composed of anorthosite which, as already noted (p. 52), contains an average of 9 % of calcium.

Thuja is *not* found on the Rupert River which for its entire length flows over Laurentian gneiss, but it *is* found "just south of the mouth of the Rupert River," the eastern limit of the calcareous area already discussed (p. 47). Similarly it is on the lower Noddoway in the calcareous soils which reach south from James Bay (Bell, n. s. viii. 80A), the region from which *Pinus Banksiana* is absent (see p. 46).

[1] Logan, Geol. of Canada, 47 (1863).
[2] Michaux, Journal, 1787–1796, ed. Sargent, 76 (1888).

On the lower Abitibi *Thuja* occurs, the river for the lower 70 miles flowing over Devonian limestones (Wilson, xv.— for 1902–'03 — 233, 235A). On the Kwataboahegan which enters the mouth of the Moose River and which "flows over flat-lying, fossiliferous limestone for thirty-two miles," "cedar is common" (Wilson, l. c. 229–231A).

In the great Devonian and Silurian limestone region southwest and west of James Bay and Hudson Bay, *Thuja* does not stop in its northern extension at the lower Albany River as Hutchinson's map implies. It is found on most if not all of the rivers which enter James Bay from the west through this vast limestone lowland. It is on the Kapiskau, the banks of which for the lower 125 miles are composed of clay and sand "containing marine shells," but higher up of "a very soft reddish-brown argillaceous limestone" (Wilson, l. c. 224A); and it extends north to the Winisk which enters Hudson Bay in lat. 55° 20′ (Wilson, l. c.— for 1903 — 103A).

Hutchinson finds the limits of *Pinus Banksiana* "irregular" because "this species has migrated to 56° N. lat." in Labrador (which is acid Laurentian country) but "has been limited in its northward progress by the low-lying lands south and westward from James Bay" (the calcareous area). Why not reverse the argument and say that the limits of *Thuja occidentalis* are "irregular," since on the low-lying country southwest of Hudson Bay it has extended beyond 55° N. latitude, while it "has been limited in its northward progress" in Labrador by the Laurentian upland?

On the headwaters of the Severn River, entering Hudson Bay northwest of the Winisk, *Thuja* reaches its northern limit in that direction, though it is "a rare tree," nearly the whole country being Archaean, "but it occurs on the east end of Slate lake, on Sesikinaga lake, on Cedar (Kishikas) lake, and also on Greenshields lake. On the shores of the last a few rusty looking trees are growing, and this is their northern limit" (Camsell, xvi. 151A). The whole region is granite and gneiss, except for a few limited areas: "The valley of Slate lake, which has been formed by the erosion of the soft calc schists" (Camsell, l. c. 148A); "Two narrow tongues, however, of basic rocks" which "intervene before reaching Gull lake. One of these occurs on the Sesikinaga river" (Camsell, l. c. 147A); "basic inclusions . . . on the lake at the head of Cedar river; on the lower end of Cedar (Kishikas) lake" (Camsell, l. c. 148A); while "The highest hill in the whole area is situated about three miles west of Greenshields lake. It rises 300 feet above the level of the water and is composed seemingly entirely of boulders and drift material" (Camsell, l. c. 146A).

Hutchinson quotes Bell's old statement that "there is a remarkable outlier of white cedar brushwood around Cedar Lake on the upper part of the Saskatchewan River at a distance of 190 miles to the northwest of the nearest point of the main area covered by this species." It is, therefore, significant to find Dowling stating that the Devonian coralline limestones of James Bay "are similar to rocks of Silurian age on Cedar lake in the Saskatchewan district" (Dowling, n. s. xiv. 36F). And is it not significant, also, that Hutchinson, writing of a vast Archaean country should state that "it is notable that throughout great areas, for instance the Temagami region, *Thuja* is unknown?" At this point in his discussion he was near the answer to his problem and had he pursued the question with that "notable" fact as a basis he would quickly have discovered the truth: that THUJA OCCIDENTALIS *is almost as pronouncedly calcicolous as* PINUS BANKSIANA *is calciphobous.*

The impression seems to be very general that *Thuja* prefers swamps, yet it is certainly noteworthy that in really wet swamps it is usually only a shrub or small tree, there rarely developing trunks 1 foot in diameter. In the area of its best development, the calcareous region of northern Maine, northwestern New Brunswick, and the Gaspé Peninsula, the splendid trees with trunks often 3 feet in diameter and sometimes twice that size are always on the well drained river-terraces or alluvial banks or on rocky slopes. In New Brunswick Ganong likewise notes that *Thuja* "shows a marked dualism of habitat, occurring most characteristically in low wet places ('Cedar swamps') but also capable, (at least individual trees are) of existence upon upland where conditions approach the xerophytic."[1] Similarly Professor L. W. Bailey described the Tobique as passing "near the base of high and precipitous cliffs of ferruginous rock, overhung with cedar";[2] in Connecticut two of the three stations are on limestone ledges; on the lower Hudson it was "on . . . fine bluffs of paleozoic limestone," and nearly at the southern limit of the species, along the Holston River, at altitudes mostly under 1,000 feet, "especially where the banks are rocky and cañon-like . . . . Measurements of the largest

[1] Ganong, Bull. Nat. Hist. Soc. N. B. xxi. 55 (1902).
[2] L. W. Bailey, Can. Nat. ser. 2, i. 82 (1864).

trees were taken which showed trunks at each locality of about fifteen feet in circumference."[1]

These facts indicate conclusively enough that, although in swamps *Thuja* forms impenetrable tangles of low, usually interlocking, small trees, it is on the better-drained or even xerophytic rock-habitats that it develops its full stature. Consequently if, as Hutchinson says, water is the "limiting factor" which prevents *Pinus Banksiana* from spreading into the limestone region southwest of James Bay, it certainly cannot be argued that *lack of water* is the factor which keeps *Thuja* from pushing north on the acid Archaean country; but, even if it be urged that *Thuja* most commonly occurs in swamps, it must be evident that there are plenty of swamps on the Labrador Peninsula, for Low tells us that water covers "at a moderate estimate, at least one fourth of the total area" of the peninsula (Low, n. s. viii. 23L).

Hutchinson (p. 488) says, further, that "The presence of 'outliers' . . . indicates that the general area of its distribution does not extend to its ecological limit, in many instances at least. The northern area of its distribution is roughly outlined by a semicircle, a fact which contributes evidence that *Thuja* has migrated radiately from a limited area . . . it does not migrate rapidly . . . this form has lagged behind." When, therefore, following Hutchinson's suggestion, we draw the circle connecting the "outliers" (in western North Carolina, western Prince Edward Island, western Anticosti, and Cedar Lake on the Saskatchewan) it is impressive to find that the center of the circle falls in the great acid Archaean area northeast of Lake Superior, the Temagami region; for Hutchinson particularly informs us that "it is notable that throughout great areas, for instance the Temagami region, *Thuja* is unknown." And since the Temagami region was not accessible to forests until after the vanishing of the Pleistocene ice, by Hutchinson's interpretation that the tree has "migrated radiately" we are forced to the dramatic picture of the infant *Thuja occidentalis* created in very modern times in the center of the Temagami region and finding nothing to live on, migrating as rapidly as its "lagging" tendency would allow to the calcareous regions northwest, north, east, and south!

Wherever the "Cedar swamp" is open and full of glades or swales it supports a characteristic vegetation quite unlike that of the acid

[1] Small & Vail, Mem. Torr. Bot. Cl. iv. 167 (1893).

bog, the following species being found in many such swamps of northern Maine, New Brunswick or Gaspé: *Selaginella selaginoides, Equisetum palustre* and *E. scirpoides, Triglochin palustris* and *T. maritima, Scirpus pauciflorus* and *S. hudsonianus, Eriophorum viridi-carinatum, Carex gynocrates, C. chordorhiza* and *C. vaginata, Juncus stygius, Orchis rotundifolia, Calypso bulbosa, Microstylis monophyllos, Cypripedium hirsutum* and *C. parviflorum, Betula pumila, Caltha palustris, Geum rivale, Rhamnus alnifolia, Angelica atropurpurea, Veronica americana, Valeriana uliginosa, Galium palustre,* and *Lonicera oblongifolia.* This long list of species is here entered because in Europe nearly all of them or their immediate European allies occur in the "low-moors," and Warming, the father of modern ecology, correctly states that "The water coming from low-moor is *rich in calcium and potassium.*"[1] *The Canadian "Cedar swamp" is, then, a phase of Warming's calcareous "low-moor"*; and every farmer in northern Maine and New Brunswick knows perfectly well that by clearing a "Cedar swamp" he will get a valuable addition to his tillable acreage, but, wherever *Pinus Banksiana* grows the farmer knows it is useless to attempt cultivation. In fact, even the most ignorant "habitant" will argue that whenever that pine ("Cyprès," as he calls it) takes possession it makes the region sterile, and so powerful is its sterilizing influence that it is considered positively dangerous for a pregnant woman even to walk near a Banksian pine!

The law that some plants are oxylophytes, some calcicoles, is "as old as the hills" and it is just as true today as it was when Linney wrote of Kentucky: "Altitudes had little, here, to do with the distribution of the trees; only two natural conditions seem to have modified their disposition: one of minor importance — the quantity of moisture; and the other of much consequence — the character of the soil";[2] or when that great geologist, J. W. Dawson, wrote:

"Until the botanical geographer pursues his studies of distribution with a geological map in his hand, and a knowledge of the habitudes of plants in reference to soils, his labours will be to a great extent fruitless. A little more lime or a little less alkali in the soil renders vast regions uninhabitable by certain species of plants. For many of the plants of our Laurentide hills to extend themselves over the calcareous

[1] Warming, Oecology of Plants, transl. Groom & Balfour, 197 (1909).
[2] Linney, Bot. of Madison, Lincoln, Garrard, Washington and Marion Counties, Ky. 8 (1882).

plains south of them, under any imaginable conditions of climate, is quite as far beyond the range of possibility as to extend across the wide ocean."[1]

The fact that many plants are calcicolous, many calcifuge, is clearly recognized by the European ecologists, Tansley in his wonderfully lucid little book, *Types of British Vegetation,* saying with perfect positiveness: "Soils containing a comparatively large proportion of lime are always marked by the presence and usually by the abundance of certain species of plants — the so-called 'calcicole' species. . . . Contrasting with the 'calcicole' species there are others, called 'calcifuge' which appear to be really intolerant of much lime in the soil."[2]

Again, Praeger in his monumental *Irish Topographical Botany* says without quibble: "The presence or absence of lime is the most important particular in which petrology affects the distribution of plants; and in Ireland the bold grouping of the calcareous and non-calcareous rocks helps to emphasize this feature of phytogeology. . . . A knob of Old Red Sandstone . . . breaking through the limestone crust of the Central Plain, immediately produces *Galium saxatile, Vaccinium Myrtillus, Rumex Acetosella, Deschampsia flexuosa,* and other characteristic calcifuge species. . . . The converse case — the absence of calcicole species in counties poor in or devoid of limestone — is more strongly marked. . . . A . . . conspicuous line of demarkation — indeed one of the most remarkable phytogeological boundaries in Ireland — is seen where the Central Plain limestones lie up against the ancient metamorphic highlands of Connaught. . . . Here, as we pass off the limestone, *Habenaria intacta, Gentiana verna, Sesleria,* and other interesting plants which have been our companions over many miles, give way abruptly."[3]

Why is this almost axiomatic law blindly ignored or only grudgingly admitted by so many American physiographic ecologists and phytogeographers? That it is fundamental is beyond dispute, and by the English, Irish, and many other European investigators is clearly recognized as an essential factor in phytogeography; and as someone has said, "If the English and Irish agree on it, it must be so." Until American physiographic ecologists and phytogeographers recognize and use this law as a constant guide their labors, as Dawson prophetically said, "will be to a great extent fruitless."

[1] J. W. Dawson, Can. Nat. and Geol. vii. 342 (1862).
[2] Tansley, Types of Brit. Veg. 144 (1911).
[3] Praeger, Irish Topogr. Bot.: Proc. Royal Irish Acad. vii. p. xxvii (1901).

Though, as just said, the law itself is "as old as the hills," the recognition of it, naturally, is much more recent. Nevertheless it was clearly comprehended by the ancient Greeks. Here are the words of Theophrastus, written about 300 B. C.: "Yet it is not strange that there should be some mountains which do not thus bear all things, but have a more special kind of vegetation to a great extent if not entirely: for instance the range of Ida in Crete, for there Cupressus grows; or the hills of Cilicia and Syria, on which Cedrus grows; or certain parts of Syria where the terebinth grows. For it is the differences of soil which give a special character to the vegetation."[1]

Cowles, who has found it necessary elsewhere to explain that he is one of "those of broader viewpoint," says that "The world of morphologists, physiologists and ecologists has borne with" the sinning taxonomist "patiently and long . . . a little more and the sinning taxonomist will be 'cast out into the outer darkness where there shall be wailing and gnashing of teeth'," [2] but he says nothing about our toleration of the sinning ecologist.[3] Two of the great truths of science taught by the ancient Greeks, and just as true now as prior to the Christian era, were (1) that "it is the differences of soil which give a special character to the vegetation"; and (2) that the earth is round. In these days anyone who seriously argues that the earth is flat is treated as a pitiable eccentric or is kept in confinement.

Gray Herbarium.

[1] Theophrastus, Hist. Plant. lib. iii. cap. 3 (circ. 300 B. C.).

[2] Cowles, Am. Nat. xlii. 270, 271 (1908).

[3] Everyone, however, will agree with Cowles when in the same paragraph he says: "Species-making by taxonomic tyros must be abandoned"; but it is certainly diverting, that on the preceding page Cowles tried his hand at a most difficult genus and published two brand-new combinations, "*Crataegus mollis ellwangeriana*" and "*C. mollis champlainensis*," although in doing so he violated three of the articles of the International Code, which in a preceding paragraph he seems to defend: publishing without an adequate bibliographic reference to the name-bringing synonym; making trinomials, without indicating the category (whether subspecies, variety, or form); and decapitalizing a personal name, *Ellwangeriana*. Naturally, if this represents an ecologist's conception of taxonomic work it is not surprising that Cowles should condemn the "sinning" taxoncmist.

LOPHIOLA AUREA IN NOVA SCOTIA.

George E. Nichols.

A few months ago, in a letter to the writer, Miss Margaret Brown, of Halifax, an enthusiastic amateur botanist, casually remarked that she had just received a specimen of *Lophiola aurea* from near Digby, Nova Scotia. *Lophiola aurea* in Nova Scotia? Surely there must be some mistake.

But there is no mistake. At the writer's request Miss Brown has submitted the specimen for examination, and it is unquestionably *Lophiola:* a fine, large specimen, in full flower and quite 20 inches tall. Thus another species is added to that remarkable assemblage of plants, exemplified by *Schizaea pusilla* and *Corema Conradii,* characteristic of the New Jersey pine barrens, or of the coastal plain from New Jersey southward, but occurring at more or less widely separated stations along the coast northward to Newfoundland. The specimen has been deposited in the Herbarium of Yale University.

The following notes regarding the Nova Scotia station for *Lophiola aurea* have been furnished by the discoverer, Mr. E. Chesley Allen, of Truro. The specimen was collected on Sept. 6, 1917, between Little River and East Ferry, Digby County. The locality is described as a low, boggy swale which runs parallel with the post-road from Little River to East Ferry. The area is probably not more than two or three hundred yards wide, perhaps two or three miles long, and more or less broken up by higher land. Scattered over the surface are frequent small, stagnant ponds. The vegetation is largely grass-like, with various low shrubs, and with sphagnum locally abundant. Mr. Allen remarks the presence of what he took to be a species of *Juniperus* other than the common *J. communis:* possibly it was *Chamaecyparis.* About the only other plant noted was a species of *Utricularia.* The area did not seem to be a typical bog, and Mr. Allen's description suggests strongly the wet savannahs which are the favorite haunt of this plant in southern New Jersey. The specimen collected was the only one seen, but Mr. Allen was in search of surgical sphagnum and did not appreciate at the time the importance of his discovery. In view of the comparative accessibility of the area it is to be hoped that it can be explored more thoroughly in the near future.

Sheffield Scientific School, Yale University.

A NEGLECTED SOLIDAGO NAME.[1]

PAUL C. STANDLEY.

ONE of the earliest books of travel relating to the United States, is one entitled "Reise durch einige der mittlern und südlichen vereinigten nordamerikanischen Staaten nach Ost-Florida und den Bahama-Inseln, unternommen in den Jahren 1783 und 1784," by Johann David Schoepf, published at Erlangen in 1788. An English translation by Alfred J. Morrison was printed at Philadelphia in 1911.

Schoepf was a Bavarian who had studied botany at the University of Erlangen under Schreber, who later named in his honor the genus *Schoepfia,* a group of tropical trees and shrubs of the family *Olacaceae.* He came to New York in 1777 as chief surgeon of the Ansbach contingent of the German troops sent over by George III. He remained in New York until the conclusion of the war, upon which he undertook a tour of the United States, which, beginning in New Jersey, extended to western Pennsylvania, southeastward through Maryland to what is now the District of Columbia, and southward along the coast to Florida, whence he sailed to the Bahamas.

The two volumes of the Reise give a vivid picture of the political and physical conditions of the coastal states at that time. Schoepf was interested in all branches of natural history but gave his chief attention to the geology of the regions traversed. He made many observations upon animals and plants, and in footnotes he published descriptions of two new species of plants, one a *Houstonia,* the other a *Solidago.* His names for these were taken up by Gmelin in his edition of Linnaeus's Systema Naturae, but they have received no attention from other authors. Although both are listed in the Index Kewensis, they are credited to Gmelin and his work is given as the place of publication. While the present writer was engaged in a monographic account of the family *Rubiaceae* for the North American Flora, his attention was called to Schoepf's book by Dr. J. H. Barnhart, and as a result it was found necessary to adopt *Houstonia pusilla* Schoepf as the valid name for the species hitherto known as *H. patens* Ell.[2]

The *Solidago* mentioned above is discussed by Schoepf on page 466

[1] Published by permission of the Secretary of the Smithsonian Institution.
[2] N. Amer. Fl. xxxii. 29 (1918).

of the first volume of the Reise. His account of the plant is as follows (the English being that of Morrison's translation):

"We continued the way we had come [along the Juniata River in Bedford County, Pennsylvania], over Crossing-hill, Rays-hill, and Sideling-hill, and spent the night at MacDonald's tavern, where the coffee is drunk out of tin-ware, there are potatoes to eat, and straw to sleep upon, and a prodigiously dear reckoning.

Here we were introduced to still another domestic tea-plant, a variety of Solidago.[1] The leaves were gathered and dried over a slow fire. It was said that around Fort Littleton many 100 pounds of this Bohea-tea, as they call it, had been made as long as the Chinese was scarcer. Our hostess praised its good taste, but this was not conspicuous in what she brewed."

It is evident that the plant discussed is that commonly known as *Solidago odora*, a name published by Aiton in 1789, for not only does the description apply certainly to *S. odora*, but the Plukenet citation also refers to the same species.[2] Since Schoepf's name was published a year earlier than Aiton's, the former is the one which must be adopted. It is noteworthy that the now unfamiliar name hereafter to be applied to this plant, one of the two or three easily recognizable species of *Solidago*, is fully as descriptive and distinctive of the plant as the name it displaces, being, in fact, practically synonymous with it. The essential synonymy of the species is summarized below.

Solidago suaveolens Schoepf, Reise Ver. Nordamer. Staaten i. 466 (1788). *S. odora* Ait Hort. Kew. iii. 214 (1789). *S. retrorsa* Michx. Fl. Bor. Amer. ii. 117 (1803). *S. puncticulata* DC. Prodr. v. 332 (1836). The type locality is presumably in Bedford County, Pennsylvania.

U. S. National Museum, Washington, D. C.

An unusual Daucus Carota.— Miss Emily F. Fletcher recently brought to the Gray Herbarium a very striking specimen of *Daucus Carota* L. in which nearly half of the compound umbel, instead of

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[1] **SOLIDAGO** *suaveolens;* foliis lanceolato-linearibus, integerrimis, acutis, subquinque-nerviis, punctatis, glabris, tenerrime ciliatis.— Virga aurea americana, tarraconis facie & sapore, panicula speciosissima. *Pluk. alm. p.* 389. *tab.* 116. *f.* 6.— A species similar to this grows about New York, and has a pleasant odor of anise, noticeable also in the plant here, but weaker; no doubt because it was already late in the season and it had suffered from the cold.

[2] Gray, Syn. Fl. N. Amer. i. pt. 2, 151 (1884).

having the customary white, merely pale-roseate or occasionally very light yellow petals, has them prevailingly of the rich deep violet (making the impression almost of black) which is familiar in dark central flower commonly present. Miss Fletcher states that the plant was found by Miss Harriet M. Hodgman, at Westford, Massachusetts, August, 1918, on the land of Mr. Charles O. Prescot.

Reference to the readily available literature on teratology brought out the fact that Penzig, Pflanzen-Teratol. i. 523 (1890), reports having observed not rarely individuals of *Daucus Carota* in which the single apical dark flower was replaced by a terminal umbellet of which most or all of the flowers were dark. Pluskal, Oester. Bot. Zeitschr. i. 228 (1851), discussing earlier the same phenomenon, mentions the fact that he had a Carrot umbel in which most of the flowers in one of the peripheral umbellets had the same dark brown color. This he stated to be a great rarity.

Kronfeld, who applied the name "anthocyanic flowers" (Anthokyanblüthen) to these dark-petaled structures, discussed them briefly, Bot. Centralbl. xlix. 11 (1892), stating that the central one is not sterile as often supposed but cleistogamous and fertile. He also suggests that these dark flowers are the result of inherited gall-formation. The literature of the subject seems rather slight and unsatisfactory.

In the plant from Westford about 12 of the umbellets constituting between a third and a half of the whole inflorescence are dark-petaled. These occur on one side of the compound umbel, being disposed from near the center to the periphery. They do not take the place of the apical dark flower for that is present as usual. In some of these dark-flowered umbellets all the petals are of uniform dark rich violet, in others the greater part of them are dark, but some even in the same flowers are white or deep purple striped with white. Except for their unusual color the flowers appear to be normal.

The inflorescence at first sight suggests that it must have been affected by some smut or other such influence but this does not appear to have been the case.

The striking and interesting specimen here described will be preserved in Miss Fletcher's herbarium. A photograph of it has been taken for record in the Gray Herbarium.— B. L. Robinson.

Two Festuca Varieties.— The following note refers to two somewhat unusual varieties of *Festuca.*

Festuca ovina hispidula. At Franklin, Connecticut, on a dry, steep, otherwise rather barren hillside, this variety is abundant, in association with the typical form of the species. The tufts of the variety are about as numerous as those of the species. In some specimens the lemmas are uniformly hirsute, while in others the stiff pubescence is more dense toward the margins of the lemmas. The same variety occurs at Orange, Connecticut, where occasional tufts are found over a considerable area of sandy plain. The writer collected it at Orange, June 9, 1914. Professor A. S. Hitchcock has kindly verified specimens from both towns.

Festuca rubra subvillosa. Several years ago the writer reported this variety from Franklin.[1] Almost every season since, it has been noticed at a new locality in Franklin and specimens have been collected from open woodlands, rich pastures, dry hillsides, hayfields, where it is often abundant, house lawns, barren gravel knolls and wet meadows. A variety so widely distributed in one town may very likely be found in other towns if search is made for it.

Specimens of the above have been deposited in the Gray Herbarium. — R. W. Woodward, New Haven, Connecticut.

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[1] Rhodora, xiii. 70 (1911).

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Rhodora

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LONG POND.

C. A. Weatherby.

Professor Fernald maintains that there is especial virtue in the appellation "Long Pond"; that any body of water bearing that name is pretty sure to harbor, in or about it, desirable plants; and that a composite flora of "Long Ponds" would make interesting reading. It is as a contribution to such a work that I offer the following account of my own particular Long Pond.

In October, 1916, in the course of a tramp through the woods in the extreme northeastern corner of Connecticut, in the town of Thompson, Mrs. Weatherby and I noticed a small pond, surrounded by broad margins of swamp and producing in its shallower parts a rank growth of sedges. It looked good; and we then and there resolved to visit it again at a more favorable season for botanizing.

The immediate region in which it lies consists of low ridges and small, flat areas of sand and gravel, presumably the bars and deltas of glacial streams. The hollows between them are occupied by swamps and by two small ponds, drained by streams which flow sluggishly through wide stretches of marsh, full of *Peltandra*. One of these ponds — Little Pond — we had already visited. It has a clean sandy strand, only here and there overlaid with a thin deposit of vegetable matter, and inhabited by such characteristic plants as *Gratiola aurea, Cyperus dentatus, Juncus pelocarpus, Elatine minima* and, in the more mucky places, *Hydrocotyle umbellata, Utricularia gibba* and *Sagittaria Engelmanniana*. The swamps along its outlet were known to harbor *Rosa nitida, Rynchospora fusca* and *Eleocharis tuberculosa*.[1] In the maple

[1] The last two species are associated with each other and with *Panicum spretum* (which also grows in Thompson) in at least two other Connecticut swamps.

swamps between the ridges scattered individuals of tamarack and black spruce persist from an earlier growth. Some specimens of the latter are fifteen to twenty feet high — a very good size for Connecticut. Most of the plants here mentioned are noteworthy in this region: it was, therefore, with anticipations which we tried to keep prudently chastened that, in August, 1918, we at last started on our expedition to Long Pond.

War-time train service had made the locality difficult of access. The best way to reach it and have a few clear hours there seemed to be to take an afternoon train to the nearest railroad station, walk in, carrying what we needed, to an old farm clearing near the pond, spend the night in the fields there and do our botanizing the next morning. This we accordingly did. It was a novel experience for us, but proved distinctly entertaining. The one real drawback was a lack of drinking water, for finding which we had trusted to luck. By morning we were driven to a desperate attempt to collect dew from the grass, where there seemed to be enough of it to slake the thirst of an army. The attempt failed; but it led to the interesting scientific discovery that a dewdrop is by no means the crystal pure article the poets would have us believe it. On the contrary, it is a globule of incredibly dirty water: its primary function must be to relieve the atmosphere of all — positively all — its impurities.

At breakfast, we were honored by a visit from a mink, which moved about at a safe distance and barked at us. We suspected him of jeering at our waterless condition: he knew where the water was. Later we found out; and, much refreshed, began our botanizing.

Rhexia virginica grew sparingly at the edge of the clearing where we had camped. A few rods away, in the edge of the swamp, was a good-sized patch of *Smilacina trifolia*, a species not previously reported from Windham County. Long Pond itself, when we reached it, proved to be quite different in character from Little Pond. All around it ran a more or less broad belt of mucky swamp, grown up to a well-nigh impenetrable tangle of bushes and sedge, among which young red maples were beginning to creep in. At one point where firm ground came close to the water, a path led down to it. Here we found a boat, of the awkward flat-bottomed type usual on New England ponds, and half an oar. Fortunately, it was the business half. As no better equipment seemed available, we set forth with this, in the face of a rather lively breeze. After some three hours' hard labor, we had succeeded in circumnavigating about half the pond — which is half a mile long — and were quite ready to go ashore and have lunch.

But the botanizing was good. Not one of the plants noted as characteristic of Little Pond was found here, the different conditions at the two being well reflected in their floras. On the black mud where the boat was drawn up was a mat of *Eleocharis olivacea,* not before reported from Windham County. In the shallower parts of the pond was an abundant growth of aquatics — white and yellow water-lilies, *Brasenia, Nymphoides* (sometimes called "fairy lily" in Connecticut), *Nejas flexilis, Utricularia vulgaris,* var. *americana, U. purpurea* in abundance and *Potamogeton natans,* the last two new to the county. Near the further shore, slender culms of *Scirpus subterminalis* and *Eleocharis Robbinsii* projected from the water — both likewise new to Windham County. Here also were scattered plants of *Pontederia cordata,* var. *angustifolia.* Only the variety was observed in the pond itself, though there was an abundance of the typical form along the outlet. In the edge of the marginal swamp grew many plants of a pretty and unfamiliar *Aster,* which we managed to collect by driving the bow of the boat (if a craft with perfectly interchangeable ends can be said to have a bow) as far as possible into the bushes, and which, on later investigation, proved to be *Aster nemoralis,* previously collected near Long Pond by Mr. E. B. Harger in June, 1908, but not reported because his specimens were too young for certain identification. Further along, we picked a single fruiting head of *Juncus militaris,* another addition to the Windham County list. Around it were numerous jointed culms which I took to be sterile plants of the *Juncus.* We set about hunting for more flowering or fruiting material. Presently Mrs. Weatherby remarked: "Here is a flower on one of these things." I looked around, and probably only the limitations of the boat prevented my doing something undignified. There is a keenness of pleasure in the finding of a really rare plant which one never quite outgrows. And this flower was not that of a *Juncus,* but of an *Eleocharis* and the thick, jointed culm on which it grew could belong only to *E. interstincta,* a species not only new to Connecticut, but known from only three other places in New England.

If this be boasting, it is boasting of the locality, not of the collectors; and it is also an invitation. Only half of Long Pond has been explored; when we last saw it, the boat and the half oar were waiting. And the pond lies in a belt of more or less similar country which apparently extends along the western border of Rhode Island all the way from Westerly to a point near Webster, Massachusetts. Any part of it is likely to repay exploration.

East Hartford, Connecticut.

BROMELICA (THURBER): A NEW GENUS OF GRASSES.

Oliver Atkins Farwell.

For some years past our eastern species of Oat Grass have been bandied about between *Avena* and *Melica,* affording for some a merry game of shuttlecock. These species appear to have no permanent home and to be a restless group, that, like Banquo's Ghost, will not down. It seems best, therefore, to create a new genus for them. At least one of that small group of grasses, to which belong our eastern Oat Grasses, has been included at one time or another in five different genera, *Festuca, Bromus, Melica, Avena* and *Trisetum.* As regards our eastern species Michaux first described *Avena striata* in 1803; Torrey next described it as *Trisetum purpurascens;* A. Gray replaced it in *Avena* using Michaux's name; Hitchcock then removed it to *Melica* as *M. striata;* finally Nash restored it to *Avena* as *A. Torreyi.* The second species was described by Porter in 1867 as *Avena Smithii* and it was removed to *Melica* by Vasey in 1888. At the present time Hitchcock, in Gray's Manual, lists these species under *Melica;* Britton & Brown in the Illustrated Flora list them under *Avena;* Rydberg in the Flora of the Rocky Mountains steers an intermediate course listing the first under *Avena* and the second under *Melica.* When authors are at such wide variance with each other in their treatment of such closely related species, the probabilities are that the species do not belong to any one of the genera to which they have been referred. A careful analysis of the distinguishing characters of each genus bears out this supposition.

These species can scarcely belong to *Avena* since they lack the most important *tribal characters* distinctive of the *Aveneae,* viz.: the spine-like end of the rachilla prolonged behind the uppermost floret and glumes *longer* than the lower floret. They do agree with the *Festuceae* in not possessing the spine-like elongation of the rachilla and in having glumes shorter than the lower floret. A genus of the *Festuceae* must then be sought for these species and amongst those genera having many nerved lemmas. They do not belong to *Festuca* because the lemmas are *not entire.* They do not belong to *Bromus* because the grain is *not adherent to the palet nor pubescent* at the summit. They do not belong to *Melica* because the *lemmas are not subcoriaceous* and the uppermost *do not form a convolute club-shaped mass* but *are distinct.* In *Bromelica* the glumes and lemmas are *membranous,* the former being somewhat *unequal and shorter* than the lowest floret; the latter are *acute, notched or bidentate,* generally with a *terminal awn* formed by the excurrent midrib between the teeth, the uppermost being *similar to the others and distinct,* the uppermost floret consisting of a single lemma only. Thus delimited, *Melica* and *Bromelica* consist, each of a clear, homogeneous group of species; united, *Melica* is a heterogeneous group. *Bromelica* is almost exactly intermediate between *Melica* and *Bromus,* with closer relationship to the latter than to the former, which is exemplified by habit and by the characters of the glumes and lemmas; if *Bromelica* is retained in *Melica* there is no good reason why *Melica* in its entirety should not be united with *Bromus.*

Lemmas membranous, all alike and distinct, acute, awned or awnless.
  Lemmas entire .... ***Festuca.***
  Lemmas notched or bidentate.
    Grain adherent to the palet and pubescent at apex .... ***Bromus.***
    Grain free, not pubescent .... ***Bromelica.***
Lemmas subcoriaceous, obtuse, convolute around each other and forming a club-shaped mass .... ***Melica.***

The synonymy and species follow:

BROMELICA (Thurber), n. gen. *Melica* subgenus *Bromelica* Thurber, Bot. Calif. ii. 304 (1880), and in Gray's Manual, ed. 6, 152 (1908).

B. striata (Mx.), n. comb. *Avena striata* Mx. Fl. Bor. Am. i. 73 (1803). *Trisetum purpurascens* Torr. Fl. U. S. 127 (1824). *Melica striata* (Mx.) Hitchc. Rhodora, viii. 211 (1906). *Avena Torreyi* Nash in Britt. & Br. Illus. Fl. ed. 2, i. 219 (1913).

B. Smithii (Porter), n. comb. *Avena Smithii* Porter in Gray's Manual, ed. 5, 640 (1867). *Melica Smithii* (Porter) Vasey, Bull. Torr. Cl. xv. 294 (1888).

B. aristata (Thurber), n. comb. *Melica aristata* Thurber in Boland. Proc. Cal. Acad. iv. 103 (1870).

B. subulata (Bong.), n. comb. *Festuca subulata* Bong. Veg. Sitch. 173 (1832). *Bromus subulatus* Griseb. in Ledeb. Fl. Ross. iv. 358 (1853). *Melica acuminata* Boland. Proc. Cal. Acad. iv. 104 (1870). *M. subulata* Scribn. Proc. Acad. Phila. 47 (1885).

B. Harfordii (Boland.), n. comb. *Melica Harfordii* Boland. Proc. Cal. Acad. 47 (1885).

B. Harfordii, var. **minor** (Vasey), n. comb. *Melica Harfordii*, var. *minor* Vasey, Bull. Torr. Cl. xv. 48 (1888). *M. Harfordii*, subsp. *tenuior* Piper, Cont. U. S. Nat. Herb. xi. 127 (1906).

B. Geyeri (Munro). n. comb. *Melica Geyeri* Munro in Boland. Proc. Cal. Acad. iv. 103 (1870). *M. bromoides* Boland. ex A. Gray, Proc. Am. Acad. viii. 409 (1872).

B. Geyeri, var. **Howellii** (Scribn.), n. comb. *Melica bromoides*, var. *Howellii* Scribn. Proc. Acad. Philad. 47 (1885).

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Detroit, Michigan.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,— XXX.

LINACEAE.

LINUM.

L. medium (Planch.) Britton. Dry soil, ten scattered stations, none in Essex county.

L. striatum Walt. Rock Pond, Georgetown (*Mrs. C. N. S. Horner,* no date); Cedar Swamp, Peabody (*J. H. Sears,* July 12, 1887); Essex Woods (*J. H. Sears & J. Robinson,* September, 1880); old railway track under Elm St., Dedham (*K. M. Wiegand & Margaret Heatley,* July 23, 1908).

L. sulcatum Riddell. Middlesex Fells (*F. S. Collins,* Aug. 8, 1885); roadside, Winchester (*W. Boott,* Sept. 13, 1868; *C. W. Jenks & C. W. Swan,* July 19, 1890); Boston (*F. Boott,* ——, 1822).

L. usitatissimum L. Roadsides and waste places, frequent.

L. virginianum L. Dry gravelly and sandy soil; well distributed, especially southward.

OXALIDACEAE.

OXALIS.

O. americana Bigel. (*O. Acetosella* L. of American authors. See Rhodora xx. 76, 1918). Salisbury (*R. Dodge*, Aug. 12, 1890); moist rich woods, Concord (*Horace Mann*, ——, 1862; introduced by Minot Pratt, see Rhodora i, 170, 1899); Purgatory Swamp, Norwood (*F. S. Collins & C. W. Swan*, June 18, 1883).

O. corniculata L. (*O. repens* Thunb. of Gray's Manual, 7th Ed.). A rare weed, in garden at Andover (*A. S. Pease*, July 4, 1902); abundant in greenhouses at Cambridge, Dorchester, Wellesley and Easton.

O. europaea Jord. (*O. corniculata* L. of Gray's Manual, 7th ed. See No. 227, Plantae Exsiccatae Grayanae.) Fields, gardens and waste places, very common throughout.

O. filipes Small. Dry soil, rare; Wayland, Sherborn, Milton, Walpole.

O. stricta L. Dry or sandy soil, occasional (eleven stations).

O. violacea L. Open woods and ledges, rare; Ipswich (*Wm. Oakes*), Belmont, Waltham, Weston, Arlington, Lincoln, Concord.

GERANIACEAE.

ERODIUM.

E. Botrys Bertol. Introduced in wool-waste; Tewksbury (*E. F. Williams, B. L. Robinson & W. P. Rich*, Nov. 4, 11, 1900); Westfield (*C. W. Swan*, no date); Boston (*D. Murray*, ——, 1863). Native of southern Europe.

E. ciconium (L.) Ait. Wool-waste dump, Westford (*Miss E. F. Fletcher*, June 26, 1913 et seq. Specimen in herb. Gray). See Rhodora xv. 172, 1913. Native of Mediterranean region and the Orient.

E. ciconium (L.) Ait., var. tenuisectum Nym. Woolwaste dump, Westford (*Miss E. F. Fletcher*, ——, 1915. Specimen in herb. Gray). There are not any European specimens of this variety in the Gray Herbarium, but these specimens fit the published description. See

Rhodora xviii. 143, 1916. Native of southern France and Spain.

E. cicutarium (L.) L'Hér. Waste places, especially near woollen mills, occasional.

E. laciniatum (Cav.) Willd., var. Bovei (Delile) Murbeck. Woolwaste dump, N. Chelmsford (*Miss E. F. Fletcher,* Sept. 5, 1917. Specimens in herb. Gray and N. E. Botanical Club). See Rhodora xx. 20, 1918. A native of Egypt, Tunis and Algiers.

E. malacoides Willd. Millyard, north side of Merrimac river, Lawrence (*A. S. Pease,* July 9, 1902. Specimen in herb. N. E. Botanical Club). Native of Mediterranean countries.

E. moschatum (L.) L'Hér. Waste places, especially near woollen mills, rare (eight stations).

E. Stephanianum Willd. Woolwaste at Westford (*Miss E. F. Fletcher,* July–August, 1916. Specimen in herb. Gray). See Rhodora xix. 132, 1917. An Asiatic species, ranging from the Caucasus to southern China.

GERANIUM.

G. Bicknellii Britton. Open woods and clearings, occasional.

G. carolinianum L. Dry sandy and rocky soil; frequent.

G. dissectum L. Dump, Centralville, Lowell (*C. W. Swan,* Aug. 4, 1884. Specimen in herb. N. E. Botanical Club). Native of Europe, northern Asia and Australia.

G. maculatum L. Fields and meadows, very common throughout.

G. molle L. Sporadic in new grassland, at Lexington, Cambridge, Dorchester and Wellesley.

G. pratense L. Meadow at Swampscott, perhaps 50 plants (*L. A. Wentworth,* June 26, 1903. Specimen in herb. Gray). See Rhodora v. 256, 1903.

G. pusillum Burm. f. Waste places and gardens; Andover (*A. S. Pease,* July 21, 1901); Wellesley (*F. W. Hunnewell,* Aug. 29, 1912); Sherborn (*Martha L. Loomis,* May 29, 1913); Lexington, according to M. P. Cook, Rhodora i. 81, 1899.

G. Robertianum L. Rich rocky woods; common, except possibly in the most southern towns.

G. sibiricum L. Waste heap, Cambridge (*T. Morong,* July 27, 1885. Specimen in herb. W. Deane).

RUTACEAE.

PTELEA.

P. TRIFOLIATA L. Waste places; Medford, Somerville, Boston, Roxbury, Dorchester, Dedham, Hingham, Newton, Wellesley. Introduced from further south.

ZANTHOXYLUM.

Z. americanum Mill. Roadsides and old places, north and west of Boston. Probably introduced at most if not all stations.

SIMARUBACEAE.

AILANTHUS.

A. GLANDULOSA Desf. Persistent and spreading, occasional.

POLYGALACEAE.

POLYGALA.

P. cruciata L. Meadows and swamps; not reported from western towns, but occasional throughout the towns nearer the coast.

P. Nuttallii T. & G. Old spur track, Sharon (*E. F. Williams*, Sept. 10, 1899. Specimens in herb. Gray and N. E. Botanical Club).

P. paucifolia Willd. Woods and open places; unevenly distributed but abundant, especially in southwestern towns. White form, forma **alba** Wheelock (Mem. Torr. Bot. Club. ii. 142, 1891) at Concord (Dame & Collins, Fl. Middlesex Co. 23, 1888; A. W. Hosmer, RHODORA i. 173, 1899); violet form at Sudbury (A. W. Hosmer, RHODORA i. 173, 223, 1899).

P. polygama Walt. Dry sandy and rocky soil; common except in northern Middlesex Co.

P. polygama Walt., forma **pallida** Britton. Sandy margin of Winter Pond, Winchester (*M. L. Fernald & Bayard Long,* June 22, 1913. Specimen in herb. N. E. Botanical Club).

P. sanguinea L. Swamps and fields, common throughout; "often varying to white" (J. Robinson, Fl. Essex Co. 44, 1880). This is forma **albiflora** Millsp. Fl. W. Va. 333, 1892.

P. verticillata L. Dry soil, common.

P. verticillata L., var. **ambigua** (Nutt.) Wood. This extreme form is apparently very rare, but forms tending toward it are occasional.

EUPHORBIACEAE.

ACALYPHA.

A. gracilens Gray. Dry soil, frequent.

A. virginica L. Fields and waste places, common.

CROTON.

C. CAPITATUS Michx. S. Boston flats (*C. E. Perkins,* Aug. 27, 1879. Specimen in herb. N. E. Botanical Club). Waif from the West.

C. TEXENSIS (Klotzsch) Muell. Arg. Filled land, Back Bay, Boston (*C. W. Swan,* Sept. 9, 1890. Specimens in herb. Gray and Yale). Waif from the Southwest.

EUPHORBIA.

E. COROLLATA L. Sparingly introduced at Lowell, Concord, Wellesley, Natick and Sherborn.

E. CYPARISSIAS L. Cemeteries, fields and roadsides, common throughout.

E. ESULA L. Fields and waste places; very abundant in Salisbury, Amesbury, Newburyport, Rowley and Newbury; Ipswich (*Wm. Oakes*), also sporadic at Somerville, Boston and West Roxbury.

E. HELIOSCOPIA L. Waste places at Melrose, Somerville, Cambridge, Roxbury and Scituate.

E. hirsuta (Torr.) Wiegand. Dry sand, especially by railways; Lowell, Concord, Ayer, Cambridge, S. Boston, Wellesley, Natick.

E. maculata L. Dry sand and gravel, very common throughout.

E. MARGINATA Pursh. Vacant lot, Boylston St., Boston, now extinct (*W. P. Rich,* Aug. 24, 1879. See RHODORA x. 152, 1908); waste place by (or in) salt marsh, a few plants (*F. W. Grigg,* Aug. 9, 1913. Specimens in herb. F. W. Grigg).

E. PEPLUS L. Waste places and gardens; sporadic at Salem, Woburn, Somerville and Lynn; Tremont St., Boston (*W. Boott,* Sept. 11, 1853).

E. PLATYPHYLLA L. Rubbish heap, not persistent, Cambridge (*W. Deane,* Oct. 10, 1885).

E. polygonifolia L. Seashore sands from Salisbury to Duxbury.

E. Preslii Guss. Sandy soil and waste places, rare (twelve stations).

E. PROSTRATA Ait. Cotton waste, Malden (*F. S. Collins,* Sept. 20, 1890. Specimen in herb. N. E. Botanical Club). Native of tropical America.

MERCURIALIS.

M. ANNUA L. Newburyport ("*E. U.*" 1880); E. Somerville freight-yards (*A. S. Pease & A. H. Moore,* Oct. 20, 1903); Boston (*J. A. Lowell,* no date); yard, Newtonville (*F. W. Grigg,* Aug. 24, 1912).

RICINUS.

R. COMMUNIS L. Dump, Cambridge (*M. L. Fernald,* Sept. 26, 1908); railway dump, Dedham (*Sydney Harris,* Aug. 22, 1897; *E. F. Williams,* Oct. 2, 1898).

C. H. KNOWLTON } *Committee on*
WALTER DEANE } *Local Flora.*

CAREX NOTES.

IRA W. CLOKEY.

CAREX **arapahoensis**, spec. nov. Growing in small clumps; the culms stiffly erect, rather stout, 2–4 dm. high, somewhat exceeding the leaves, minutely rough on the angles below the head, aphyllopodic. Leaves with well developed blades 4–7 to a fertile culm, on the lower third of the culm, somewhat bunched; the blades flat, the upper long-attenuate, 1.5–3 mm. wide, 12–25 mm. long, minutely rough on the edges; lower sheaths without blades light brown, sheaths overlapping; ventral band hyaline, white or light-green. Heads ovoid, 13–20 mm. long; spikes 3–5, closely aggregated, gynaecandrous, 8–11 mm. long, 4–8 mm. wide, rounded at base, rounded or somewhat pointed at apex. Bracts scale-like, with brown center and broad white hyaline margin, shorter than the head, the lowest frequently stiff and attenuated. Scales ovate, blunt, about as long and broad as the perigynia, chestnut-brown with white hyaline margin especially well marked in the staminate and lower pistillate scales. Perigynia hidden by the scales, ascending, dark brown at maturity, dull obscurely nerved on both faces, winged, ovate, 4.5–5.25 mm. long, 2–2.25 mm. wide, broadest near the top of the achene, contracted at base, sessile, rather abruptly contracted into a flat winged bidentate beak serrulate to the tip; teeth erect 1 mm. long. Achenes oval, 2 mm. long, 1.2 mm. wide, light brown and dull at maturity, substipitate; style slender; stigmas 2.

The above description is based on plants found growing abundantly in dry soil at an elevation of 3550 m., 200 m. above the timber line, on Mt. Arapahoe, Boulder County, Colorado. My number 3227, preserved in my herbarium, is designated as the type. At the type-locality are found *Carex albo-nigra* Mack. and *C. ellynoides* Holm.

Carex **subimpressa**, spec. nov. "*Carex impressa* (Wright) Mackenzie × *Carex lanuginosa*, Michx." Clokey, Torreya, vol. 16, no. 9, Sept., 1916.

This hybrid has become so well established and shows such vigor, having become more abundant than either parent at the type locality, that it should be given rank as a species. My number 2338, preserved in my herbarium, is designated as the type.

Carex tribuloides, Wahl. var. **sangamonensis**, var. nov. Growing in small clumps from short stout rootstocks. Culms 2.2–6.5 dm. high, slender, soft, sharply angled, very slightly rough on the edges just below the head, about the length of the leaves of the fertile culms. Leaves on the fertile culm 4–8, on the sterile very numerous, 1.5–4 mm. wide, scattered, soft, flat, ribbon-like, gradually tapering to a delicate point, rough on the edges, those of the sterile culms frequently much longer than the fertile culms. Sheaths overlapping, lowest somewhat fibrillose at base. Inflorescence *erect or somewhat flexuous*, 2–4.2 cm. long; spikes 4–6. occasionally 3 or 7 and rarely 8, dull green or straw-color, sessile, obovoid, blunt, slightly to decidedly clavate at base, 6–12 mm. long including staminate part (frequently constituting one third or more of the longer spikes), 3–6 mm. wide, irregularly separated to approximate. Bracts absent or the lower 1–3 present, setaceous, shorter or longer than the head. Staminate flowers basal. Perigynia 3–4 mm. long .9–1.25 mm. wide, straw-colored over achene, rest light green to straw-color, thin, scale-like, scarcely distended over the achene, several-nerved on each face, straight, tapering to slightly cleft apex, without well-marked beak. Achene 1–1.25 mm. long, .67–.75 mm. wide, dull straw-color, lenticular, elliptical, short-stipitate; style slender. Scale white-hyaline with green midrib to uniform straw-color, acute, .67–.75 the length of the perigynia, narrower than the perigynia. Stigmas 2.

This well marked plant is found growing in rich alluvial soil in two small widely separated areas in Macon County, Illinois. My number 2364, preserved in my herbarium, is designated as the type. My number 2362 also belongs here. At the type-locality the plant is found growing with *Carex Leavenworthii* Dewey, and *C. muskingumensis* Schwein. It may be separated from the typical form of *C. tribuloides* Wahl., and from Bailey's varieties *turbata* and *reducta* by the following key.

Spikes 3–7; leaves 1.5–4 mm. broad........*C. tribuloides*, v. *sangamonensis*.
Spikes 8–14; leaves 3–8 mm. broad.
  Perigynia with appressed tips.
    Inflorescence moniliform, spikes scattered....*C. tribuloides*, v. *turbata*.
    Inflorescence cylindric, spikes approximate....*C. tribuloides* (typical).
  Perigynia with spreading tips, inflorescence flexuous.
    C. tribuloides, v. *reducta*.

Var. *sangamonensis* is in some respects between varieties *turbata* and *reducta*, in others different from all other forms of the species. A large number of specimens show that the tips of the perigynia are frequently straight with the perigynia slightly spreading, not appressed as in var. *turbata*, nor recurved as in var. *reducta*. Many of the heads show a flexuous inflorescence with decidedly separated spikes. The small number of spikes is a regular thing, not an exception. Out of several hundred plants carefully examined, only 2–3 heads were found with 8 spikes, a relatively small number with 3 or 7 spikes, and probably over 90% with 4–6 spikes. Another point of difference is in the perigynia which, when fully mature, measure 3–4 mm. with the average of 3.5 mm. long.

Denver, Colorado.

PLANS FOR 1919 SPRING FIELD TRIP OF THE NEW ENGLAND BOTANICAL CLUB.

During the war the field trips of the New England Botanical Club were temporarily abandoned, the last trip two years ago at the time of great financial demands having an attendance of only four members. Now that more settled conditions are in prospect it is proposed to renew these week-end explorations, which have proved so effective in the past in largely increasing our detailed knowledge of local distribution and in affording a remarkable opportunity for many members who enjoy good botanizing and good comradeship to coöperate.

This spring it is proposed to spend Friday, Saturday, and for those who wish it, Sunday, May 30, 31, and June 1, intensively exploring the spring and early summer flora of southwestern Massachusetts. The proposition is to gather at Pittsfield Thursday evening, when plans for the active field work will be clearly formulated. As in the past, the party will be divided into groups of two or three and assigned definite tracts of southern Berkshire County to explore. Each party is held responsible for the collection of every vascular plant in recognizable condition in the area assigned, a full series of these plants to be turned in to the New England Botanical Club to add to its detailed representation. At the end of the trip each member of the party will be asked to supply to the phaenogamic curator the proper data for label-forms and indication of the number of labels needed and these printed label-forms will be supplied to each member.

Southern Berkshire is somewhat known in midsummer but only very limited areas have been botanized in late spring. The present season with *Hepatica, Epigaea,* and others of the earliest flowers expanded in March, promises to be unusually early, so that at the end of May the Berkshire party will find all the interesting material it can care for. The members should take an abundant supply of specimen-papers in which to lay out their daily collections and those who wish naturally will take a supply of driers. By laying out the specimens in pressing paper without many driers the plants can be kept in reasonably good condition for two or three days until the return home, when they will be in condition for final straightening and drying.

The particular object of the late spring exploration of southern Berkshire, besides enjoying the best botanizing to be found in the temperate sections of New England, is to search for the many scores of species which closely approach the Massachusetts border from the west or southwest but which are not yet definitely known within the limits of the state. The region of Berkshire County is geographically and geologically so closely allied to Litchfield County, Ct., to Dutchess and Columbia Counties, N. Y., and to Bennington County, Vt., that plants which are found in these adjacent counties should certainly be expected in Berkshire County. The list of such species is, as intimated, a large one and from it there have been selected the following easily recognized plants which approach southwestern Berkshire County very closely, some of them being found within one mile of our border and all within a distance of ten, or in a few cases only twelve or fifteen miles, from Mount Washington or Sheffield.

Triglochin palustris, marshes, Pine Plains, N. Y. (Characteristic of calcareous marshes throughout the Canadian zone but in New England known only from Maine.)

Eriophorum angustifolium, peat bogs, Pine Plains, N. Y. (One of the early species, maturing in Maine during May and early June but in New England unknown except in Maine.)

Rynchospora capillacea, abundant in calcareous marshes at Pine Plains, N. Y.; also at Salisbury, Ct., and on limy ledges in Vermont. (In northern Maine this species is in recognizable condition during June, although it matures later.)

Carex Crawei, moist fields and meadows, Salisbury, Ct. and somewhat frequent in the calcareous regions of central and western New York; also in the limy soils of Aroostook County, Maine.

Carex castanea, alluvial soils and meadows, Salisbury, Ct.; also in Vermont and common in the calcareous regions of Maine.

Wolffia columbiana, surfaces of ponds and pools, Salisbury, Ct. (The tiniest of the *Lemnaceae*, the minute plants floating just at the surface of the water and without rootlets.)

Juglans nigra, indigenous at North Canaan, Ct. (Reported but unverified from western Massachusetts.)

Morus rubra, frequent in mountain woods, Dutchess County, N. Y.; Salisbury, Ct.; also in southwestern Bennington County, Vt. (Reported but unverified in Massachusetts.)

Ranunculus circinatus, ponds and streams, Salisbury, Ct.; also in Vermont.

Trollius laxus, swampy woods and meadows, Cornwall, Ct. (Reported but unverified from the Connecticut Valley in New Hampshire; also from Maine.)

Corydalis aurea, frequent on limestone cliffs and in rocky woods, Dutchess County, N. Y.; also in western Vermont.

Heuchera americana, wooded banks of the Housatonic, Litchfield County, Ct.

Ribes rotundifolium, rocky woods and hillsides, Dutchess County N. Y.; and Salisbury, Ct.

Hybanthus concolor (Green Violet), very abundant in May "in a cold mountainous woods about a mile from the village of Pine Plains. It was growing very luxuriously — many of the stems being all of three feet in height — and covered several acres of ground almost to the exclusion of other herbacous plants."

Zizia cordata "rather common in all our open woods," Pine Plains; also at various stations in Connecticut.

Taenidia integerrima, frequent in gravelly or rocky woods, Dutchess County, N. Y.; wooded banks of Housatonic River, Ct.; also in western Vermont.

Polemonium Van Bruntiae, swamps, Salisbury, Ct.; also western Vermont.

Valeriana uliginosa "very abundant in some of the marshes and swamps about Pine Plains," over an area 12 miles in diameter, one of the stations within three miles of the Massachusetts-Connecticut line, growing in swamps with *Salix candida* and *Betula pumila;* also locally in Vermont. (Abundant in the calcareous swamps of northern Maine and locally across central and western New York.)

Surely some, if not all, of these characteristic plants of the calcareous regions are to be found in Berkshire County. All of them are in good condition for collecting in late May or June and a party of 15 or 20 enthusiastic explorers should in two or three days of active raking of southern Berkshire bring them to light. The best regions are naturally the least accessible by railroad or trolley, consequently, it is hoped that those who have automobiles will feel ready to put them at the disposal of the Club in order to reach the more remote areas away from railroads.

A notice stating the headquarters of the Club for this trip and other details as to times of trains, etc., will be prepared later. All who wish this final notice should notify R. C. Bean, 48 Emerson Street, Wakefield, Mass.

M. L. Fernald, *Chairman*
R. C. Bean
C. H. Knowlton
Committee on Field Excursions.

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RUBUS IDAEUS AND SOME OF ITS VARIATIONS IN NORTH AMERICA.

M. L. Fernald.

In an attempt to organize the material of the common Red Raspberry in the Gray Herbarium the writer has found himself face to face with several different interpretations and with a plant of New England which does not appear to have been included in the seemingly sufficient "species" or "subspecies" of raspberry which have recently been proposed. In the first place, the distinguished Dr. Focke of Bremen, who has made a life-long study of *Rubus* and whose judgment of specific values in the genus should have great weight, treats *Rubus idaeus* in his *Species Ruborum* [1] as a circumpolar species with numerous geographic subspecies and varieties. Somewhat earlier, the late E. L. Greene, taking up for the Red Raspberries as a separate genus the subgeneric name *Batidaea* of Dumortier, said of the common American representative:

"B. strigosa. *Rubus strigosus*, Michx., the original from Canada; but, between the high Northeast and the mountain districts of the South, there occur several excellent subspecies to be distinguished. Those proposed below are western." [2] Then follow sixteen of the subspecies of *B. strigosa* distinguished by Greene in the region from the Great Lakes westward. To be sure the subspecies are all given binomials, *B. heterodoxa*, *B. amplissima*, etc., like true species and at variance with the ordinarily recognized method of indicating subspecies; but in view of Greene's insistence upon accurate English and

[1] Fock , Species Ruborum pars ii. 207–211: Biblioth. Bot. 72 II (1911).

[2] Greene, Leaflets, i. 238, 239 (1906).

Latin in others (witness pages 229–236, immediately preceding his discussion of *Batidaea*), it is not to be expected that he would write "there occur several excellent subspecies to be distinguished. Those proposed below are western" unless he intended them as *subspecies*, not *species*. The latest treatment of the American Red Raspberries is by Rydberg in the North American Flora (xxii. pt. 5) where he restores the plants to *Rubus* and recognizes in North America eleven species.

Thus it will appear that the student of the flora of North America is left somewhat perplexed as to the status of our Red Raspberries; and, with no desire to add to the perplexity but rather to present certain new evidence and the result of a study of the group at intervals during several years, the following treatment of the plants, especially of eastern America, is presented.

The commoner raspberries of North America and of eastern Asia are distinguished from the European *Rubus idaeus* by their strong tendency to bear stipitate glands on the pedicels, peduncles, new canes, and often on other regions of the plant, as the calyx or petioles, and by bearing bristle-like prickles; the true *R. idaeus* quite lacking both the glands and the bristles, but often having on the pedicels, new canes, etc., strong broad-based prickles somewhat as in our *R. occidentalis*, from which species it is at once distinguished by its more racemose inflorescence, red berries, erect canes, and pinnate leaves on the new canes.

R. idaeus (typical) is commonly cultivated and frequently spreads to roadsides in the neighborhood of gardens, but by neither Focke nor Rydberg is it admitted as more than an introduced plant in North America; although by Focke a close ally, glandless and bristleless and differing from Eurasian *R. idaeus* only in the more abundant dark prickles of the calyx, etc., and a slight tendency to less pubescent branches, is set off as *R. idaeus*, subsp. *melanotrachys*, from northwestern America and by Rydberg is maintained as a distinct species. In the Northwest also is another variant which is quite glandless and bristleless but with the characteristic prickles of *R. idaeus;* though this plant, from Spokane, Washington, has the leaves quite glabrate and green on both surfaces, thus strongly suggesting Focke's description of *R. idaeus*, var. *denudatus* Schimp. & Spenn.: "glabriusculus; foliola subtus viridia."[1] Other specimens from Spokane (Piper's

[1] Focke, l. c. 208.

no. 2268), quite like the first in aspect and prickles, differ, however, in having the pedicels copiously glandular-hispid and viscid-puberulent and thus seem to be the plant which has been described as *Batidaea strigosa,* subsp. *B. peramoena* Greene and which has recently appeared as *Rubus paramoenus* (Greene) Rydberg. These two plants from the same locality, one without stipitate glands and viscid pubescence on the pedicels, the other with them, and in all other characters so similar that their discriminating collector labeled both *Rubus strigosus,* are representative of the variability of the characters which by some authors are taken as dividing our Red Raspberries into distinct species.

As already stated, neither Focke nor Rydberg admit true *Rubus idaeus* as indigenous in North America, although very close allies are recognized in the Northwest and by Rydberg Greene's supposedly indigenous American *Batidaea strigosa,* subsp. *B. itascica,* described from Lake Itaska, Minnesota, is reduced without question to the Eurasian *Rubus idaeus.*[1] Furthermore, on the still uncleared and essentially uninhabited Brion Island, the remote wooded island north of the main archipelago of the Magdalen Islands in the Gulf of St. Lawrence, the Red Raspberry of the indigenous thickets is strictly without bristles or glands and in every particular seems to be perfectly pure *R. idaeus,* the smooth-caned extreme which is included by Focke in his subsp. *vulgaris* and which has sometimes been designated as a forma *inermis.* At other points in the East, as Peaks Island in Casco Bay, perfectly typical *R. idaeus,* there with slightly prickly canes, occurs on the rocky shores as if indigenous, although at the Peaks Island station there is greater possibility of introduction than on the practically unsettled Brion Island.[2] Similarly in the Middle West where *R. idaeus,* according to Rydberg, includes *Batidaea itascica* Greene, the shrub seems to be indigenous. The type locality of the latter plant has been noted; and an entirely similar plant, in its flowering cane quite inseparable from European *R. idaeus,* was collected by Dr. J. Lunell on the shores of Pleasant Lake, Pierce County, North Dakota, in 1901 and distributed as the endemic North American *R. strigosus;* while the fragment in the Gray Her-

[1] See Rydberg, l. c., 445.

[2] Brion Island, although discovered by Cartier, has remained a remote nearly uninhabited islet covered with dense thicket. Its two families are those of the light-keeper and of a solitary farmer.

barium of Rydberg's no. 657 from the Black Hills of South Dakota, labelled by its collector "*Rubus strigosus*" shows neither bristles nor glands in the inflorescence. From these facts it will be clear that, although by no means so common as the bristly and glandular shrubs, the bristleless and glandless *R. idaeus* is locally indigenous (as well as introduced) in North America.

Although the presence of glands and fine bristles characterizes much of the North American and eastern Asiatic Red Raspberry as opposed to the typical *Rubus idaeus* of Eurasia and of local occurrence in North America, a plant which when prickly bears stronger broad-based prickles, strong prickles are by no means confined to the glandless shrubs. In 1858 Regel & Tiling described from eastern Siberia as *R. idaeus,* var. *aculeatissimus*[1] a shrub which has firm broad-based prickles as well as glands. Later an Asiatic and North American plant, which in its details is inseparable from Tiling's original material of var. *aculeatissimus* from Ajan, a duplicate of which is in the Gray Herbarium, was proposed by Focke as *R. idaeus,* subsp. *melanolasius* or *R. idaeus,* subsp. *R. melanolasius,*[2] under the impression that the name var. *aculeatissimus* had never been published.[3] This plant, described by Focke from eastern Siberia and northwestern America, is taken up by Rydberg as a strictly American species, *R. melanolasius,* and to it are reduced as synonyms four of Greene's binomial subspecies of *Batidaea strigosa.*

In eastern America there also occurs a Red Raspberry in which not only the glands but the fine bristles of the American and eastern Asiatic shrubs are abundantly mixed with the stronger prickles of the European. This is a shrub which occurs on steep clay banks of Casco Bay, Maine, an extreme obviously near to *R. idaeus,* var. *aculeatissimus,* but with very tomentose (as well as prickly, setose and glandular) new canes. These two illustrations are sufficient to indicate that, although the absence of glands and bristles and the presence only of stoutish prickles in the upper parts of the plant is a characteristic of European *Rubus idaeus,* the lack of such stoutish

[1] Regel & Tiling, Fl. Ajan. 87 (1858).

[2] Focke, like Greene, unfortunately seems to have had slight regard for the conventional methods of writing plant-names and consequently for the convenience and clear understanding of others, for in the original publication he called the plant a subspecies but (like Greene in case of the subspecies of *Batidaea strigosa*) gave it a binomial designation as well as a subspecific name, a practice long discountenanced and now forbidden by the International Rules.

[3] Focke, Abh. Nat. Ver. Bremen. xiii. 472 (1896).

prickles is by no means a constant characteristic of the glandular and bristly American and eastern Asiatic series, and that species erected upon these characters alone cannot be long maintained. As geographic varieties such plants have some strength and their true relationship is, it seems to the writer, best so expressed.

The commonest plants of eastern America lack the strong prickles but have slender bristles and glands upon the new growth and about the inflorescence. There are two common varieties and others of local occurrence. In the plant which is commonly interpreted as Michaux's *R. strigosus,* the first of the American Red Raspberries to be distinguished, the bristles are ordinarily rather scattered or few or sometimes quite wanting on the canes which have the cortex glabrous or merely glaucous, often becoming lustrous in age. This shrub is abundant especially in the East, but it extends from Newfoundland to British Columbia, south to Virginia, the Great Lake states, and Wyoming. Specimens from Japan, especially from the island of Yezo, are quite inseparable from the American *R. strigosus* in all details and probably represent *R. Matsumuranus* Léveillé & Vaniot.[1]

The other common variety differs from var. *strigosus* in having the new canes closely pubescent and copiously bristly, the grayish pubescence among the numerous bristles giving the canes a peculiar fuscous or dusty aspect. This seems to be the plant which Richardson called *R. idaeus β. canadensis,* from west of Hudson Bay and described as having the "canes fuscous, with crowded small rigid setae."[2] Var. *canadensis* occurs from Labrador to Alaska, south to North Carolina, Michigan, South Dakota, and Colorado; and material from Sachalin Island, northwest of Japan, seems quite inseparable from many sheets of North American var. *canadensis.* The Sachalin Island plant is apparently *R. sachalinensis* Léveillé in Fedde, Repert. vi. 332 (1909), taken up by Focke as *R. idaeus,* subsp. *sachalinensis* and said to have "Folia omnia ternata . . . fructus exsuccus."[3] But the North American specimens of *R. idaeus,* var. *canadensis,* show only ternate leaves on the fruiting canes and very often ternate leaves on the new canes. Furthermore, in view of the scanty material from Sachalin Island and the fact that in defining the plant Focke found it necessary to quote the original description rather than draw up a

[1] Léveillé & Vaniot, Bull. Acad. Géogr. Bot. xx. 135 (1909).
[2] Richardson, Appendix, 2d ed. in Frankl. Journey, ed. 1, 747 (1823).
[3] Focke, Sp. Rub. 209, 210 (1911).

new one based upon abundant material and correlated with his other descriptions, it seems probable that the "dry fruit" of the Sachalin Island plant is *young* fruit, which at that stage is dry in all the varieties of *R. idaeus*.

Var. *canadensis* has recently been called *R. subarcticus* (Greene) Rydberg and *R. carolinianus* Rydberg. In treating this variety as two species Rydberg placed the emphasis upon the degree to which the sepals bear caudate tips; *R. carolinianus*, restricted by him to the mountains of North Carolina, having the "sepals ovate, more than 1 cm. long, caudate-acuminate, the slender tip from half to fully as long as the sepal proper,"[1] while *R. subarcticus*, with southern limits placed at Nova Scotia and British Columbia and "apparently also Nantucket" is said to have "sepals broadly ovate, abruptly acuminate . . . about 6 mm. long."[2] In the key, it is true, the so-called new species, *R. carolinianus*, which is subsequently said to have "sepals ovate," is placed in a section with "Sepals narrowly lanceolate." The definition would thus seem to be loose enough to assure the name covering considerable material; but, unfortunately some North Carolina specimens show sepals even less than 6 mm. long and with very short tips, while the writer has before him many specimens from Labrador, Newfoundland, Canada, and New England with sepals not only a full cm. long, but sometimes even 2–2.5 cm. in length; and on some individual branches occur both short-tipped and long-appendaged sepals. In fact, in a single New Hampshire "clearing" one may collect specimens having sepals with or without caudate appendages and of any length he chooses from 5 mm. to 2.3 cm. The fact is, that this character is extremely variable and not one to use unsupported by stronger characters even in varietal separations. Rydberg himself recognized this when in his key he included *R. strigosus* under both headings: "Sepals. . . .gradually acuminate" and "Sepals. . . .abruptly acuminate." The ranges for his *R. carolinianus* and *R. subarcticus* would seem to preclude the occurrence of either between North Carolina and Canada, except "apparently" on Nantucket. Both of them, however, i. e. the one variety, occur in all the New England states (except possibly Rhode Island), being common in some thickets about Boston, occasional on Cape Cod, and pushing southward into the Pennsylvania mountains, so that the

[1] Rydberg, N. A. Fl. l. c. 447 (1913).
[2] Rydberg, N. A. Fl. l. c. 448 (1913).

gap between the North Carolinian and the Canadian areas is of no more significance than the contradictory characters of the sepals.

These two shrubs, *Rubus idaeus,* vars. *strigosus* and *canadensis,* include the great bulk of Red Raspberries in the East; yet there are two local variants which so closely simulate European varieties of true *R. idaeus* as to be of great interest. In Europe among the recognized varieties of the glandless *R. idaeus* are var. *angustifolius* Schmidely and var. *anomalus* Arrhenius. The former has very narrow lanceolate leaflets, often incised, and is closely simulated by a plant of southeastern Newfoundland which has been described as *R. strigosus,* var. *caudatus* Robinson & Schrenk; but the Newfoundland variety has the new canes pubescent as in *R. idaeus,* var. *canadensis.*

The American representative of the European *R. idaeus,* var. *anomalus,* is the plant recently named by Blanchard *R. Egglestonii* and previously discussed at length by the present writer and illustrated as *R. idaeus,* var. *anomalus.*[1] The Vermont *R. Egglestonii* is exactly parallel with *R. idaeus,* var. *anomalus,* differing from *R. idaeus,* var. *strigosus,* as var. *anomalus* differs from typical *R. idaeus.* It is of peculiar interest as a reversionary variety in which the shorter rounder leaves and leaflets are thought to repeat the more simple foliage of an ancestral type. In this connection it is noteworthy that on old fertile canes of the common var. *strigosus* occasional shoots bear the simple rounded leaves of the so-called *R. Egglestonii,* thus supporting the generally accepted argument that var. *anomalus* (and of course the parallel var. *Egglestonii*) is a reversionary variant.

The variations of *Rubus idaeus* in eastern America may be summarized as follows.[2]

A. Inflorescence without glands or minute bristles: prickles (when present) of the new canes strong and obviously broadened at base. .... *R. idaeus* (typical)

A. Inflorescence bearing glands and minute bristles: new canes (except in an occasional prickleless form of var. *strigosus*) bearing slender bristles and often stipitate glands B.

B. Bark of the new canes glabrous or at most glaucous beneath the bristles, in age becoming lustrous C.

C. Prickles mostly strong and obviously broadened at base. .... var. *aculeatissimus.*

[1] See Rhodora, ii. 195–200, t. 20 (1900).

[2] It may be stated that this discussion was written three years ago, but was held in manuscript in order to check the characters of the varieties in the field. During the three subsequent seasons the writer, sometimes accompanied by Mr. Bayard Long, sometimes by Professor A. S. Pease, closely watched the Red Raspberries and collected extensively from 35 regions in New England, from Aroostook County to Cape Cod and the Connecticut Valley.

C. Prickles (when present) bristleform and not much thickened at base D.
D. Leaves of the new canes with oblong to ovate acuminate leaflets; of the fruiting canes with 3 (rarely 5) similar but shorter leaflets.
New canes bristly.................... var. *strigosus*.
New canes without bristles. . var. *strigosus*, forma *tonsus*.
D. Leaves of the new canes with 3 short ovate to suborbicular round-tipped or blunt leaflets; of the fruiting canes simple and rounded or at most 3-lobed. . var. *Egglestonii*.
B, Bark of the new canes cinereous-tomentulose beneath the prickles.
Many of the prickles stout and broad-based..... var. *heterolasius*.
Prickles all bristleform........................ var. *canadensis*.

R. IDAEUS L. Sp. Pl. i. 492 (1753). *R. idaeus vulgatus* Arrhen. Monog. Rub. Suec. 12 (1840). *Batidaea strigosa*, subsp. *B. itascica* Greene, Leaflets, i. 239 (1906).— Indigenous on the Magdalen Islands (forma INERMIS Kaufmann in Flora Exsiccata Bavarica, no. 25), and in Minnesota and North and South Dakota, presumably elsewhere; also generally introduced and escaping from cultivation. In various regions of Quebec and northern Maine strongly approached by clearly indigenous forms of var. *strigosus* and *canadensis*.

Var. ACULEATISSIMUS Regel & Tiling, Fl. Ajan. 87 (1858). *R. idaeus*, subsp. *melanolasius* Focke, Abh. Nat. Ver. Bremen, xiii. 473 (1896). *R. melanolasius* Focke, l. c. (1896); Rydberg, N. A. Fl. xxii. 448 (1913). *Batidaea strigosa*, subsp. *B. cataphracta* Greene, Leaflets, i. 241 (1906).— Eastern Asia and western North America, extending east to MICHIGAN: Vermillion, Chippewa Co., *C. K. Dodge*, no. 64.

Var. STRIGOSUS (Michx.) Maxim. Bull. Acad. St. Pétersb. xvii. 161 (1872). *R. strigosus* Michx. Fl. Bor.—Am. i. 297 (1803). *R. pensilvanicus* Poir. in Lam. Encyc. vi. 246 (1804). *Batidaea strigosa* (Michx.) Greene, Leaflets, i. 238 (1906). *B. strigosa*, subsp. *B. heterodoxa* Greene, l. c. 239 (1906), fide Rydberg. *B. strigosa*, subsp. *B. elegantula* Greene, l. c. 239 (1906), fide Rydberg. *R. idaeus*, var. *aculeatissimus*, Robinson & Fernald in Gray, Man. ed. 7, 486 (1908) in part, not Regel & Tiling, Fl. Ajan. 87 (1858). *R. Matsumuranus* Léveillé & Vaniot, Bull. Acad. Geogr. Bot. xx. 135 (1909). *R. idaeus*, subsp. *strigosus* (Michx.) Focke, Spec. Rub. pt. 2, 209 (1911). *R. strigosus*, var. *borealis*, Spach ex Focke, l. c. (1911).— Southern Newfoundland and Gaspé Co., Quebec, to southern British Columbia, south to Virginia, the Great Lake States, and Wyoming; also eastern Asia.

Var. STRIGOSUS, forma **albus** (Fuller), n. comb. *R. strigosus*, var. *albus* Fuller ex Bailey, Cyc. Am. Hort. 1582 (1902). *R. idaeus*, var. *aculeatissimus*, forma *albus* (Fuller) Fernald, RHODORA, x. 50 (1908).— Fruit amber-white.— Rare; seen only from NEW HAMPSHIRE: rocky pasture, Cobb's Hill, Alstead, August 5, 1900, *Fernald*.

Var. STRIGOSUS, forma **tonsus**, n. f., turionibus laevibus, aciculis nullis.

New canes smooth; the bristles wanting.— Occasional, Gaspé Co., Quebec to Vermont. QUEBEC: at timberline, Mt. Albert, Gaspé Co., August, 1905, *Fernald & Collins*. MAINE: alluvial woods, Abbot, August 15, 1916, *Fernald & Long*, no. 13,846 (TYPE in herb. N. E. Bot. Club); brooksides and gullies in wooded river-terraces, Fairfield, July 24, 1916, *Fernald & Long*, no. 13,844: alluvial woods, Vassalboro, July 6, 1916, *Fernald*, no. 13,843; alluvial thicket, Limington, August 28, 1916, *Fernald & Long*, no. 13,847; boggy woods and thickets, Gerrish Island, Kittery, *Fernald & Long*, no. 13,845. VERMONT: Hancock, July 7, 1908, *E. F. Williams*.

Var **Egglestonii** (Blanchard), n. comb. *R. idaeus*, var. *anomalus* Fernald, RHODORA, ii. 195, t. 20 (1900), not Arrhenius. *R. Egglestonii* Blanchard, Torreya, vii. 140 (1907).— Known only from VERMONT: limestone ledges, Cavendish, *W. W. Eggleston;* dry rocky soil, Townshend, *L. A. Wheeler*.

Var. **heterolasius**, n. var., turionibus cum ramis pedunculisque viridescentibus tomentosis glandulosis setosis grosse aciculatisque; foliolis subtus albis subtiliter crenatis.

New canes, branches and peduncles greenish, tomentose, glandular, bristly and coarsely prickly: leaflets white beneath, finely crenate.— MAINE: steep clay bank, Eastern Promenade, Portland, June 30, 1909, *Fernald*, no. 1935 (TYPE in Gray Herb.).

Var. CANADENSIS Richardson, Appendix, ed. 2. in Frankl. Journey, ed. 1, 747 (1823). *Batidaea strigosa*, subsp. *B. subarctica* Greene, Leaflets, i. 242 (1906). *R. sachalinensis* Léveillé in Fedde, Repert. vi. 332 (1909). *R. idaeus*, subsp. *sachalinensis* (Léveillé) Focke, Sp. Rub. pt. 2, 210 (1911). *R. carolinianus* Rydberg, N. A. Fl. xxii. 447 (1913). *R. subarcticus* (Greene) Rydb. l. c. 448 (1913).— Labrador to Alaska, south to Nantucket and Cape Cod, Massachusetts, southeastern Connecticut, locally in the mountains to North Carolina, Michigan, South Dakota, and Colorado; also eastern Asia.

Var. CANADENSIS, forma **caudatus** (Robinson & Schrenk), n. comb. *R. strigosus*, var. *caudatus* Robinson & Schrenk, Can. Rec. Sci. vii. 14 (1896). — Known only from the original collection.

The variations confined to western America include the following:

Var. **melanotrachys** (Focke), n. comb. *R. idaeus*, subsp. *melanotrachys* Focke, Abh. Nat. Ver. Brem. xiii. 472, 473 (1906). *R. melanotrachys* Focke, l. c. (1906).

Focke did not regard this plant as a variety of *R. idaeus* but as a *subspecies*. He, like the majority of European taxonomists, distinguishes clearly between the two categories and in his *Species Ruborum* indicates under *R. idaeus*, subsp. *vulgatus*, many varieties.

Var. **arizonicus** (Greene), n. comb. *Batidaea strigosa*, subsp. *B. arizonica* Greene, Leaflets, i. 243 (1906). *R. arizonicus* (Greene) Rydberg, N. A. Fl. xxii. 446 (1913).

Var. **peramoenus** (Greene), n. comb. *Batidaea strigosa*, subsp. *peramoena* Greene, l. c. 241 (1906). *R. peramoenus* (Greene) Rydberg, l. c. (1913).

Var. **acalyphaceus** (Greene), n. comb. *Batidaea strigosa*, subsp. *B. acalyphacea* Greene, l. c. 240 (1906). *R. acalyphaceus* (Greene) Rydberg, l. c. 248 (1913).

The last is similar to var. *heterolasius* but has darker often purple canes and branches and coarsely serrate leaflets.

Gray Herbarium.

FURTHER NOTES ON IMPATIENS BIFLORA.

C. A. Weatherby.

Impatiens biflora, forma Peasei.— When this name was published,[1] I had never seen living material of the plant in question. The description (for which, as it appeared, I was responsible) was drawn up from the reports of three trustworthy botanists who had collected the plant and from statements on herbarium labels. All agreed in describing the flowers as "pink" or "roseate." Moreover, the flowers in certain herbarium specimens examined showed traces of pink coloration.

Since that time, I have had an opportunity to examine living plants of f. *Peasei* at the type station and at two other localities in the White Mountain region — with somewhat disconcerting results. Points of view, it appears, make a difference. The flower of the real f. *Peasei* is not pink throughout as described and as I had supposed. Seen from in front (that is, as one looks directly into the throat of the perianth) it does, indeed, give the impression of a pink blossom; and this fact doubtless explains the statements of collectors in regard to it. But the pink coloration is confined to the inner surface of the spreading perianth-parts, where, in all forms, the spots are usually most numerous. The back of these same parts and the saccate sepal— really,

[1] Rhodora, xix. 116, July 2, 1917.

the greater part of the perianth — is cream-color. Cream is the ground-color of the flower; and ground-color is the basis I used in delimiting the forms of *I. biflora* and, I am convinced, the only practicable one. Forma *Peasei* is, then, essentially only a phase of f. *albiflora*[1] in which the pink spots frequently present in that form are very numerous and coalescent into solid patches of pink.

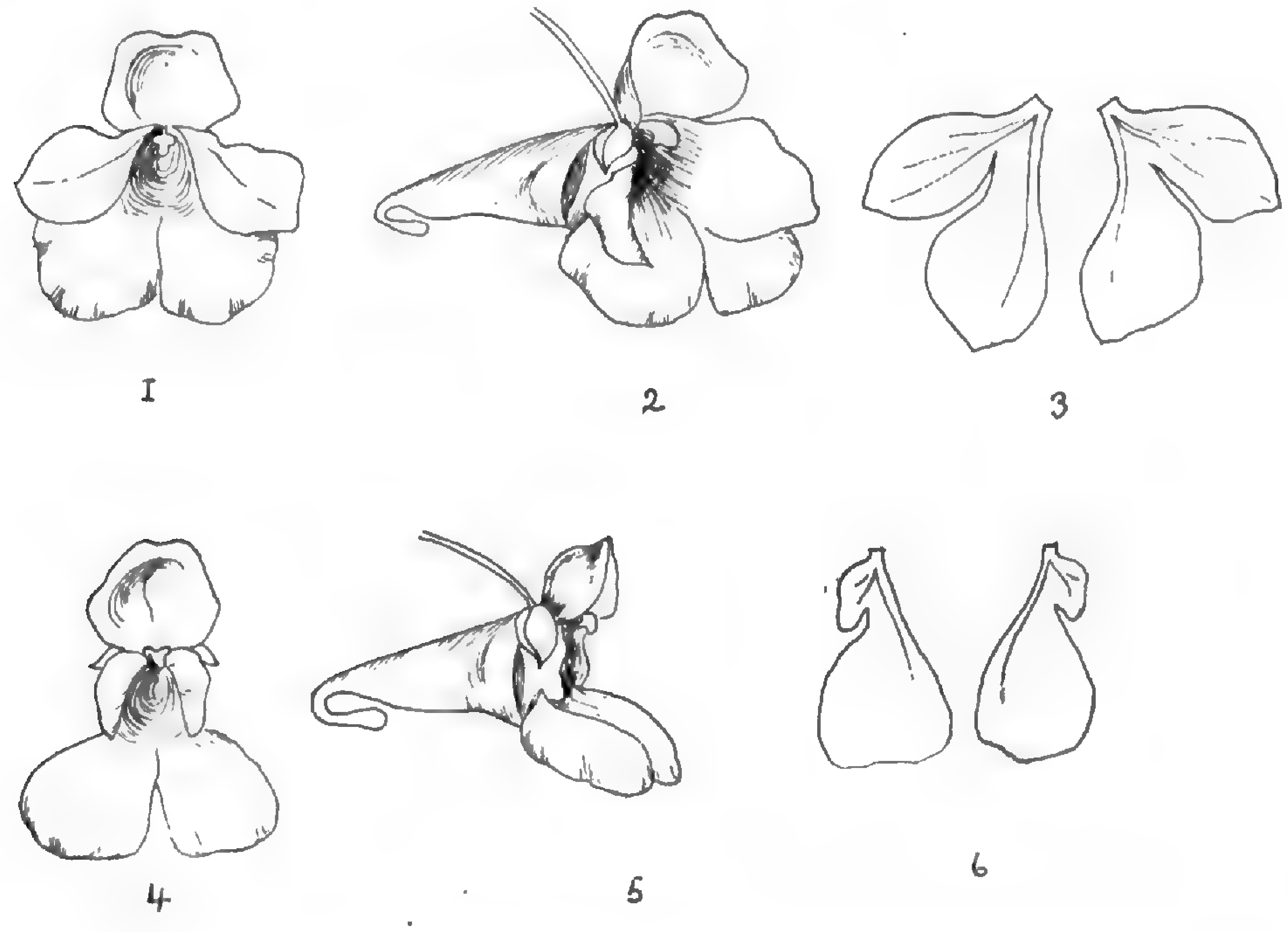
Such a phenomenon occurs commonly enough in both the typical form and f. *citrina*. In the former, flowers with few, scattered spots and with very many spots merging into broad patches of crimson have been observed on the same plant. However, in these two forms the phases with abundant, coalescent spots occur as scattered individuals, mingled with typical plants and likely to be found wherever they are. Forma *Peasei*, on the contrary, occurs in the White Mountain region in pure colonies and there appears to take the place of f. *albiflora* nearly or quite completely. In view of this more definite segregation and of its undoubtedly striking appearance, f. *Peasei* may be allowed to stand, at least pending further investigation. Its description, however, should be amended to read: "Perianth cream-color, the pink spots numerous and coalescent on the inner surfaces of the spreading perianth-parts into patches of solid pink."

I. BIFLORA, forma **platymeris** f. nov.— Petalorum lobis basalibus dilatatis magnis, apicale aequantibus. Basal lobes of the petals large, equalling the apical in size and often over-lapping them.—Moist, shaded ground, with the typical form, Southbury, Connecticut, August 13, 1918, *Una F. Weatherby* (Herb. C. A. Weatherby, no. 4357).

This interesting form was detected by Mrs. Weatherby during one of the summer field meetings of the Connecticut Botanical Society. In the typical form of *I. biflora*, the petals are unequally two-lobed on the outer edge, the basal lobe being small, about one-half the size of the dilated apical lobe. In f. *platymeris*, the basal lobe is about as large as the apical, or even slightly larger, and often over-laps it, giving the flower the appearance of being partially doubled. The accompanying sketches show these differences. If, as is supposed, the two-lobed petals of *Impatiens* have resulted from the union of two petals of a simpler and more regular ancestral flower, f. *platymeris*

[1] It should be remembered that Rand & Redfield's original description of f. *albiflora* was drawn to cover both white and cream-colored flowers. Only the latter were seen, however; and the name, though inappropriate, must be retained for that form. See RHODORA, l. c.

may represent a more primitive condition than typical *I. biflora*, since the development would have been from the more to the less regular and, in the former, the petals would naturally have been of the same size or more nearly so.



Flowers and Petals (the latter removed and spread out) of *Impatiens biflora* (figs. 4–6) and of f. *platymeris* (figs. 1–3).

In f. *platymeris* the erect upper sepal tends to be less concave than in the typical form.

About eight plants of the new form were found, growing intermingled with numerous individuals of the typical form and, except for the floral characters, in no way different from them. As the characters of f. *platymeris* are not readily seen in herbarium material, patches of jewel-weed were examined at every opportunity during the rest of the season in an effort to find it elsewhere; but without success. Mr. Walter Deane and Dr. A. S. Pease have very kindly made similar search in the White Mountain region where, a memory of uncommonly large jewel-weed flowers suggested to me, this form might occur; but they likewise failed to find it.

EAST HARTFORD, CONNECTICUT.

NECESSARY CHANGES IN BOTANICAL NOMENCLATURE.

OLIVER ATKINS FARWELL.

POPULUS BALSAMIFERA Linn. Sp. Pl. ii. 1034 (1753); Miller, Dict. ed. 8, no. 5 (1768). *P. angulatus* Ait. Hort, iii. 407 (1789).—*Populus balsamifera* Miller, l. c., is referred by the Index Kewensis to *P. deltoides* and to *P. heterophylla.* A careful comparison of Miller's description with that of Linnaeus shows, however, that the two are identical, Miller having copied the technical description of Linnaeus, l. c., *verbatim.* Both quote Hort. Cliff. 460. A reference to the latter publication shows that species No. 4 *Populus foliis cordatis crenatis* is the one referred to. This is founded solely on *Populus nigra, folio maximo, gemmis balsamum odoratissimum fundentibus* Catesby, Car. i. 34, t. 34 (1731), a Carolina species, also quoted by Miller, l. c. There is therefore no question as to the identity of the one with the other and that the binomial *P. balsamifera* belongs to the Carolina Poplar, as usually understood, since in last analysis the Linnaean species is founded upon that of Catesby.

P. TACAMAHACCA Miller, Dict. ed. 8, no. 6 (1768). *P. balsamifera* Marshall, Arbust. Amer. 107 (1785), & French ed. 173 (1788). *P. viminea* Marsh. l. c. *P. candicans* Ait. Hort. iii. 406 (1789). *P. ontariensis* Desf. Hort. Par. *P. balsamifera* var. *candicans* A. Gray, Man. ed. 2, 419 (1858).— This is the common Balm of Gilead. Miller's name, which is the oldest, should be adopted for it instead of the later one of Aiton. A form with very scanty pubescence is

Var. **Michauxii** (Henry), n. comb. (*P. balsamifera* var. *Michauxii* Henry.)

Another form, generally without cordate leaves and pubescence, is the Northern Balsam Poplar that has so generally been known as *P. balsamifera.* In accordance with priority this should bear the name

Var. **lanceolata** (Marsh.), n. comb. *P. balsamifera* Linn. Syst. Nat. ed. 13, ii. 656 (1770) and possibly of some earlier editions, and also of most subsequent authors but not of Linn. Sp. Pl. ii. 1034 (1753). *P. balsamifera* var. *lanceolata* Marsh. Arbust. Amer. 108 (1785), & French ed. 173 (1788).

VERONICA PERSICA Poir. Dict. viii. 542 (1808). *V. Buxbaumii*

Ten. Fl. Nap. i. 7, t. 1 (1811).— *Veronica Tournefortii* C. C. Gmelin, Fl. Bad. i. 39 (1805), is the name employed in our local manuals to designate the plant that has, at times, been passing under the names of *V. Buxbaumii* or *V. byzantina.* A reference to Gmelin's Flora Baden shows: (1) that the specific name is based upon Tournefort's *Veronica orientalis, foliis Hederae terrestris, flore magno;* (2) that the synonymy quoted is the Tournefortian species just mentioned, *V. filiformis* Sm. Trans. Linn. Soc. i. 195 (1791), and Buxbaum, Plantae minus cognitae Cent. i. t. 40, f. 1 (1727), all these being identical; (3) that the greater part of the description applies to *V. filiformis* Sm. The description of the leaf is that of *V. Buxbaumii.* While it is more than probable that Gmelin intended to include under his name both the species then known as *V. filiformis* Sm. and that which was later called *V. Buxbaumii* Ten., a careful analysis of all the factors to be considered can not leave any doubt but that he intended to make the Tournefortian species the type of his own and this conclusion is particularly evidenced by the specific name itself which certainly cannot have been derived from any other element. Since a binomial stands or falls with the element upon which it is founded, *V. Tournefortii* becomes a synonym of the older *V. filiformis* Sm. and its retention for *V. Buxbaumii* is erroneous. *V. persica* Poir. seems to be the oldest name applicable and should be taken up instead of *V. Tournefortii* for the species long known as *V. Buxbaumii.*

Viburnum Opulus Linn. var. americanum (Mill.) Ait. In Rhodora, xx. 14–15 (1918) Mr. S. F. Blake gives his reasons for dropping the "(Mill.)" from the authority for this variety and retaining "Ait." only. The reasons are that Miller's herbarium specimen of his *Viburnum americanum* is nothing more nor less than *Hydrangea arborescens* Linn. [Therefore by inference Miller's species is a mere synonym of *Hydrangea arborescens* Linn.] and that as Aiton made no reference to Miller's publication, Miller should not be a part of the author-citation. The above argument of Mr. Blake is of the nature of a boomerang for it is an excellent one against the practice he follows of adopting old herbarium specimens as types of species. Miller calls his species the Guelder Rose and says it has red berries, factors that will not permit of the species being referred as a synonym to *Hydrangea arborescens.* While Aiton did not mention Miller's publication there can be no doubt that he knew of it and that it was this knowledge that led him, when describing the plant as a variety, to use the same name that Miller did. The authority therefore should remain as heretofore "(Miller) Ait."

It would be interesting to know if Miller's *Hydrangea arborescens* is represented in his herbarium and if so by a specimen of what species. Is it perhaps *Viburnum americanum,* thus proving another instance of the interchange of labels or of specimens? Philip Miller was too discriminating a botanist ever to have described in the same volume identical plants under two such widely diverse genera as *Hydrangea* and *Viburnum.*

Department of Botany, Parke, Davis & Co.,
Detroit, Michigan.

Bidens connata Muhl., var. **gracilipes,** n. var., foliis primariis lobatis, lobis 2–4 basilaribus divergentibus decurrentibus, lobo terminali foliisque superioribus lanceolato-attenuatis anguste serratis dentibus subfalcatis, petiolis gracilibus vix marginatis; achaeniis exterioribus 3–4 mm. longis, interioribus 4.5–5 mm. longis aristis marginalibus 2–2.5 mm. longis.

Primary leaves lobed, the 2–4 lobes basal, divergent, decurrent; the terminal lobe and the upper leaves lance-attenuate, slenderly serrate with subfalcate teeth; petioles slender, scarcely margined: outer achenes 3–4 mm. long; the inner 4.5–5 mm. long, with marginal awns 2–2.5 mm. long.— Massachusetts: peaty margins of small ponds west of White Pond, Chatham, September 9, 1913, *Fernald & Long,* no. 10,683; quagmire in woods south of Sparrow Young's Pond, Chatham, August 20, 1918, *Fernald & Long,* no. 17,606; borders of peaty quagmires east of Buck Pond, Harwich, August 30, 1918, *Fernald & Long,* no. 17,607; sandy beach of Seymour Pond, Harwich, September 19, 1918, *Fernald & Weatherby,* no. 17,608 (type in Gray Herb.); wet shore, Mashpee Pond, Mashpee, September 16, 1916, *Bean, Bird & Knowlton.*

In its slender-petioled leaves near *B. connata,* var. *petiolata* (Nutt.) Farwell, but differing in the conspicuously lobed primary leaves and the very short achenes, the achenes of well developed var. *petiolata* being larger, the outer up to 6.5 mm. long, the inner up to 8 mm. long and with marginal awns up to 4.7 mm. long. In its conspicuously lobed leaves and short achenes var. *gracilipes,* which is abundant on Cape Cod, is close to typical *B. connata;* but the latter plant has the less sharply toothed leaves on broadly winged petioles and the achenes, although smaller than in var. *petiolata*, are not so small as in var. *gracilipes*, the outer being 4–5.3 mm. long, the inner 5–6.5 mm. long and with marginal awns 2.2–3.6 mm. long.

Very young specimens from peaty shores of the Little Ossipee River, Limington, Maine (*Fernald & Long*, no. 14,843) may belong here.— M. L. Fernald, Gray Herbarium.

An Omission in the preliminary List of New England Ranunculaceae.— By a regrettable oversight, chiefly my own, the one New England record for *Cimicifuga racemosa* (L.) Nutt., var. *dissecta* Gray was omitted from the list of New England *Ranunculaceae* published in Rhodora, xx. 182. The plant in question was collected by Dr. E. H. Eames at Stratford, Conn., in 1893 and was duly included in the Connecticut Flora. There is also a specimen in the Gray Herbarium. *C. racemosa*, var. *dissecta* should have been entered in the list and marked with a cross.— C. A. Weatherby, East Hartford, Connecticut.

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JASIONE MONTANA A CONSPICUOUS WEED NEAR LAKEWOOD, NEW JERSEY.

BAYARD LONG.

AMONG certain plants received for identification at the Philadelphia Academy during the winter of 1917 was a specimen of *Jasione montana,* said to have been collected the previous summer near Lakewood, New Jersey, by Miss Florence Beckwith of the Rochester Academy of Science.

This striking species is well known about Newport, Rhode Island, especially on Conanicut Island, but elsewhere, apparently (although recognized as occurring from Massachusetts to New York) it has been noted as a very unusual plant.[1] The Lakewood specimen was received through Mr. O. H. Brown of Cape May City. Through his interest and the kindly response of Miss Beckwith it was learned that the plant had been found in a sandy field, sparsely covered with grass and weeds, along the River Road (leading toward Toms River) about two miles out from Lakewood. It was said to be not infrequent in this field but observed nowhere else. With the assurance that the

[1] In fact, although there is an historical occurrence of it at Philadelphia, it has apparently never even been recorded from here. It was doubtless among the rarest of ballast ground waifs, as the only extant material, to the best of my knowledge, is a single specimen at the University of Pennsylvania from "Girard Point (on ballast) Phila.," collected by Isaac Burk, probably about the 60's. The occurrence in New York is in all probability similarly historical rather than actual. Mr. Norman Taylor, in his *Flora of the Vicinity of New York,* notes it "Rare as a waif. . . near the City of New York," but Mr. Percy Wilson has recently written me from the New York Botanical Garden, on my inquiry, "We have only one specimen labelled *Jasione montana* in the local collection. This was collected in ballast grounds at Hunter's Point, New York, in 1879." In the authoritative *Catalogue of the Flowering Plants and Ferns of Connecticut* it is reported as rare in that state, two stations being noted, but is definitely placed in a carefully compiled list of *Fugitive Species.* Probably as little may be said for its occurrence in Massachusetts.

specimen was not a single casual picked out of a clover-field or some similar habitat, the occurrence was considered likely to prove of sufficient interest to warrant a trip to Lakewood — with the hope of being able to rediscover the plant and learn its actual status at this new locality.

On arriving at Lakewood, June 22, 1917, the River Road, or River Avenue, was easily located and a course toward Toms River pursued. It was seen that originally, doubtless, this road ran through pine and oak barrens chiefly, but being one of the main highways through Lakewood to the shore it has become an improved road and much of the natural woods adjacent has given way to cleared land about scattered houses. When little more than a half-mile out of Lakewood my glance fell upon a little group of spindly-stemmed plants (and rosettes) growing along the roadside in the partial shade of a close row of Norway Spruces. They were at once recognized as the desired *Jasione montana*, and although there was a natural disappointment in finding the plants still only in small bud, the discovery itself furnished sufficient satisfaction to make the trip already successful. The best developed plants of the colony were collected for specimens and some rosettes carefully dug for growing. In an endeavor to get out of the heat and glare of a day like midsummer, while putting the specimens in press and wrapping up the rosettes, I crawled in under the spruces. Glancing through the low-hanging branches into the open beyond, I was attracted by the semblance of a blue haze lying low over the ground. To a Philadelphian, "Bluebottles" at once instinctively came to mind. Fields and meadows blued with *Muscari botryoides* are familiar sights in but few places outside the Philadelphia area, however, and the simile may convey little to the generality of botanists. But those to whom this sight has been granted will have a definite point of comparison — and the only one which was suggested to me as I gazed across this acre or more of *Jasione montana*.

Closer inspection showed a field of the most sandy, sterile character, evidently once cultivated but now lying fallow. Here and there among more common weeds were *Potentilla argentea* and *P. recta*, but the dominant plant, occurring in thousands upon thousands, was the *Jasione*. A more dry, torrid, and apparently sterile habitat could scarcely be imagined, but here these plants were flourishing in the greatest luxuriance. They were mostly in their first bloom, a few of the most robust getting into fruit.

The species is a quite curious and unique one in our flora and at first glance suggests little of its alliance to our Harebell and other Bellflowers of the genus *Campanula.* With its tiny flowers in close, hemispheric heads subtended by an involucre it more nearly simulates a Composite. The handsome pale blue of the corolla is strikingly offset in the fresh flower by a pink, exserted, club-shaped body which proves to be the stigma. No less curious are the rounded, burlike fruiting heads, prickly with the pointed, persistent calyx-lobes topping the capsules.

Having in mind that the original station was said to be about two miles out from Lakewood it seemed worth while to continue further along the River Road. Within a short distance another spot was seen where the plant was frequent, then a third, a fourth, till at least a dozen distinct stations were noted between Lakewood and Seven Stars School, three miles south — some of thousands of plants, some few, of course. It was found most frequent within a mile or a mile and a half of Lakewood — a common and conspicuous plant — apparently disappearing as Seven Stars was approached.

The most characteristic habitats were open, sandy areas — old fallow fields, neglected gardens, dooryards, roadsides — in general, cleared areas associated with settlement and cultivation. One station of a particularly interesting type was observed within a mile of Lakewood. Some years ago this spot was evidently cleared and a wide road run through in the process of "land improvement." Now there is only a narrow wagon track winding through the sand and the cleared area is growing up with Pines and Oaks and the regular pine-barren types of the adjacent native flora. In some places the woodland has already come back; in others are only thickets; nearest the River Road is still open sand, characterized by *Euphorbia Ipecacuanhae, Eupatorium album, Carex pennsylvanica.* In this association, in the most sterile, sun-scorched sand, as well as among the thickets of young Pitch Pine and Sassafras, and in the shade of the woods, *Jasione montana* is very frequent and has all the appearance of a native plant — so thoroughly has it adapted itself here. The much greater robustness of the plants in the open sun is clearly indicative of its preferred habitat but its occurrence in the woods shows it to be tolerant of varying conditions.

In the course of my ramblings about one of the larger colonies a farmer was encountered. Upon inquiry whether the plant in his field had recently come in and if he had ever seen it elsewhere, he assured me that the "Blue-weed" has been frequent about Lakewood for twenty-five years and is said to be elsewhere in Monmouth County. Such information may be taken for what it is worth, but the frequence and thorough establishment of the plant along the River Road south of Lakewood is at least suggestive of the possible verity of this fuller statement.

Academy of Natural Sciences of Philadelphia.

TSUGA AMERICANA (MILL.) FARWELL, A FINAL WORD.

Oliver A. Farwell.

In Rhodora for October, 1918, pages 185–8, Mr. Tidestrom argues for the retention of the name *Tsuga Canadensis* (L.) Carr. for the Hemlock Spruce on the grounds that Linnaeus, in 1739, assisted in writing up the description of the plant for Gronovius's *Flora Virginica*, 1743, and hence was familiar with the species and therefore the element Linnaeus knew should be considered as the type; also that the word *submembranaceis* of the description excludes the White Spruce from consideration. He fails to prove, however, that the White Spruce was not equally known to Linnaeus; he only supposes that it was not. He says:—"That Linnaeus meant that his *P. Canadensis* should stand for a Spruce as we understand this genus is out of the question." Since Linnaeus included the "Spruce" as an element of his *Pinus Canadensis* it is rather astonishing, to say the least, to learn, "That Linnaeus meant it, is out of the question." Philip Miller, a contemporary of Linnaeus and a botanist of no mean ability, ranking perhaps in his day as second only to the distinguished Swede, and one who probably knew as much as any about the then current concept of species, certainly understood *Pinus Canadensis* Linn. to be the White Spruce. Note the description of each:—

Pinus Canadensis, Linn.	Abies Canadensis, Miller.
Pinus foliis solitariis linearibus obtusiusculis submembranaceis.	Abies (Canadensis) foliis linearibus obtusiusculis submembranaceis.

With the exception of the word *solitariis* these descriptions are identical and it is *self-evident* that Miller *adopted the specific name and* *technical description from Linnaeus;* also that if the word *submembranaceis* excludes the White Spruce in one instance it must in the other also. *Abies Canadensis* Miller as to name and technical description, but not as to plant, is a *pure synonym of Pinus Canadensis* Linn., *thus leaving Miller's plant nameless;* yet Mr. Tidestrom accepts *Picea Canadensis* (Mill.) Britt. If *Pinus Canadensis* Linn. (*Abies Canadensis* Mill. as to name bringing synonym) is legitimately construed as the Hemlock Spruce, then the *nameless plant* of Miller, the White Spruce, must be given a different appellation than the one by which it is now known since two species can not be given the same specific name when based upon the same earlier binomial. One or the other must drop the specific name *Canadensis:* if it is to be the Hemlock, then its name should be the one heading this article; if the White Spruce, the name for it should be Picea glauca (Moench.) Beissn. (*Pinus glauca* Moench, Verz. 73, 1785.)

For my part and with all due respect to Mr. Tidestrom, I fail to see that he has thrown any new light upon the subject; he has not shown the *determining incident occurring after 1753* that induced Linnaeus to create a new binomial or species, *if it were not,* as previously maintained by me, the *publication of Miller's plate and description.* If Linnaeus did not know the White Spruce, the plate of Miller illustrating it was second only to an actual specimen in hand and therefore he became through studying the figures as familiar with the Spruce as he could have been with the Hemlock from an examination of the Clayton fragmentary twig, some twenty odd years previously; he was at the time (when Miller's *figures* were brought to his attention) probably engrossed with the production of the 2nd Ed. of the Species Plantarum; his study of the Hemlock was brought to mind; he saw a greater resemblance in it to the Spruce than to the Balsam Fir; it was, therefore, taken out of *Pinus Balsamea* and placed under his new species, *P. Canadensis,* where it "should not be considered as necessarily belonging to the species, but that it was possible that such was the case;" having brought these two species together, that he used the old description of his own rather than that of a rival author was perfectly natural, and quite understandable. Since, however, the plate of Miller is the determining factor in the creation of *Pinus Canadensis,* it should be considered as the type.

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PANICUM § CAPILLARIA IN NEW ENGLAND.

M. L. Fernald.

Ever since the publication of Hitchcock & Chase's *North American Species of Panicum*[1] the writer has attempted in vain to reconcile the New England plants of the section *Capillaria* with the published treatment. Finally, finding that by Hitchcock & Chase's treatment all the eastern *P. barbipulvinatum* Nash had been thrust into *P. capillare* L., that much of the northwestern *P. capillare* had been forced into *P. barbipulvinatum,* and that the common indigenous species of river- and lake-shores of most of New England had been merged with the strikingly dissimilar *P. philadelphicum* Bernh., it seemed desirable to study these plants from a new standpoint.

In this study it has been found that the common New England plant which has been confused with *P. philadelphicum* is distinguished at once from *P. capillare* (including *P. barbipulvinatum*) and *P. philadelphicum* by having strictly glabrous pulvini (at the bases of the panicle-branches), in this character agreeing with the southern *P. Gattingeri* Nash; while *P. capillare* and *P. philadelphicum* have the pulvini obviously hispid.

The characters relied upon by Hitchcock & Chase to separate *P. barbipulvinatum* from *P. capillare* are

"Spikelets 2 to 2.2, rarely 2.5 mm. long; blades not crowded toward the base. 23. *P. capillare.*
Spikelets 3 to 3.3, rarely only 2.5 mm. long; blades usually crowded toward the base........................24. *P. barbipulvinatum.*"

It will be noticed that the spikelet-length is not constant, and this becomes conspicuously the case when the series of specimens in the Gray Herbarium and the herbarium of the New England Botanical Club, examined by Hitchcock & Chase, is studied anew, for of the 9 sheets labeled by them "*P. capillare,*" 5 are exact matches for western sheets which they marked "*P. barbipulvinatum.*" Conversely, many of the western specimens marked by them "*P. barbipulvinatum*" are inseparable from eastern plants called "*P. capillare.*" Nor does the crowding of foliage at the base hold any better.

[1] Contrib. U. S. Nat. Herb. xv. (1910).

On the whole, typical *P. capillare* is distinguished by its usually purplish panicle, with the crowded branches included at base and strongly ascending until complete maturity when the branches become divaricately spreading; in *P. barbipulvinatum* the commonly less purple panicle is soon exserted and its branches quickly divaricate. In *P. capillare* the spikelets are usually plumper, those of *P. barbipulvinatum* being more lance-attenuate, but this, like the habit and the length of the spikelet, is not constant. The most definite character seems to be in the length of the pedicels. In typical *P. capillare* the spikelets are mostly on long pedicels; in *P. barbipulvinatum* only the terminal spikelet of each branchlet is obviously pedicelled, the lateral spikelets being very short-pedicelled or even subsessile. This character, however, like the others, is not constant, and *P. barbipulvinatum* seems to the writer, as it has to Rydberg, much better treated as a variety of *P. capillare* than as a distinct species. As a variety the plant should be called *P. capillare*, var. *occidentale* Rydberg, Contrib. U. S. Nat. Herb. iii. 186 (1895), Rydberg's type-number (1788) from Grant Co., Nebraska, being a close match for the type-number (*Rydberg & Bessey*, no. 3544) of *P. barbipulvinatum*.

As understood by the writer the New England species of *Panicum* § *Capillaria* may be distinguished as follows:

Pulvini hispid.
  Spikelets all or nearly all long-pedicelled, 2–3 mm. long: panicle tardily exserted, its lower branches mostly included during anthesis. ..... *P. capillare*.
  Spikelets subsessile or only short-pedicelled along the ultimate branchlets: panicle exserted in anthesis.
    Primary panicle (except in obviously starved individuals) 1.5–3 dm. long: spikelets 2.5–3.3 mm. long, attenuate at tip ..... *P. capillare*, var. *occidentale*.
    Primary panicle 0.4–1.8 dm. long: spikelets 1.7–2 mm. long, merely acute or short-acuminate ..... *P. philadelphicum*.
Pulvini glabrous or merely ciliate at tip ..... *P. Tuckermani*.

P. CAPILLARE L. Sp. Pl. i. 58 (1753); Hitchcock & Chase, Contrib. U. S. Nat. Herb. xv. 60 (1910), in large part. *P. capillare*, var. *agreste* Gattinger, Tenn. Fl. 94 (1887).— *P. capillare*, var. *vulgaris* Scribn. Grasses Tenn. pt. 2, 44 (1894).— Dry open soil, sandy fields, roadsides and waste places, common in southern New England, extending locally north to Windsor Co., Vermont, and Cumberland and Hancock Cos., Maine.

Var. OCCIDENTALE Rydberg, Contrib. U. S. Nat. Herb. iii. 186 (1895). *P. capillare brevifolium* Vasey in Rydberg & Shear, U. S. Dept. Agric. Bull. no. 5, 21 (1897). *P. barbipulvinatum* Nash in

Rydberg, Mem. N. Y. Bot. Gard. i. 21 (1900); Hitchcock & Chase, l. c. 62 (1910), in large part.— Prince Edward Island and Quebec to British Columbia, southward to southern New England, Michigan, Missouri, etc.; a common plant of waste lands, roadsides, and railroad banks in northern New England and eastern Canada. Probably naturalized from the West.

P. philadelphicum Bernh. in Trin. Gram. Pan. 216 (1826), published as a variety of *P. capillare* but with a binomial, validated by Nees, Agrost. Bras. 198 (1829); Hitchcock & Chase, l. c. 58 in part (1910). *P. capillare β. sylvaticum* Torr. Fl. No. and Mid. U. S. 149 (1824). *P. porphyrium* Trin. ex Nees, l. c. as synonym (1829). *P. torreyi* Fourn. in Hemsl. Biol. Centr. Am. Bot. iii. 497 (1885) and Fourn. Mex. Pl. ii. 28 (1886) as to synonym only. *P. capillare*, var. *minimum* Engelm. in Gattinger, l. c. (1887), perhaps also *P. capillare*, var. *minimum* Engelm. in Vasey Cat. Grasses U. S. 9 (1885). *P. minimum* (Engelm.) Scribn. & Merr. U. S. Dept. Agric. Div. Agrost. Circ. no. 27, 4 (1900).— A southern species, known in New England only locally in Connecticut: dry open woods, Franklin, September 12 and 26, 1911, *R. W. Woodward.*

P. **Tuckermani**, n. sp., annuum; culmis plerumque decumbentibus numerosis furcatisque rare adscendentibus vel erectis paucis vel solitariis simplicibusque 0.3–7 dm. longis papilloso-hispidis foliosis; vaginibus papilloso-hispidis, laminis 0.2–2.5 dm. longis 0.1–1 cm. latis longe acuminatis laxe adscendentibus plus minusve hispidis; paniculis plerumque numerosis primariis exsertis late ovoideis 0.2–2 dm. longis, ramibus laxe divergentibus vel deinde subreflexis, ramulis spicato-racemosis spiculis 2–7 breviter pedicellatis vel subsessilibus, pulvinis coriaceis glabris; spiculis ovoideis breviter acuminatis 1.5–2 mm. longis 0.6–0.7 mm. latis, gluma inferiore deltoideo-suborbicularibus breviter acuminatis 0.6–0.9 mm. longis, superiore lemmatibusque sterilibus aequantibus 5-nerviis fructibus paullo superantibus.

Annual; culms usually decumbent and very numerous and forking, sometimes ascending or erect and few or solitary and simple, 0.3–7 dm. long, papillose-hispid, leafy throughout: sheaths papillose-hispid; blades 0.2–2.5 dm. long, 0.1–1 cm. broad, long-acuminate, loosely ascending, more or less hispid on both surfaces: panicles usually numerous, the primary one exserted, broadly ovoid, 0.2–2 dm. long, its branches loosely divergent or finally almost reflexed; the branchlets spicate-racemose, with 2–7 short-pedicelled or subsessile spikelets; pulvini coriaceous, glabrous: spikelets ovoid, short-acuminate, 1.5–2 mm. long, 0.6–0.7 mm. broad; 1st glume deltoid-suborbicular, short-acuminate, 0.6–0.9 mm. long; 2d glume and sterile lemma equal, 5-nerved, barely exceeding the fruit.— Sandy and gravelly shores or open soils, Quebec and northern Maine to Connecticut and Wisconsin. Quebec: damp magnesian gravel and mud about the asbestos quarries, Black Lake, August 26, 1915, *Fernald & Jackson*, no. 11,998. MAINE: gravelly shore of St. John River, Fort Kent, September 21, 1899, *Fernald;* wet sandy shore of Aroostook River, Masardis, September 8, 1898, *Fernald;* river-beach, Mattawamkeag River, Mattawamkeag, September 14, 1898, *Fernald*, no. 2,802; alluvial woods by the Penobscot, Pea Cove, Oldtown, July 27, 1916, *Fernald & Long*, no. 12,472; sandy shore of the Penobscot, Upper Stillwater, September 18, 1899, *Fernald;* sandy soil, Orono, July 30, 1889, *Fernald;* gravelly shore, Orono, September 1, 1893, *Fernald;* exsiccated clay, Orono, August 18, 1908, *Fernald* in Pl. Exsicc. Gray. no. 113; low thickets by the Penobscot River, Veazie, August 25, 1908, *Fernald;* Woodstock, 1887, *J. C. Parlin;* beach of Lambert Lake, September 1, 1908, *Fernald;* gravelly railroad bank, Pembroke, August 18, 1909, *Fernald*, no. 1,272; flats of Small Mill Pond east of Great Pond, Somesville, August 24, 1889, *E. L. Rand;* dry woods, South Deer Isle, August 18, 1914, *A. F. Hill*, no. 1,865; sandy and gravelly beach of Nequasset Lake, Woolwich, September 15, 1916, *Fernald & Long*, no. 12,476; sandy bank of the Androscoggin, Topsham, August 22, 1911, *C. H. Bissell;* Androscoggin Lake, North Leeds, 1894, *Kate Furbish;* South Poland, 1893, 1894, *Kate Furbish;* Harding's, Brunswick, 1899, *Kate Furbish;* The Park, Brunswick, June 26, 1913, *Kate Furbish;* wet clay of wood-path, Baldwin, August 28, 1916, *Fernald & Long*, no. 12,474; wet sandy bank of Saco River, Limington, August 28, 1916, *Fernald & Long*, no. 12,473; sandy beach, Ward Pond, Limington, August 29, 1916, *Fernald, Long & Norton*, no. 12,475; in Fletcher's Woods, Biddeford, September 20, 1901, *G. G. Kennedy*. NEW HAMPSHIRE: weed in garden, Shelburne, September 4, 1915, *W. Deane;* muddy bank of Clear Stream, Errol, September 5, 1917, *Fernald & Pease*, no. 16,968; near Ravine House, Randolph, September 20, 1904, *A. S. Pease*, no. 4,127; damp roadside, Jefferson Highlands, Jefferson, September 7, 1916, *A. S. Pease*, no. 16,873; dry roadside, Alstead, August 2, 1900, *Fernald*, no. 361. VERMONT: head of Lake Memphremagog, September, 1859, *Edw. Tuckerman* (TYPE in Gray Herb.). MASSACHUSETTS: muddy island, Foster's Pond, Andover, September 11, 1913, *A. S. Pease*, no. 2,605; edge of Johnson's Pond, Groveland, September 16, 1901, *A. S. Pease*, no. 2,056; near Spot Pond, Stoneham, October 9, 1852, *Wm. Boott;* sandy shore of Winter Pond, Winchester, September 22, 1908, *Fernald*, October 14, 1906, *Pease*, no. 9,837½; shore of Great Pond, Weymouth, September 9, 1908, *G. G. Kennedy;* ditch, Becket, September 22, 1904, *R. Hoffmann*. RHODE ISLAND: open gravelly soil, Lincoln, September 16, 1906, *Fernald;* damp sandy or peaty shore of Beach Pond, Exeter, September 3, 1914, *Collins & Fernald*, no. 11,243; sandy and peaty shore, southern end of Long Pond, South Kingstown, September 5, 1914, *Collins & Fernald*, no. 11,244. CONNECTICUT: sand flats, bed of Connecticut River, Hartford, September 25, 1909, *C. H.*

Bissell; wet, sandy pond-margin, Sharon, September 7, 1909, *C. A. Weatherby,* no. 2,713. New York: open alluvial and marshy flats between the city and Cayuga Lake west of the Inlet, Ithaca, August 13, 1913, *A. L. Palmer,* no. 79. Wisconsin: St. Croix, "native," 1861, *T. J. Hale.*

Confused by Hitchcock & Chase with the more southern *P. philadelphicum* from which it differs in habit, more leafy culm, short-exserted panicles, glabrous pulvini, and spicate-racemose branchlets of the inflorescence. Much nearer *P. Gattingeri* Nash, which, however, has shorter and broader leaves, ellipsoid panicle, and more scattered, longer-pediceled larger spikelets.

The type-sheet of *P. Tuckermani* was indicated by Tuckerman as a new species which he was afterward dissuaded from publishing. Tuckerman's herbarium name, *P. soboliferum,* has twice been published in synonymy, first by Scribner & Merrill as a synonym of *P. minimum* in Rhodora, iii. 106 (1901), later by Hitchcock & Chase as a synonym of *P. philadelphicum* in Contrib. U. S. Nat. Herb. xv. 58 (1910). In view of the fact that Tuckerman himself never published his herbarium-name and that it has twice been published by others in synonymy, it seems wisest to let it lapse and to use for the plant which Tuckerman at one time thought to be distinct a name which is open to no question and which at the same time associates the discoverer of the species definitely with the plant.

Gray Herbarium.

SOME CONNECTICUT PLANTS.

R. W. Woodward.

Elodea. At Old Lyme, last summer, the writer was surprised to see an *elodea* growing abundantly in the brackish waters of a tidal stream, as he had known *Elodea* only in fresh waters. It was a plant with linear, acute leaves, quite different in appearance from the plant with firmer, more crowded, oblong, or ovate-oblong, obtuse leaves, which comprises much of the aggregate which has hitherto passed as *E. canadensis,* and is now segregated as *Philotria canadensis* (Michx.) Britton. Fortunately, a number of staminate flowers were found floating on the water. These have oblong anthers, which are 0.8–1.0 mm. long. In the pistillate flower the three stigmas are linear, 2-cleft, and exceeding the perianth, which is, at least in dried specimens, purplish or purple-flecked. The fruit of *Elodea* is ordinarily described as oblong, but in this plant the fruit is globose, although the persistent base of the style may give an oblong appearance to partly grown fruit. We have in Connecticut Elodeas with oblong fruit, and others with globose fruit, a fact which indicates that specific characters may yet be found in the fruit. In general, this Old Lyme plant agrees well with Rydberg's description of *Philotria angustifolia* (Muhl.) Britton,[1] and is apparently this species, or close to it, although in the literature at command, the writer has been unable to find a printed record of *Elodea* in marine waters, and our local collectors state that they have not met with the genus in such waters. It was growing at, or below, the edge of low water. The herbarium sheets, showing both kinds of flowers, and mature fruit, are more satisfactory than sheets of *Elodea* usually are.

Lophotocarpus spongiosus, reported in the Connecticut Catalogue by Dr. C. B. Graves as rare at Old Lyme, was noticed the past summer, in the same town, at one station, where it was quite abundant, and many plants were seen with scapes reaching the unusual height of 20 cm., although the majority were tiny affairs, 4 or 5 cm. high.

Panicum virgatum cubense. The writer has in his herbarium a sheet of this variety collected at Norwich, August 11, 1900, on a gravel bank along the Shetucket river a few miles above its entrance into the Thames. The spikelets are 2.8–3 mm. long and match perfectly material verified by Mrs. Agnes Chase, but the panicles are less strict than is usual in this form of *P. virgatum.* The same variety has been collected by Dr. C. B. Graves at Groton, a town on the east bank of the Thames at its mouth, and the writer has found it at Westerly, Rhode Island, a few miles east of Groton, where it is abundant at several stations in brackish sand.[2] This appears to be another instance, of which there are several, of southern or coastal species following up the Thames, a tidal stream, and its tributaries. Thus, *Paspalum psammophilum* is known from several stations along the Shetucket, *P. circulare* occurs on the Yantic, another tributary of

[1] Rydberg, Bull. Torr. Bot. Club, xxxv. 460 (1908).
[2] Rhodora, xvi. 136 (1914).

the Thames, and *Hierochloeodorata* is occasional on many meadows near the Shetucket, and is so abundant at Occum on a marsh crossed by the trolley line that it gives, in May, a distinct yellowish tinge to the marsh. In the Norwich plants the 1st glume of the spikelets is not so acute as in the Westerly plants and the spikelets approach more nearly to the type as figured by Hitchcock and Chase.[1]

Elymus riparius is certainly not rare in southern Connecticut. It is occasional in Franklin, on river bottoms, and is abundant on gravel flats of the Shetucket in Sprague, where perhaps one half of the plants show a distinct reddish tinge, which is quite noticeable in the field. It also occurs in dry situations, as for instance, well up on slopes of the West Rock trap ridge, New Haven, where it is found not as stray individuals but in colonies. In all specimens seen by me, at least the lower sheaths are ciliate and often somewhat pubescent.

Carex glaucodea, occasional in Franklin, often along woodland roads, and always very glaucous, occurs at one station in Franklin where the plants are green or at most, show only a suggestion of the white bloom which is a characteristic of the species.

Eriocaulon Parkeri, reported by Dr. E. H. Eames from the vicinity of New Haven, occurs also at Old Lyme. The writer saw several hundred plants at one station, all growing in soft tidal mud and below the high water line.

Actaea rubra neglecta, Franklin, five or six plants in rich open woods.

Aquilegia canadensis flaviflora. Franklin, on a shaded ledge. The plant was noticed at this station for several seasons about ten years ago. The place has not been visited in recent years. Known hitherto in Connecticut only from a printed record.[2]

Epilobium molle occurs sparingly at Franklin in sphagnous meadows, associated with *E. densum*. It has not been reported in Connecticut from east of the Connecticut River.

Specimens of the above, with a single exception, have been deposited in the Gray Herbarium.

New Haven, Connecticut.

[1] North American Panicium, Hitchcock & Chase, Contrib. U. S. Nat. Herb. xv. 92 (1910).
[2] Rhodora, xx. 182 (1918).

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A NEW LOCALITY FOR SENECIO CRAWFORDII.[1]

Paul C. Standley.

Of the comparatively few species of *Senecio* native to the eastern United States, one of the rarest or, at least, most local in its distribution is *S. Crawfordii* Britton, which was described in 1901 from specimens collected near Philadelphia. In Gray's New Manual Dr. J. M. Greenman treated the plant as a variety of *S. Balsamitae* Muhl. (= *S. pauperculus* Michx.), but in his recent monograph of the genus [1] he has accorded it specific rank. Such a treatment it seems to merit, certainly as much as *S. Smallii* Britton, which is recognized as a species in Gray's Manual, although to the writer the differences which separate it from *S. pauperculus* seem very slight.

The specimens of *S. Crawfordii* cited by Greenman in his monograph, most of them in the herbarium of the Philadelphia Academy of Sciences, are all from southeastern Pennsylvania and western New Jersey. Consequently it may be of interest to record an additional locality for the species, considerably removed from its previously known range. On May 25, 1917, Mr. William R. Maxon obtained in a bog near Suitland, Maryland, a few miles east of Washington, specimens of a *Senecio* which was evidently new to our local flora. It was obviously a relative of *S. Smallii* although conspicuously different in its bright green, very succulent, and comparatively short and broad basal leaves. The writer identified it as *S. Crawfordii*, and the identification was later confirmed by Mr. Bayard Long, after

[1] Published by permission of the Secretary of the Smithsonian Institution.
[2] Ann. Mo. Bot. Gard. iii. 139 (1916).

comparison with the ample material at Philadelphia. On May 12, 1918, Mr. Edgar Brown, Prof. A. S. Hitchcock, Mr. Maxon, and the writer visited the Suitland bog and found the plant growing in some abundance. It was not very conspicuous, however, for the plants were scattered and half hidden among tufts of withered grass.

The two other species of *Senecio* common about Washington are found in quite different habitats. *S. aureus* is frequent along streams and in wet soil generally in the hilly Piedmont Region westward, especially along the valley of the Potomac. *S. Smallii,* also, occurs in the same general region, but in dry, elevated situations. *S. Crawfordii,* on the other hand, occurs in one of the characteristic white gravel or magnolia bogs of the low Coastal Plain.

These bogs are the most interesting feature of our local flora.[1] They are small, hardly more than a few yards across, and lie always upon a gentle slope, usually surrounded by a thick growth of trees and shrubs, a circumstance which often makes their discovery difficult. The necessary condition for their occurrence is a thin bed of gravel or coarse sand, commonly about a foot thick, lying between two beds of clay. On a hillside where the gravel is exposed the water which flows through the subterranean gravel stratum trickles over the bed and keeps it constantly wet, even in the driest seasons. Such bogs are very pleasant botanizing grounds, for here one may wander about nearly dry-shod among a host of interesting bog plants which usually grow in much less comfortably accessible places. A number of the bogs are known in the Coastal Plain region north and east of Washington, and there are probably others still undiscovered in the less explored portions of our area. They are our only stations for a number of interesting species, most of which are characteristic pine-barren plants. The bog near Suitland is in some respects the most interesting of all, for it has yielded several species not found in the others within our limits,[2] such as *Carex Collinsii, Habenaria cristata, Polygala lutea,* and *Arethusa bulbosa.* The last species was reported from our region about 80 years ago, but had not been recollected until we discovered it near Suitland at the same time that we collected the *Senecio.*

[1] See W. L. McAtee. A sketch of the natural history of the District of Columbia. Bull. Biol. Soc. Washington i. 74–90 (1918). McAtee gives a very full and interesting account of the magnolia bogs, and an equally instructive discussion of the other phytogeographic features of the District and vicinity.

[2] The area included in the District flora region, as usually limited, is a circle of 15 miles radius, the Capitol being taken as the center.

The gravel bed, which is the essential feature of these bogs, is bare in spots, but is largely covered by patches of sphagnum and scattered clumps of *Cladonia*, among which grow various herbaceous plants of higher groups. The bog is essentially open, but shrubs are banked about its edge and form occasional clumps over its surface. The shrubs or small trees are chiefly *Alnus rugosa, Myrica carolinensis, Itea virginica, Aronia atropurpurea, Amelanchier oblongifolia, Rhus vernix, Ilex laevigata, Acer rubrum, Nyssa sylvatica, Azalea viscosa, Eubotrys racemosa, Kalmia angustifolia, Gaylussacia dumosa, Vaccinium atrococcum* and *V. corymbosum, Chionanthus virginica,* and *Viburnum nudum* and *V. cassinoides.* The swamp magnolia is present in all the bogs, and it is because of this fact that McAtee has proposed for them the term "magnolia bogs." The more characteristic or interesting herbaceous plants are *Osmunda cinnamomea, Lycopodium adpressum* and *L. carolinianum, Panicum lucidum, Eriocaulon decangulare, Xyris caroliniana, Tofieldia racemosa, Melanthium angustifolium, Limodorum tuberosum, Pogonia ophioglossoides, Drosera rotundifolia, Polygala lutea* and *P. cruciata, Triadenum virginicum, Rhexia virginica, Oxypolis rigidior, Utricularia subulata,* and *Helianthus angustifolius.*

It will be seen that most of the plants enumerated are characteristic species of the pine-barrens which, in the northeastern states, attain their best development in New Jersey. Notwithstanding the presence of so many species characteristic of that type of vegetation, no pine-barrens exist in our region. The isolated occurrence of such a large percentage of pine-barren species (it is estimated that 70 per cent of the typical ones occur in Delaware and eastern Maryland) is explained by McAtee as having probably resulted from the depression of the Coastal Plain. It is assumed that formerly a belt of the pine-barren flora extended along much of the Atlantic coast, but that when the Coastal region was depressed most of the vegetation of this type was destroyed. Isolated colonies of plants were able to maintain their existence in favorable spots near or upon the Piedmont Plateau, and although conditions in such situations were generally unsuited to the growth of pine-barren plants, some of them have managed to persist in places where conditions were particularly propitious, as, for instance, in these magnolia bogs.

It may be noted in concluding that although *Senecio Crawfordii* is found with us in association with pine-barren species, it appears to occur in a different habitat in Pennsylvania and New Jersey. Stone[1] reports it from "Damp meadows or bogs in the Middle district, near the Delaware River, local and not common."

U. S. National Museum, Washington, D. C.

TWO NEW MYRIOPHYLLUMS AND A SPECIES NEW TO THE UNITED STATES.

M. L. Fernald.

Myriophyllum **exalbescens**, n. sp., herba aquatica, caule glaberrimo folioso simplice vel ramoso purpureo in statu exsiccato exalbescente; foliis verticillatis raro 3^{nis} plerumque 4^{nis} 1.2–3 cm. longis, segmentis 7–11-jugis capillaceis flaccidis vix subrigidis 0.5–3 cm. longis; spicis terminalibus subnudis, floribus verticillatis inferioribus foemineis superioribus masculis sessilibus; bracteis fructum rare aequantibus spatulato-obovatis vel oblongo-cochleiformibus inferioribus serratis superioribus integris; bracteolis ovatis integris brunneo-marginatis 0.7–1 mm. longis; petalis oblongo-obovatis concavis 2.5 mm. longis; staminibus 8, antheris oblongis 1.2–1.8 mm. longis; fructibus subglobosis angustissime 4-sulcatis 2.3–3 mm. longis, merocarpiis dorso rotundatis laevibus vel rugulosis.

Aquatic herb; the stem glabrous, leafy, simple or branching, purple, in the dried state becoming white: leaves verticillate, rarely in 3's, commonly in 4's, 1.2–3 cm. long, with 7–11 pairs of capillary flaccid or barely a little rigid segments: spikes terminal, almost naked, the flowers verticillate; the lower pistillate, the upper staminate, sessile: bracts rarely equalling the fruit, spatulate-obovate or oblong-cochleiform; the lower serrate, the upper entire: bracteoles ovate, entire, brown-margined, 0.7–1 mm. long: petals oblong-obovate, concave, 2.5 mm. long: stamens 8; anthers oblong, 1.2–1.8 mm. long: fruits subglobose, very slenderly 4-sulcate, 2.3–3 mm. long; the merocarps rounded on the back, smooth or rugulose.— Ponds, pools and quiet streams, often brackish or calcareous, Greenland and Labrador to Washington, south to western Newfoundland, Cape Breton, southern New Brunswick, southern New England, southeastern, central and western New York, the Great Lake region, Kansas, Arizona and southern California. Greenland: Ikerasak, July 19, 1892, *Vandhöffen*. Labrador: shallow sandy-bottomed

[1] Plants of southern New Jersey 777 (1911).

pools, Blanc Sablon River, August 4, 1910, *Fernald & Wiegand*, no. 3,753. NEWFOUNDLAND: pools in limestone barrens, Pointe Riche, August 4, 1910, *Fernald & Wiegand*, no. 3,754. MAGDALEN ISLANDS: shallow pools among the sand ridges between East Cape and East Point, Coffin Island, *Fernald, Bartram, Long & St. John*, no. 7,842. QUEBEC: shallow pond, Longue Pointe, Brest, July 31, 1915, *St. John*, nos. 90,616, 90,617; brackish pools and dead waters near the mouth of Dartmouth River, August 26 and 27, 1904, *Collins, Fernald & Pease;* York River, July 29, 1905, *Williams, Collins & Fernald* (TYPE in Gray Herb.). PRINCE EDWARD ISLAND: shallow pools in *Thuja* swamps, Tignish, August 6, 1912, *Fernald, Long & St. John*, no. 7,840; Black Pond, July 28, 1912, *Fernald, Bartram, Long & St. John*, no. 7,841. NOVA SCOTIA: lake at Bay St. Lawrence, Cape Breton, August 12, 1904, *J. R. Churchill.* MAINE: near margins of lakes in 3–10 feet of water, St. Francis River, August 14, 1902, *Eggleston & Fernald* (*Eggleston*, no. 3,024); quiet pools, St. Croix River, Calais, August 3, 1909, *Fernald*, no. 2,014. VERMONT: Shelburne, July 31, 1894, *A. J. Grout;* Dorset, July 28, 1898, *M. A. Day.* MASSACHUSETTS: Idlewild Lake, Wenham, September 13, 1908, *F. S. Collins;* Mystic Pond, Medford, September 24, 1865, *Wm. Boott;* Fresh Pond, Cambridge, *Faxon et al.;* outlet of Stockbridge Bowl, Stockbridge, August 9, 1914, *Hoffmann.* CONNECTICUT: New Haven, 1857, *D. C. Eaton;* pond near headwaters of Saugatuck River, Danbury, July 21, 1917, *E. H. Eames & C. C. Godfrey.* NEW YORK: Sucker Brook, Lisbon, June 22, 1914, *O. P. Phelps*, no. 717 in part; Elmira, 1859, *E. Tatnall.* ONTARIO: Ottawa River below Britannia, August 21, 1911, *J. Macoun*, no. 85,941; Rideau River, Cummings Bridge, September 7, 1911, *J. Macoun*, no. 85,942; Smith's Falls, July 14, 1898, *J. Fowler.* OHIO: Cedar Point, Erie Co., July 8, 1894, *E. L. Moseley.* MICHIGAN: Lansing, August 18, 1885, *L. H. Bailey.* WISCONSIN: Milwaukee, *I. A. Lapham;* Green Bay near Bars Channel, June 29, 1890, *J. H. Schuette.* ILLINOIS: Fox River, 1862, *Geo. Vasey;* in a peat-bog lake, Lake Villa, Lake Co., August 8, 1906, *Gleason & Shobe*, no. 178 (distributed as *Ceratophyllum demersum*). MINNESOTA: Lake of the Woods, June 26, 1894, *McMillan & Sheldon*, no. 568. NORTH DAKOTA: pools, Leeds, August 5, 1900, *J. Lunell.* SOUTH DAKOTA: Sioux River, Brookings, July 4, 1894, *J. J. Thornber.* NEBRASKA: Swan Lake, Grant Co., August 7, 1893, *Rydberg*, no. 1,651. KANSAS: ponds, Decatur Co., June 26, 1897, *A. S. Hitchcock*, no. 1,083. SASKATCHEWAN: 1858, *Bourgeau;* Crane Lake, June 16, 1894, *J. Macoun*, no. 4,934. MONTANA: Bitterroot Valley near Missoula, August 4, 1880, *S. Watson*, no. 143; Cliff Lake, Madison Co., July 27, 1897, *Rydberg & Bessey*, no. 4,591. WYOMING: Bath Lake, September 8, 1896, *A. Nelson*, no. 2,782; Green River, August 26, 1894, *A. Nelson*, no. 1,038. COLORADO: ponds, Tabeguache Basin, July 21, 1913, *E. Payson*, no. 145; Gunnison, August 16, 1901, *C. F. Baker*, no. 824

(form with remarkably elongate bracts). Arizona: Mormon Lake, June 6, 1898, *MacDougal*, no. 75. Idaho: Pend Oreille River, 1861, *Lyall;* ponds and streams, Falk's Store, Canyon Co., June 28, 1910, *J. F. Macbride*, no. 302. California: Big Meadows, August, 1879, *Mrs. R. M. Austin;* Presidio, June, 1891, *Michiner & Bioletti*, no. 175; Mountain Lake, San Francisco, June 27, 1892, *J. W. Blankinship;* Bear Valley, San Bernardino Mts., August, 1882, *Parish*, no. 1,433. Oregon: sluggish stream, Malheur Co., June 24, 1898, *Cusick*, no. 1,959. Washington: Seattle, August, 1892, *Piper*, no. 1,132; Lake Cushman, Mason Co., August, 1895, *Piper*, no. 2,230; Blakeley Island, San Juan Islands, 1917, *S. M. & E. B. Zeller*, no. 1,144 (distributed as *Ceratophyllum demersum*).

Myriophyllum exalbescens has always passed in America as *M. spicatum* L. The latter species of Eurasia, however, differs from the American plant in several characters: the principal leaves of the primary stems have 14–21 pairs of rigid slenderly linear divisions; the bracts are rhombic-obovate; the bractlets are suborbicular or reniform, broader than long, and distinctly shorter than in most of *M. exalbescens*, 0.5–0.8 mm. long; and the linear anthers tend to be longer, being 1.8–2.2 mm. in length. In *M. exalbescens*, furthermore, the dried stems very strongly tend to become white, although this change is not always noted; in *M. spicatum*, however, the old herbarium-specimens still retain a fulvous or olivaceous tone in the stems.

On the Magdalen Islands occurs a species of *Myriophyllum* which in foliage and in the whitening of the stem upon drying strongly suggests *M. exalbescens* but with fruit so very unlike that of the latter species or of the old world *M. spicatum* or of any species known to the writer that it is here proposed as

Myriophyllum **magdalense**, n. sp., *M. exalbescenti* simile; caule ramoso in statu exsiccato exalbescente, foliis plerumque 4^{nis} 1–2 cm. longis segmentis 3–7-jugis capillaceis flaccidis 0.5–1.3 cm. longis, superioribus emergentibus elongato-oblanceolatis vel linearibus breviter pectinatis vel subintegris; spicis terminalibus rhachi filiformi floribus verticillatis inferioribus foemineis superioribus masculis sessilibus; bracteis elongatis lineari-oblanceolatis conduplicatis apice sursum curvatis integris vel inferioribus pectinatis 0.3–1 cm. longis; bracteolis ovatis 0.6–0.8 mm. longis; petalis ovato-oblongis concavis, 1.5 mm. longis; staminibus 8, antheris oblongis 1.5 mm. longis (immaturis); fructibus subglobosis 3 mm. longis latissime 4-sulcatis, merocarpiis dorso-rotundatis rugosis.

Similar to *M. exalbescens;* the stem branching, becoming white when dried: leaves mostly in 4's, 1–2 cm. long, with 3–7 pairs of capillary flaccid segments 0.5–1.3 cm. long; the upper emergent ones elongate-oblanceolate or linear, short-pectinate or subentire: spikes terminal, with the rhachis filiform; flowers verticillate, the lower pistillate, the upper staminate, sessile: bracts elongate, linear-oblanceolate, conduplicate, up-curved at the end, entire or the lower pectinate, 0.3–1 cm. long: bractlets ovate, 0.6–0.8 mm. long: petals ovate-oblong, concave, 1.5 mm. long: stamens 8; anthers oblong, 1.5 mm. long (immature); fruits subglobose, 3 mm. long, very broadly 4-sulcate; the merocarps with rounded rugose backs.— MAGDALEN ISLANDS, QUEBEC: shallow ponds among the sand hills between East Cape and East Point, Coffin Island, August 17, 1912, *Fernald, Long & St. John*, no. 7,843 (TYPE in Gray Herb.).

In the whitening of its stem *M. magdalense* simulates *M. exalbescens* from which it differs in the elongate, entire or subentire upper leaves, the elongate bracts, the very short petals and especially in the very broadly and openly sulcate fruits. From *M. spicatum* it differs in the whitening stem, the few capillary and flaccid segments of the leaves, the elongate bracts (sometimes found also in varieties of *M. spicatum*), the ovate bractlets, the short petals and anthers, and in the very characteristic fruit, the fruits of *M. spicatum* being slenderly sulcate as in *M. exalbescens.*

Unfortunately the material of *M. magdalense* is mostly immature, only one plant being found with good fruit. The species filled a single small pond to the exclusion of other species and flowered freely so that a visit in September should yield abundant fruiting material. The *Myriophyllum* of neighboring pools was *M. exalbescens* and in a single station *M. verticillatum,* var. *intermedium* Koch, which apparently has not heretofore been found in North America.

In the Gray Herbarium, among the various species which have been erroneously called by their collectors *Myriophyllum verticillatum* is a sheet from Farewell Bend, Crook Co., Oregon, collected in July, 1894 by J. B. Leiberg (no. 465), which is quite unlike any recognized North American plant. In its very glaucous or blue-green, emersed, broad, entire or variously serrate leaves and the tendency of the inflorescence to fork it is unique among American plants as it is in the very long (2 mm.) slenderly triangular, serrate bractlets. This plant proves to be a well known species of the southern hemisphere,

M. ELATINOIDES Gaudichaud, Ann. Sci. Nat. v. 105 (1825) = *M. titikakense* Remy, Ann. Sci. Nat. sér. 3, vi. 352 (1846). *M. elatinoides* is one of that remarkable group of species confined to southern Australia, Tasmania and New Zealand and America but not known in Africa nor Eurasia. Outside the Australian region it has been heretofore known only as a common Andean species, from the Falkland Islands and Tierra del Fuego along the higher Andes to Ecuador. In the *Pflanzenreich* Schindler cites a specimen of Botteri's collected somewhere in Mexico, the station not known. The discovery of this Australian and Andean species in Oregon[1] is, therefore, highly important and particularly striking as adding another to a small group of plants which have followed essentially similar lines of migration. Occasionally these Andean plants are also in eastern America, for instance *Polystichum scopulinum* (D. C. Eaton) Maxon. In writing elsewhere of the distribution of that and its allies the present writer has said: "I refer to *P. mohrioides* and its allies (fig. 17). There are four or five species of this alliance, all plants of the highest degree of localization. *P. mohrioides* and other austral species are known only from the Antarctic Prince Edward Islands, 1,200 miles southeast of the Cape of Good Hope, from the Falkland Islands, Tierra del Fuego, and Patagonia, and as the rarest of isolated species in the Andes. In North America we have two species so close to *P. mohrioides* that some authors have considered them inseparable: *P. Lemmoni*, a famous rare species of the mountains of California, Oregon and Washington; and *P. scopulinum* of similar range, though even rarer, and found with *Pellaea densa* on arid mountain-walls of Gaspé County, Quebec."[2] Now that the Andean *Myriophyllum elatinoides* has been found in Oregon, we may, therefore, watch for it with some confidence in the Gaspé or Newfoundland waters.

Schindler cites in the synonymy of *M. elatinoides*, *M. quitense* HBK. Nov. Gen. et Sp. vi. 89 (1823) and if the identification is confirmed *M. quitense* must be maintained as the earliest name. The description, however, is not satisfactory, for the plant is described as near *M. spicatum*, with all the leaves immersed and pectinate-pinnatisect.

GRAY HERBARIUM.

[1] Since the above went into type a beautiful sheet of *M. elatinoides* has been received from Prof. Morton E. Peck, collected in Des Chutes River, Oregon, July 27, 1914 (*Peck*, no. 5718).

[2] Fernald, Am. Jour. Bot. v, 231 (1918).

REPORTS ON THE FLORA OF THE BOSTON DISTRICT, — XXXI.

CALLITRICHACEAE.

CALLITRICHE.

C. heterophylla Pursh. Brooks, occasional; no reports from southern towns of district.

C. palustris L. Brooks and wet places, frequent throughout.

ANACARDIACEAE.

RHUS.

R. copallina L. Dry sandy and rocky soil, common throughout.

R. Cotinus L. Waste land, Beverly Farms (*F. T. Hubbard,* June 20, 1913); escaped, Medford (*L. L. Dame,* July, 1886).

R. glabra L. Dry soil, very common throughout. [Forma *lacinata* (Carr.) Robinson has been reported from Weston and Scituate, but no specimens have been preserved.]

R. Toxicodendron L. Fields, roadsides, woods and sea-beaches, common throughout.

R. Toxicodendron L., var. **radicans** (L.) Torr. On trees and walls, common.

[Beside the above variety there seem to be three other forms in our region: the slender prostrate vine of dry fields and river thickets; a bushy form with large dark green leaves which stands alone or forms hedges along stonewalls; and the thick-leaved, compact plants which grow on the sea-beaches above high water.]

R. typhina L. Dry soil, common throughout.

R. Vernix L. Swamps and low ground; common, but not always abundant.

AQUIFOLIACEAE.

ILEX.

I. glabra (L.) Gray. Swamps and moist woods; abundant at Magnolia swamp in Gloucester, also reported from Rockport and

Wenham; Blue Hills, Hingham and Cohasset southward (see Rhodora xvi. 163–5, 1914).

I. laevigata (Pursh) Gray. Wet soil, frequent near the coast, especially in Plymouth county, but not reported from western towns.

I. laevigata (Pursh) Gray, forma **Herveyi** Robinson. Long Pond, Tewksbury (*A. S. Pease,* Sept. 23, 1901). Specimen in herb. N. E. Botanical Club.

I. opaca Ait. Dogtown Commons, Rockport (*Frank Lufkin,* no date). Specimen in herb. Peabody Acad. of Sciences. This extreme northeastern station for the species is now extinct, according to J. H. Sears, Rhodora x. 43, 1908. Rather common in woods from Quincy, Holbrook, Hingham and Cohasset southward. See Rhodora xvi. 163–5, 1914.

I. verticillata (L.) Gray. Low ground, common throughout.

I. verticillata (L.) Gray, forma **chrysocarpa** Robinson. Georgetown (*Mrs. C. N. S. Horner,* no date); brackish river shore, Newburyport (*Donald White,* Sept. 13, 1913); W. Boxford (*M. H. Cole,* September, 1881); reported from Westford (*Miss E. F. Fletcher,* no date).

I. verticillata (L.) Gray, var. **padifolia** (Willd.) T. & G. Occasional.

I. verticillata (L.) Gray, var. **tenuifolia** (Torr.) Wats. Amesbury, Ipswich, Cohasset, Marshfield.

NEMOPANTHUS.

N. mucronata (L.) Trel. Swamps and wet woods, well distributed throughout.

CELASTRACEAE.

CELASTRUS.

C. scandens L. Woods and thickets, rather common throughout.

EVONYMUS.

E. atropurpureus Jacq. Persistent or sporadic at Salem and Milton.

STAPHYLEACEAE.

STAPHYLEA.

S. trifolia L. Needham (*T. O. Fuller*, June 4, 1885; *E. & C. E. Faxon*, Aug. 16, 1891); "in woods at Weston," Bigelow, Fl. Bost. 121, 1824.

ACERACEAE.

ACER.

A. NEGUNDO L. Introduced from further west and frequently spreading.

A. pennsylvanicum L. Cold rich woods; frequent in Essex County; also at Medford, Concord, Groton, and Blue Hill Reservation.

A. PLATANOIDES L. A rare escape from cultivation.

A PSEUDO-PLATANUS L. Casual escape at W. Medford and Dorchester.

A. rubrum L. Swamps and wet woods, very common throughout.

A. rubrum L., var. **tridens** Wood. One tree near Auburndale (*M. L. Fernald & A. Rehder*, May 17, 1904). See RHODORA ix. 116, 1907. Probably elsewhere in the district.

A. saccharinum L. Occasional by streams, especially in Essex County; introduced in many places.

A. saccharum Marsh. Rich woods; occasional in northern half of district and at Blue Hill Reservation and Hingham.

A. spicatum Lam. Newburyport (*Edw. Moulton*, no date). Specimen in herb. Peabody Acad. of Science.

SAPINDACEAE.

AESCULUS.

A. HIPPOCASTANUM L. Rarely spontaneous.

CARDIOSPERMUM.

C. HALICACABUM L. Somerville (*C. E. Perkins*, September, 1878). Specimen in herb. N. E. Botanical Club.

BALSAMINACEAE.

IMPATIENS.

I. biflora Walt. Moist soil, very common throughout.

I. biflora Walt., forma **albiflora** (Rand & Redfield) Weatherby. Edge of pool, Billerica (*C. A. Weatherby,* Aug. 12, 1911). See Rhodora xix. 115, 1917.

RHAMNACEAE.

CEANOTHUS.

C. americanus L. Dry open woods, common throughout.

C. ovatus Desf. Dry rocky and sandy soil; Andover, near Haggett's Pond (*Mrs. Belle P. Gowing,* June 18, 1888; *A. S. Pease,* June 4, 1904; *M. L. Fernald,* June 17, 1911); N. Chelmsford (*Mrs. A. R. Spalding,* June 14, 1898); Lowell (*Mrs. F. P. Spalding,* June 20, 1896).

C. ovatus Desf., var. **pubescens** T. & G. Shadyside Grove, Andover (*M. L. Fernald,* June 17, 1911); abundant in dry sandy soil, Lynnfield (*M. L. Fernald,* June 16, 1917).

RHAMNUS.

R. cathartica L. Thickets and waste places, common.

R. Frangula L. Large colony in low ground near railway, Wakefield (*R. C. Bean,* June 13, 1915); several trees by stone wall, Concord (*Wm. Brewster,* June 27, 1918). See Rhodora xx. 204–5, 1918.

C. H. Knowlton } *Committee on*
Walter Deane } *Local Flora.*

DISCOVERY OF TRISETUM SPICATUM IN PENNSYLVANIA.

Harold W. Pretz.

It is only the collector that can fully appreciate the charm of field collecting with its varied experiences. Whatever else may be suggested by the circumstances surrounding the collection of *Trisetum spicatum* in Lehigh County, Pennsylvania, the writer is more than ever convinced that it is a good rule to collect anything in the field that seems out of the ordinary.

On July 15, 1917, the writer and his companion Mr. Walter I. Mattern were on their way for a day's botanizing along the Blue Mountains when a sudden rain made it seem best to abandon this attractive trip. It was still raining lightly when it was decided that rather than return home a trip should be made on the tracks of the Lehigh Valley Railroad along the Lehigh River past a number of steep, shale slopes with outcropping masses of rock between Slatington and Treichler that on a number of occasions have furnished most entertaining and profitable botanizing. It was too wet to make it advisable, at least as far as comfort was concerned, to penetrate far into the water-soaked vegetation of the slopes, etc., so it was planned instead to give leisurely and thorough attention to the outcrops and such parts of the slope as were readily accessible from the tracks. The plan worked out successfully, for besides interesting general collections, there was discovered in this supposedly well known locality a small amount of *Woodsia ilvensis,* a rare fern in the county though known from four other stations, and *Dryopteris Dryopteris,* a still rarer fern previously collected only twice in the county.

It was in this same locality about a mile and three quarters southeast by south of Slatington while the writer was standing beside the tracks busy cleaning a plant for press that he chanced to see on the shale cliff beside him the dried stalks of a grass that he could not seem to recognize as anything he knew. A stroke or two with the botanical pick dislodged a small clump which dropped with a dull splash to the ground. Water-soaked, bedraggled and soiled by coal dirt it was certainly not an inviting specimen and the temptation to abandon it was strong. But then it was clearly unfamiliar so it was cleaned, put into press and taken along. Later when it turned up at the time the writer was determining his *Gramineae* of the season it looked little more inviting and was in such poor condition that no trouble was taken with it. It was merely sent along unnamed to the Academy of Natural Sciences in Philadelphia with the writer's usual contribution to the Philadelphia Botanical Club Herbarium for Mr. Bayard Long to identify. Mr. Long recognized it as *Trisetum spicatum* and, writing about it, suggested the future collection of better material. It was only then that the writer became aware of the importance of this plant.

On June 23d, 1918, another visit was made to this series of steep slopes. The outcrops and slopes were carefully scanned for *Trisetum spicatum* from the tracks without success until the place of the original collection was reached. Here the plant was found rather evenly distributed and quite abundant about the open outcrops of the rather short, steep part of the slope close to the tracks for perhaps the distance of a city block and between two moist springy places about the outcrops. The soil in which it grew was moist but that was because of the recent rain for the soil on the shelves where some grew was shallow and suggested normally dry soil. Some however did grow in the springy places or at least close to where moisture is the rule. It grew mostly on tiny shelves of the outcrops which are lower and less clifflike than some others of the series here and when growing on the tiny shelves but a few inches wide, or less in some cases, presented rather a striking appearance where it grew upright against the vertical face of the outcrop. Later in the season, on August 18, 1918, the entire distance of about five miles between Treichler and Slatington was covered and the outcrops viewed from the tracks but the grass was seen nowhere on them excepting at the original station.

Though found only within a limited area the plant is certainly well distributed and is apparently quite indigenous. It is hardly possible to say whether or not it grows or has grown on original outcrops. Some certainly now grows on outcrops close to the marks of the drills used in blasting out the railroad roadway many years ago but there are many original outcrops on these slopes, some of them adjacent to the tracks, that appear to have been little if at all disturbed. Often these outcrops adjacent to the railroad are so well occupied by a generally well balanced association of native plants that it may easily become a matter of speculation as to what may or may not have been original outcrops. *Tiarella cordifolia* has been collected as close to the tracks as the *Trisetum* surely no more than the distance of a city block or two away, and there are found on the slopes close by, as well as on those of the whole series between Slatington and Treichler, such species as *Acer pennsylvanicum, Acer spicatum, Cornus rugosa, Ilex monticola, Lonicera canadensis* and *Prunus pennsylvanica* — all of which are more normally a strong element in the association found in the higher mountains northward. *Sambucus racemosa* and *Cinna latifolia* are found on the next series of cliffs and steep slopes about a mile and a half further down the river and still other species might be mentioned to show the high percentage of northern types found in the general association of this series of slopes which, paralleling as they do the course of the Lehigh river, face either north, northeast or northwest. It need not be surprising to find a plant of such a general northern range as *Trisetum spicatum* occurring with this type of association.

As far as the writer knows *Trisetum spicatum* has not previously been collected or reported as occurring between New York and North Carolina. Upon inquiry by Mr. Bayard Long, Prof. M. L. Fernald in a reply — kindly furnished to the writer by Mr. Long — has written, "*Trisetum spicatum*, var. *molle*[1] we do not have from Pennsylvania but here are the records from New York and from North Carolina; banks of Black River, Watertown, New York, *Crawe, William Boott, et al.*; Little Falls, Herkimer County, *A. Gray;* Roan Mt., No. Carolina, *Buckley, Scribner.* It must be somewhere along the way between the Mohawk Valley and North Carolina." In reply to an inquiry concerning any additional records of New York and southward that may have come to his attention, Prof. A. S. Hitchcock has kindly furnished the following records from the collections at Washington; Lyons Falls, Lewis Co., *Haberer* 3062; Jefferson Co., *Sartwell;* Ausable Chasm, *Knowlton* in 1883; Oneida Lake, Lenox, Madison Co., *Haberer* 3276; Trenton Falls, Herkimer Co., *Haberer* 1292 — all in New York. In reply to a similar inquiry of the New York Botanical Garden, Dr. J. K. Small has kindly furnished in addition to the first mentioned above the following records from the collections there; near Montgomery, Orange County, New York, *Wm. Crabtree;* Greece, Monroe County, New York, *Dr. Bradley.* The records thus made available through inquiry have shown no known stations for the species south of New York state excepting that of the North Carolina station.

It may be interesting to observe that all excepting one of the stations recorded for New York are scattered north of a line drawn centrally across the State at about 43° latitude and that this one exception, the station for Orange county, is quite well away from the rest and not greatly distant from the boundary of New Jersey. This Orange county, New York, station would seem to be more nearly

[1] The material collected by the writer is the plant Prof. Fernald (Rhodora 18: 195. 1916) regards as *Trisetum spicatum* var. *molle* which represents the most southern of the several varieties of *Trisetum spicatum* distinguished by him.

related naturally to the next nearest station northward at Salisbury, Connecticut[1] than to the other New York stations. These two stations together with that of the Lehigh county, Pennsylvania, station[2] occur approximately in the same relation to the hills of the Older Appalachian Mountain Ranges and Appalachian Valley, large physiographic features variously named locally, and would seem to suggest that, if a natural trend of distribution for the species southward from the region of its more general occurrence be sought, the plant may be found to extend away from, rather than along, the tops of the higher mountains. Though this is not usually the case with northern types extending southward along the mountains it would appear to agree very well with the general distribution which Prof. Fernald, in his revision of the species, has noted for *Trisetum spicatum* var. *molle* which he has shown is found "in more temperate areas of the Canadian and Transition regions." Information concerning the exact location of the plant at Roan Mountain, North Carolina, which physiographically may be considered as a part of the Older Appalachian Mountain Ranges, is not available but even should it occur with other northern plants known to grow on its summit at an elevation of 6313 feet it is only what may be expected of northern plants so far south. Since the plant through its discovery in Pennsylvania has been shown, as Prof. Fernald predicted, to be "somewhere along the way between the Mohawk Valley and North Carolina," may it not be still further suggested that future discoveries of the plant southward along the mountains may probably be found to occur along the Great Appalachian Valley or, especially southward, in close relation to the Older Appalachian Mountain Ranges.

Allentown, Pennsylvania.

[1] Flora of the vicinity of New York, Norman Taylor, 1915.

[2] Collected July 15, 1917, no. 8910, on open shale outcrops of the Martinsburg formation along the Lehigh River in Lehigh County, Pennsylvania, at an elevation of about 260 feet and beside the tracks of the Lehigh Valley Railroad about 1¾ miles southeast by south of Slatington station. June 23, 1918, no. 9390. Material of this second collection has been placed in the herbarium of the U. S. National Museum at Washington, D. C., in the Gray Herbarium, Harvard University, Cambridge, Massachusetts, and at the New York Botanical Garden, Bronx Park, New York City.

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THE SPECIFIC CHARACTERS OF ERAGROSTIS PEREGRINA AND ITS TWO ALLIES.

Bayard Long.

Hackel based his *Eragrostis pilosa* var. *condensata* [1] upon a weed occurring in the Grand-Ducal Palace Garden at Karlsruhe. When Professor K. M. Wiegand renamed this plant *E. peregrina* [2] in 1917 he had material from eight stations. In a recent article on the occurrence of the species about Philadelphia [3] it was noted as frequent in this region and more than thirty-five stations for it were mentioned. The greater number of these records are supported by copious suites of material, mostly collected during 1917. In the past season a goodly number of additional collections have been made, especially by Mr. Harold W. Pretz in Lehigh County, Pennsylvania. In consequence there have accumulated at Philadelphia some hundreds of specimens from more than fifty stations. Because of this abundant material now at hand— much more than previously has been available in any study of this plant— a favorable opportunity has arisen to amplify or, in some cases, to reconsider the characters advanced by Hackel and the additional ones noted by Professor Wiegand, as well as to weigh their critical comments.

The affinities of this plant, it may be well to recall, lie with *E. Purshii* as well as *E. pilosa*. There has been a failure among many American botanists in rather recent years to separate the two latter species, but a preliminary study several years ago indicated that these

[1] Hackel, Allgem. Bot. Zeitschr. vii. 13 (1901).
[2] Wiegand, Rhodora, xix. 93 (1917).
[3] Long, Rhodora, xx. 173 (1918).

two plants could be separated with a marked degree of success. With the present interest in *E. peregrina,* a comparative study of the three plants was undertaken — not only because of the previous conviction of the distinctness of *E. Purshii* but particularly because of a number of exceptions noted by Professor Wiegand in his discussion of the distinguishing character of *E. peregrina.* Hackel had compared his plant chiefly with *E. pilosa* but he also distinguished it from *E. Purshii.* Professor Wiegand on the other hand, including *E. Purshii* in *E. pilosa,* compared his *E. peregrina* with a much more complex species-group. It was suspected that the breaking down of certain characters through exceptions was alone due to the failure to distinguish *E. Purshii.* With a further study of the group these exceptions were found to clear away and *E. peregrina,* as well as *E. Purshii,* to stand free from *E. pilosa.*

The characters of *Eragrostis peregrina* compared with those of *E. pilosa* and *E. Purshii,* critical comments, and certain observations apparently new may be taken up in the general sequence of a detailed description.

Of the most constant differences, the greatest stress is rightly laid by Professor Wiegand upon the absence of the long hairs on the auricles of the sheath. A slight delimitation of this character, apparently, should be made. The condition would seem to be more accurately described, if the absence of the hairs be noted on, say, the upper sheaths — the lower sheaths and those on short sterile branches are very often supplied with well developed auricular hairs. This possibly somewhat technical observation in no way depreciates the value of this important character brought to light by Professor Wiegand.

The distinguishing character of the solitary branches of the panicle, maintained by Hackel, is to be given critical consideration. That the panicle-branches of *E. peregrina* are solitary and those of *E. pilosa* in 2's or 4's in the strict sense does not seem to be borne out by a series of specimens, but there is here the germ of a very excellent diagnostic character. In the examination of several hundreds of specimens from many different stations it has been noted that the *base* of the panicle in *E. peregrina* is consistently composed of a single branch, its point of origin well differentiated from the branch next above, while in *E. pilosa* it is characteristically a pair or a whorl of branches. In *E. Purshii* a somewhat intermediate condition seems to exist — either single or opposite branches at the base of the panicle. Professor Wiegand notes that "The branches of the panicle...are sometimes solitary in smaller forms of *E. pilosa* (including *E. Purshii*)." These forms are probably *E. Purshii*, not true *E. pilosa*. But it will be agreed, doubtless, that the value of a character so palpably dependent upon normal growth need not be discounted by casual small forms.

The absence of the hairs in the axils of the panicle-branches appears to be perfectly constant in *E. peregrina* and therefore diagnostic for the species. Hackel notes that they are, however, sometimes absent in *E. pilosa;* the same is to be said of *E. Purshii:* hence this character must be valued accordingly.

Hackel's statement that in *E. peregrina* "the branches of the panicle are spikelet-bearing to the base so that the panicle appears much denser" while in *E. pilosa* they are "branched from the one-third or one-half point upward and loosely provided with spikelets" describes the condition in these two species perhaps sufficiently accurately, but Professor Wiegand's phrasing, in the case of *E. peregrina,* "spikelet-bearing to *near* the base," is certainly preferable. Professor Wiegand's comment,..."*E. pilosa* (including *E. Purshii*) ...in smaller plants of the latter species the spikelets extend far toward the base of the branches," was apparently induced by his comparison with plants of true *E. Purshii*. This last species rather characteristically has spikelets arising from quite near the bases of the branches. This character technically distinguishes *E. peregrina* from *E. pilosa* but not from *E. Purshii*. Another point: *E. Purshii* as well as *E. pilosa* having open, sparse panicles, obviously the denseness of the panicle in *E. peregrina* is not alone due to the panicle-branches being spikelet-bearing to the bases, as Hackel seems to infer. The point to be noted is that the panicle of *E. peregrina* bears up to five or more times as many spikelets as either of its allies. When a numerical character becomes as tangible as in this case, it assumes as much importance, it is believed, as is commonly accredited the number of florets in a spikelet in this genus.

The spikelets show characters of more or less differentiating value. The shape appears to be rather distinctive. In *E. peregrina* it is characteristically ovate or ovate-oblong; in *E. Purshii*, ovate-lanceolate; in *E. pilosa*, tending to be linear. In the width of spikelet *E. peregrina* is practically indistinguishable from *E. Purshii* but rather readily separable from *E. pilosa;* the spikelets in the first two are ordinarily about 1.5 mm. wide; in the last, about 1.0 mm. In such closely allied species the length of the spikelet and the number of florets in a spikelet may not be expected to furnish very tangible points of difference. Furthermore considerable variation is found in different colonies of the same species, in different individuals of the same colony and in spikelets of different age upon the same plant.[1] However, it can readily be shown that a tendency to increase of length and number of florets runs from *E. peregrina* through *E. pilosa* to *E. Purshii.* The spikelets in *E. peregrina* are characteristically well under 5. mm. (and rarely if ever over that length); in *E. pilosa,* somewhat tending to exceed 5. mm.; in *E. Purshii,* rather frequently well over 5. mm. A similar ratio of increase occurs in the number of florets: in *E. peregrina* commonly under 10; in *E. pilosa,* occasionally over 10, up to about 12; in *E. Purshii,* frequently over 10, at times as many as 15.

It is to be maintained that the very short pedicels of *E. peregrina* constitute an excellent diagnostic character, liable to very little if any confusion from supposed short pedicels in *E. pilosa.* In dimensional characters of this kind it is commonly no difficult task to pick out individual cases that would seem to show the given measurements to be of little value. But in the present instance it may be confidently asserted that with experience this character will be recognized as of the greatest service. It immediately distinguishes *E. peregrina* from *E. Purshii,* which latter species commonly has quite long pedicels — in fact from several to many times longer.

The character of smooth empty glumes may be reapportioned among the three species. They are characteristically quite smooth in *E. peregrina* but Professor Wiegand further notes that in *E. pilosa* they are usually but not always scabrous on the keel. This latter statement is to be connected with the inclusion of *E. Purshii* in *E.*

[1] The spikelets of all three species are subject to a notable reduction in length and number of florets in the later panicles. This seems to be most marked in *E. peregrina.* When bearing short spikelets of rather few florets *E. peregrina* will appear to almost assume the key-characters commonly used for *E. Frankii.* In fact, in general appearance — size of plant, habit of growth, many-flowered panicle with stiff, spreading branches — it often bears a greater likeness to this species than to either *E. pilosa* or *E. Purshii.* When the ripe grains are protruding from the spreading scales, in plants showing this marked reduction, *E. Frankii* is so strongly simulated that at a distance it is no slight task to distinguish the two with accuracy. Professor T. C. Porter, as shown by his own determinations, consistently referred the plant to *E. Frankii.*

pilosa. It appears that *E. pilosa* has essentially smooth empty glumes while a scabrous keel seems to be a very excellent index of *E. Purshii.* Good characters are also to be found in the actual and relative dimensions of the empty glumes. In *E. peregrina* the lower empty glume is very much reduced, measuring only about 0.5 mm. in length; the upper, about 1.0 mm. About the same condition occurs in *E. pilosa* but some variability is present. In *E. Purshii* the lower measures about 1.0 mm. and the upper about 1.5 mm. The minute lower empty glume will constantly differentiate *E. peregrina* (and usually *E. pilosa*) from *E. Purshii.*

That "the florets are. . .somewhat smaller," as Professor Wiegand observes, would appear to belong to the comparison with *E. Purshii.* There appears to be little tangible difference between those of *E. peregrina* and *E. pilosa* but the rather larger florets of *E. Purshii* will be appreciated with a little experience. Dimensionally the former two species may be said to have florets usually under 1.5 mm. in length; the latter, commonly over 1.5 mm.

Professor Wiegand, in commenting upon the statement of Hackel that "The plant is closely related to the *E. Purshii* (*caroliniana*) but is distinguished from it by the absence of conspicuous lateral nerves on the flowering glume," says, "The lateral nerves of the flowering glumes are always inconspicuous but there are occasional specimens of *E. pilosa* in which they are equally indistinct." My own observations indicate that, as in other characters, *E. peregrina* shows itself to be very closely related technically to *E. pilosa,* and in the matter of distinctness of the lateral nerves very little if any differentiation can be drawn between these two species, but *E. Purshii* may be separated from them both, with a fair degree of satisfaction, by its quite conspicuous nerves. Professor Wiegand's observation, one may believe, is due to the abundant material of *E. Purshii* which he had for comparison and the relatively small series of real *E. pilosa* — if the material at Cambridge and New York runs similar to that at Philadelphia.

The use of texture and color of the flowering glumes by some authors as key characters to separate *E. pilosa* and *E. Purshii* induced a comparative examination of these features in the three species. At best, characters of this kind do not seem overly distinctive. In the present case very little satisfaction is obtained in endeavoring to distinguish between "thin" and "firm," and "purplish," whether "bright" or "dull." It seems practically impossible to differentiate textures and the best that can be said of the coloring is that *E. pilosa* and *E. peregrina* seem to have a greater tendency to be somewhat "purplish" tinged than *E. Purshii.* It seems very doubtful if there is any real value in these points — certainly none to distinguish readily *E. peregrina.*

A distinction, apparently not previously noted, is to be found in the behavior of the paleas on the maturity of the grain. It is well known that in *Eragrostis* the paleas are often persistent after the fall of their lemmas but this point does not seem to have been used very extensively (or possibly found constant) as a diagnostic character. In the course of field study embracing mostly *E. Purshii* and *E. peregrina* it became apparent that in the former the paleas are very persistent and tightly appressed to the rachilla, even after the panicle has become completely dead and broken up. A very characteristic appearance is produced, somewhat suggesting a shriveled or desiccated spikelet. On the other hand it was found that in *E. peregrina* all the scales, including the paleas, immediately fall away with the ripened grain from the rachilla. The denuded, close, short zigzag of the rachilla proves to be a character of considerable value. It is not to be supposed, of course, that *every* palea *always* falls away but the tendency is so very strong that if a mature panicle be pulled through the fingers any paleas still attached will invariably break away at once, showing their natural disarticulation. This process applied to *E. Purshii* rarely if ever disturbs a single palea. It has not been possible to examine satisfactorily the behavior of the paleas in *E. pilosa,* as field experience with this species has been too meager to be conclusive, but it would appear that the paleas are more or less deciduous. In *E. peregrina* and *E. Purshii* this point is definite and distinctive but in *E. pilosa* herbarium material suggests it to be a variable character.

Of differences almost microscopic, but apparently distinctive in a way, the size of the grain may be noted. That of *E. peregrina* is the smallest, measuring about 0.5–0.6 mm. in length. That of *E. pilosa* and of *E. Purshii* averages about 0.7–0.8 mm. These measurements are too minute and too close to be of much practical service — particularly when some variation must be allowed for spikelets of different ages.

It might seem from a critical examination of the foregoing comments that, while *E. Purshii* has been separated from the group with some satisfaction, *E. peregrina* has been almost comprehended in *E. pilosa.* And, truth to tell, its relationship, on a majority of points, does lie more nearly with *E. pilosa,* but in the possession of several constant and unique characters it amply proves itself specifically distinct from both its allies.

The characters of *E. peregrina* may be briefly summarized. The most distinctive, separating the plant from both *E. pilosa* and *E. Purshii,* would appear to be: absence of auricular hairs on the upper sheaths; panicle densely flowered, bearing a great number of spikelets; spikelets ovate or ovate-oblong; pedicels of the spikelets very short. Of scarcely less value are those characters which are constant for *E. peregrina* but shared by one or the other of its allies — or both, in the single case of absence of hairs in the axils of the panicle branches. Among these may be noted: base of the panicle consisting of a single branch; absence of hairs in the axils of the panicle-branches; branches of the panicle spikelet-bearing to near the base; spikelets about 1.5 mm. wide; empty glumes with smooth keels, the lower one about 0.5 mm. long; florets small, usually under 1.5 mm. in length; lateral nerves of the flowering glumes inconspicuous; paleas deciduous.

Similarly, the most salient characters separating *E. pilosa* from its two allies seem to be: panicle-branches branched from the one-third to the one-half point upward; spikelets tending to be linear, about 1.0 mm. wide. Characters constant for the species but shared by *E. peregrina* or *E. Purshii*: auricles of the sheaths bearing long hairs; base of the panicle a pair or a whorl of branches; panicle sparsely flowered; pedicels of the spikelets long; empty glumes with smooth keels, the lower one about 0.5 mm. long; florets small, usually under 1.5 mm. in length; lateral nerves of the flowering glumes inconspicuous.

For *E. Purshii* the two categories of characters may be noted in like manner. First: spikelets ovate-lanceolate; empty glumes with scabrous keels, the lower one about 1.0 mm. long; florets larger, usually over 1.5 mm. in length; lateral nerves of the flowering glumes conspicuous; paleas persistent. Second: auricles of the sheaths bearing long hairs; branches of the panicle spikelet-bearing to near the base; panicle sparsely flowered; pedicels of the spikelets long; spikelets about 1.5 mm. wide.

It is not to be thought that in the distinguishing of *E. pilosa, E.*

Purshii and *E. peregrina* the difficulties surrounding this group have been removed. It is believed that they are in part ameliorated, but while *E. peregrina* and *E. Purshii* appear to be very definite species units, each quite constant in its characters, the same cannot so certainly be said of *E. pilosa*. In fact the amount of variation seen in the material grouped together under *E. pilosa* is so much more pronounced than in the two allied species that it is strongly suspected this is by no means a homogeneous series. *E. Purshii* has proved to be so satisfactorily separable, despite critical opinion to the contrary, that one is naturally inclined to a belief that this is a group still deserving careful study.

Academy of Natural Sciences of Philadelphia.

A NEW POLYGONUM FROM SOUTHEASTERN MASSACHUSETTS.

M. L. Fernald.

In 1913, while exploring the ponds of Plymouth, Massachusetts, with Messrs. Francis W. Hunnewell and Bayard Long, the writer was much interested in a strictly indigenous annual *Polygonum* of the sandy pond-margins which was obviously related to the naturalized *P. Persicaria* L. but which had more slender and more richly colored spikes. Although it was obvious that this indigenous plant of southeastern Massachusetts could not be exactly matched by *P. Persicaria*, no serious attempt was made to differentiate the two until further observations could be made. It is noteworthy, however, that in 1915, Mr. C. A. Weatherby, collecting the plant of "sandy strand of a pond" on Cape Cod, should have labeled his material "*Polygonum Persicaria* L.?" In 1918 the real opportunity to watch the plant came when the writer spent the summer on Cape Cod with side-trips into Plymouth. In this exploration he was accompanied most of the time by Mr. Long and the native *Polygonum* was found to be universally distributed on the Cape, and everywhere a plant strictly of pond-margins. The ubiquitous weed, *P. Persicaria*, with its duller pink spikes, was naturally abundant near houses and about the farms, and the indigenous plant held its own peculiar differences with constancy. Detailed study in the herbarium brings out other points which will be discussed below and which justify the description of the indigenous plant as

Polygonum **puritanorum**, n. sp., annuum; caule gracile decumbente adscendente vel erecto 1–6 dm. longo deinde ramosissimo ramis glabris vel plus minusve strigosis; ochreis laxe cylindricis strigosis ciliatis; foliis rhomboideo-lanceolatis utrinque acuminatis acutis vel subacutis breviter petiolatis vel subsessilibus plerumque immaculatis subtus plus minusve strigosis primariis 3–10 cm. longis 0.7–1.6 cm. latis; pedunculis erectis glabris vel strigosis longioribus 1–5 cm. longis; spicis densissimis cylindricis primariis 1–3.5 cm. longis 4–6.5 mm. crassis; ochreolis brunnescentibus ciliatis; perianthiis roseis vel purpureis 1.8–2 deinde 2.4–2.6 mm. longis maturitate laevibus vel obsolete nervosis; pedicellis inclusis vel paullo exsertis; staminibus 5–6; achaeniis ovato-orbicularibus biconvexis vel trigonis atris lucidis 2 mm. longis 1.4 mm. latis plerumque inclusis.

Annual: stem slender, decumbent, ascending or erect, 1–6 dm. long, finally much branched; branches glabrous or more or less strigose: ochreae loosely cylindric, strigose, ciliate: leaves rhombic-lanceolate, acuminate at base and apex, acute or subacute, short-petioled or subsessile, usually unspotted, more or less strigose beneath; the primary ones 3–10 cm. long, 0.7–1.6 cm. broad: peduncles erect, glabrous or strigose; the longer 1–5 cm. long: spikes very dense, cylindric; the primary 1–3.5 cm. long, 4–6.5 mm. thick: ochreolae brownish, ciliate: perianths rose-pink or purple, 1.8–2, becoming 2.4–2.6 mm. long, in maturity smooth or only obsoletely nerved: pedicels included or a little exserted: stamens 5 or 6: achenes ovate-orbicular, biconvex or trigonous, black, lustrous, 2 mm. long, 1.4 mm. broad, mostly included.— Plymouth and Barnstable Cos., Massachusetts: sandy shore of Clear Pond, Plymouth, August 30, 1913, *Fernald, Hunnewell & Long*, no. 9,402; damp sandy beach of Boot Pond, Plymouth, September 6, 1913, *Fernald, Hunnewell & Long*, no. 9,400; damp sandy beach of Great South Pond, Plymouth, September 6, 1913, *Fernald, Hunnewell & Long*, no. 9,401; gravelly and sandy beach, Little Sandy Pond, Plymouth, August 7 & 8, 1918, *Fernald & Clark*, no. 16,755; wet sandy or gravelly lower beach, Half-way Pond, Barnstable, September 4, 1918, *Fernald & Long*, no. 16,759; Yarmouth, September 10, 1907, *E. W. Sinnott;* Scargo Pond, Dennis, August 22, 1907, *E. W. Sinnott;* sandy strand of a pond, Dennis, October 1, 1915, *C. A. Weatherby;* sandy beach, Buck Pond, Harwich, July 8, 1918, *Fernald*, no. 16,752; sandy and gravelly beach, Hawk's Nest Pond, Harwich, July 28, 1918, *Fernald*, no. 16,754; bare sandy beach, east end of Long Pond, Harwich, August 14, 1918, *Fernald & Long*, no. 16,756 (type in Gray Herb.); sandy beach, Seymour Pond, Harwich, September 19, 1918, *Fernald & Weatherby*, no. 16,762;

wet sandy shore of Sheep Pond, Brewster, July 4, 1911, *F. S. Collins*, no. 1,184, July 11, 1918, *Fernald*, no. 16,753; sandy beach of Cliff Pond, Brewster, August 27, 1918, *Fernald & Long*, no. 16,757; wet sandy beach of Long Pond (east of Cliff Pond), Brewster, August 27, 1918, *Fernald & Long*, no. 16,758; wet sandy lower beach of second pond north of No Bottom Pond, Brewster, September 7, 1918, *Fernald & Long*, no. 16,760; lower damp sandy beach of Griffith's Pond, Brewster, September 12, 1918, *Fernald*, no. 16,761; sandy shore of pond, Eastham, August 8, 1907, *F. S. Collins*, no. 425.

Related on the one hand to *P. Persicaria* L., on the other to *P. minus* Hudson. *P. Persicaria* has thicker spikes, the mature primary ones 7–11 mm. thick; larger flowers and achenes, the achenes 2.5–3 mm. long, and often slightly exserted at maturity; and in the mature perianth the lower half of the segments is usually reticulated or strongly nerved. Besides these more constant characters there are others less pronounced: when well developed *P. Persicaria* is a much coarser plant and the primary leaves may become 2–4 cm. wide; in *P. Persicaria*, also, the pedicels are inclined to be more exserted, though this character is not a reliable one.

P. puritanorum in its smooth small perianth and small achene is nearer to *P. minus* than to *P. Persicaria*. *P. minus*, however, has decidedly less rhombic-lanceolate leaves, its primary leaves being lanceolate or linear-lanceolate to narrowly oblong; the spikes of *P. minus* are extremely slender and loosely flowered, much as in *P. Hydropiper;* and the achenes are ovate rather than ovate-orbicular.

Gray Herbarium.

FIELD TRIPS OF THE NEW ENGLAND BOTANICAL CLUB, 1919.

The Berkshire field trip with a center at Pittsfield from May 29th to 31st was attended by nine men, who during the two days of active field work explored typical sections of nine townships. As a result the Club Herbarium will be enriched by many hundreds of sheets representing nearly 500 species, many of them heretofore known from only one or two stations in the state (for instance, *Salix serissima* conspicuously in flower in late May and collected in nearly all the towns visited) while at least eight plants new to the state were collected.

It is too soon to report in detail upon these collections but the result of the trip is so gratifying that the Committee feels justified in urging a second field trip this year. It is consequently planned to spend the week-end including Labor Day, from Saturday, August 30th, to Monday, September 1st, exploring the ponds and bogs of western Rhode Island and adjacent eastern Connecticut. This region is as little known as any section of southern New England, largely because it is not readily accessible by railroad, and it is earnestly hoped that members who can provide automobiles for this exploration will feel ready to do so. Only a few of the ponds of this border line between Rhode Island and Connecticut have yet been touched by botanists but these have brought to light so many isolated, southern coastal-plain types that a concerted effort to explore many of them should yield most interesting results. Wallum Pond, at the northeastern corner of Rhode Island and in adjacent Worcester County, Massachusetts, is the only station in southern New England for *Sclerolepis uniflora.* Slightly to the south, Long Pond in Thompson, Connecticut, is the pond so invitingly recommended by Mr. Weatherby in the April number of Rhodora, where in a partial survey he and Mrs. Weatherby found many species new to the county and *Aster nemoralis* and *Eleocharis interstincta* new to the state. Beach Pond in Voluntown, Connecticut, and Exeter, Rhode Island, is the only station in New England for the rare southern *Eleocharis Torreyana;* and Grassy Pond in Hopkinton apparently received its name from the great profusion there of *Panicum longifolium,* one of the rarest grasses of southern New England. These are only a few of the ponds in this boundary tract but they have proved so productive that the Committee feels certain that a concerted exploration by automobile of this area of western Rhode Island and eastern Connecticut will yield of large results.

All members who wish further notice of the plan, including the details as to the meeting place, should notify Mr. R. C. Bean, 48 Emerson Street, Wakefield, Mass.

M. L. Fernald, *Chairman*
R. C. Bean
C. H. Knowlton
} *Committee on Field Excursions.*

The annual Field Meeting of the Vermont Botanical and Bird Clubs will be held at No. Hero, Aug. 5 and 6, 1919. Headquarters will be at the Irving House, No. Hero, where the members of the Clubs will assemble the evening of the 4th. If the attendance is beyond the capacity of the House, automobiles will be in waiting to take members to adjacent hotels. Meals at Irving House 50 to 60 cents. Members coming by train can reach No. Hero by Rutland R. R. from Burlington or Rouses Pt. There is no boat service as in former years. As the usual winter meeting was omitted this year, it is hoped that the members will make a special effort to get together this summer. The region is especially rich in shore and water plants and trips will be made to "The Gut," Pelot's Bay, and other points of botanical interest.— Geo. P. Burns, Sec.

THE IDENTITY OF ANGELICA LUCIDA.

M. L. Fernald.

In 1635, in his remarkable History of Canadian Plants, Cornut described and illustrated by a beautiful plate *Angelica lucida* [1] from Canada. The plant was soon cultivated in various gardens and was described or cited in numerous works of the 18th century, Morrison's *History, Hortus Cliffortianus*, etc., and eventually was taken up by Linnaeus in the *Species Plantarum* (1753) as a valid species, under Cornut's original name. Under this name the species was accepted by post-Linnean authors, Crantz, Jacquin, Aiton, Sprengel, Torrey, DeCandolle, Hooker, Beck, Eaton & Wright and others until in 1848, in the 2d edition of Beck's *Botany of the United States*, it made its last formal appearance as an American plant. Prior to that, however, in 1840, Torrey & Gray had cast upon it a doubt, as a result of which *Angelica lucida* was omitted from most subsequent treatments of the American flora. After citing the authentic material preserved in the Vaillant herbarium and giving a very detailed description, Torrey & Gray said: "This plant has been common in the gardens of Europe for 200 years, and appears to have been introduced by Cornuti, on whose authority alone it stands as a North American species. It is a genuine Angelica, according to authentic specimens which we examined in the herbarium of the *Hortus Cliffortianus*, and that of Vaillant. The segments are ovate, about an inch long,

[1] Cornut, Canadensium Plantarum Historia, 196, 197 (1635).

sessile, unequally serrate, and mostly decurrent or confluent at the base. The rays of the umbel are unusually thick; the involucels of about 8 lanceolate-spatulate leaflets. Fruit (immature) ovate: dorsal ribs slightly winged; the lateral ones dilated into a distinct wing. Vittae very large and filled with a pungent oil. Commissure with 2 vittae."[1] In his original manuscript note upon which the above statement was based Dr. Gray had also said of *A. lucida* "Differs enough from anything I know, unless it can possibly be *A. atropurpurea* — which, by comparison, it certainly is not!"[2]

Subsequently, in his *Bibliographical Index*, Watson, although including *Angelica lucida* as a valid species, said "A very obscure species; from Canada,"[3] and in 1888 Coulter & Rose, taking their cue from Torrey & Gray, wrote: "A. LUCIDA L. is referred to Canada by Cornuti, upon whose authority alone it stands as a North American species. It has long been cultivated in Europe, but its existence as a member of our flora is so very improbable that we do not include it";[4] and, as for the treatment in their later *Monograph of the North American Umbelliferae*,[5] the Canadian *Angelica lucida* L. might as well have been published as coming from Europe for it is not even casually mentioned.

That indigenous American material of *Angelica lucida* was not recognized by Torrey & Gray in 1840 was natural enough, for they had only one poor fragment or, as they described it, "fruit and flowers only" from an island near Beverly, Massachusetts, and that specimen, so unlike the plate of Cornut, they placed in the newly published *Archangelica peregrina* Nutt. from the coast of Oregon. Under that name or *Archangelica Gmelini* DC. or *Coelopleurum Gmelini* (DC.) Ledeb. the plant of northeastern America was known until in 1900 Coulter & Rose, distinguishing it from the western species, renamed it *Coleopleurum actaeifolium* (Michx.) Coult. & Rose,[6] based upon *Ligusticum actaeifolium* Michx. from Canada.

Subsequently to the publication of the statement by Torrey & Gray, however, Dr. Gray had for a time surmised that the seashore Angelica of northeastern America, now passing as *Coelopleurum*

[1] Torr. & Gray, Fl. N. A. i. 621 (1840).
[2] Gray, Mss. on Herb. Mus. Paris.
[3] Wats. Bibl. Ind. 412 (1878).
[4] Coult. & Rose, Rev. N. A. Umbell. 42 (1888).
[5] Coult. & Rose, Contrib. U. S. Nat. Herb. vii. no. 1 (1900).
[6] Coult. & Rose, l. c. 142 (1900).

actaeifolium, was *Angelica lucida ;* and in the 2d edition of the Manual, we find at the end of the account of *Archangelica peregrina* the note: "Perhaps it is the Angelica lucida *L.*"[1] In the 3d edition this note was dropped and in its stead appeared: "It is A[rchangelica] Gmelini, of N. W. America,"[2] and in the 5th edition (1867) the plant was formally taken up as *Archangelica Gmelini* DC., while in Watson & Coulter's revision (ed. 6) it became *Coelopleurum Gmelini* Ledeb.

That in 1856 Dr. Gray was correct in his surmise that the *Coelopleurum* of northeastern America is *Angelica lucida* L. cannot be doubted for a moment by any one who has become familiar with the plant in the field. Although in rich woods or in fertile seashore-thickets the plant may exceed 1 m. in height, thus greatly exceeding the prescription, "Angelicae lucidae vix cubitum implet caulis" of Cornut, in dry thickets and on rocky or gravelly, bushy slopes (the "Inter siluarum aprica" of Cornut) the mature plant is only 2.5–4 dm. high and the Cornut plate is beautifully matched by such sheets as *Sornborger,* no. 50, from Hopedale, Labrador, *Fernald & Wiegand,* no. 3,776, from Blanc Sablon, Labrador, *Fernald & Wiegand,* no. 3,775, from Ingornachoix Bay, Newfoundland, *Bro. Victorin,* no. 76, from Notre-Dame de Portage, Quebec; all distributed either as *Coelopleurum Gmelini* or *C. actaeifolium.* There is, then, no question that Cornut's *Angelica lucida,* published in 1635 from Canada, actually was of Canadian origin and that he illustrated a beautifully characteristic small specimen of the species which has recently passed as *Coelopleurum actaeifolium* (Michx.) Coult. & Rose. It is gratifying to clear the obscurity which has so long invested this species and to reinstate a plant taken up by Linnaeus in the *Species Plantarum.* The plant should hereafter be called

Coelopleurum **lucidum** (L.), n. comb. *Angelica lucida* L. Sp. Pl. i. 251 (1753). *Ligusticum actaeifolium* Michx. Fl. Bor.-Am. i. 166 (1803). *Imperatoria lucida* (L.) Spreng. Plant. Umbell. Prodr. 17 (1813). *Angelica Archangelica* Schrank, Pfl. Labrad. 13 (1818), not L. *Archangelica peregrina* Nutt. in Torr. & Gray, Fl. N. A. i. 622 (1840) as to Massachusetts plant. *Arch. Gmelini* Gray, Man. ed. 5, 193 (1867), not DC. *C. Gmelini* Coult. & Rose, Rev. N. A. Umbell. 90 (1888) as to plant of eastern America, not (DC.) Ledeb. *C. actaeifolium* (Michx.) Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 142 (1900).— Thickets, borders of woods, rocky or gravelly

[1] Gray, Man. ed. 2, 154 (1856).
[2] Gray, Man. ed. 3, 154 (1862).

shores, sand dunes, etc., along the coast, Greenland to Narragansett Bay, Rhode Island.

In typical *Coelopleurum lucidum* the involucels are spatulate-lanceolate or linear and entire, rarely exceeding the pedicels. On the coast of New England, however, occurs a form in which all or nearly all the involucels are converted into large 3-lobed or 3-parted serrate leaves which conspicuously exceed the umbellules. This may be called

C. LUCIDUM, forma **frondosum**, n. f., involucelli bracteolis foliaceis trilobatis vel tripartitis serratis.—MAINE: Cape Porpoise, Kennebunkport, July 2, 1901, *Kate Furbish* (TYPE in Gray Herb.); Wells, 1898, *Kate Furbish.* MASSACHUSETTS: Beverly Bay, August, 1847, *Chas. Pickering;* Swampscott, August 5, 1886, *C. W. Swan.*

GRAY HERBARIUM.

ANOTHER EXCEPTIONAL SPECIMEN OF DAUCUS CAROTA.— The recent notes in RHODORA, xxi. 70 (1919), by Dr. Robinson concerning a dark-flowered *Daucus Carota* L. remind the writer of a completely colored specimen collected at Bridgeport, Conn., 11 Sept., 1918, by Franklin A. Russell and now deposited in Gray Herbarium.

In this plant the petals throughout all the umbels were wholly very dark purple, similar to those so commonly observed in the central floret. The plant bore several similar compound umbels and was normal in all respects except color of petals.

The "pale-roseate" color-phase seems to be near the other extreme. Between the two are certain intermediates in which the marginal portion of some or even all petals is dark purple, sometimes rather sharply defined or usually gradually diffused toward a central roseate tinge or to entire extinction. Such specimens sometimes display entire petals of the darker color, very rarely, it is true to the extent of any considerable part of one or many umbels.

These observations cover a period of years and have been limited by the general infrequence of such abnormalities although not looked upon as very remarkable.

In relation to the dark coloring of the flowers it may be worthy of mention that the foliage of this species, as in numerous others of the family, is quite commonly shaded or suffused in the same way but, so far as the writer has observed, never in a definite relation to similar color in the flowers. The fertility and general vigor of all seems to be about normal or even exceptionally robust in isolated cases.— EDWIN H. EAMES, Bridgeport, Connecticut.

THE WHITE-FLOWERED BIRD'S EYE PRIMROSE.— *Primula mistassinica* Michx. ordinarily has lilac or flesh-colored flowers, but occasionally white corollas are found. In Newfoundland, however, the white-flowered form is abundant, often the only color seen. The plant is so strongly contrasted with the typical form of the species that it should have formal designation and may be called

PRIMULA MISTASSINICA Michx., forma **leucantha**, n. f., corolla lactea.

Corolla milk-white.— TYPE from NEWFOUNDLAND: borders of ponds on the limestone tableland, alt. 200–300 m., Table Mt., Port à Port Bay, July 16 and 17, 1914, *Fernald & St. John*, no. 10,861.— M. L. FERNALD, Gray Herbarium.

NOTES FROM MATINICUS.— In the summer of 1918 the writer noticed five or six plants of *Amsinckia* growing in and near an abandoned chicken-run. A specimen was sent to Prof. M. L. Fernald for identification and he reports it to be *Amsinckia Douglasiana* A.DC., a native of California, which is there abundant but which has never before been reported from the east. It would appear that having decided to come east, it made up its mind to come as far as possible, as Matinicus is twenty miles off the Maine coast. It remains to be seen whether it will become established or is just a casual.

Another interesting fact concerning this island is that it is a hitherto unpublished station for *Typha angustifolia* L. There is one large marsh which is occupied in about equal parts by *T. angustifolia* and *T. latifolia.* Although unpublished, this station has been known to me for a number of years. Previously its easternmost known habitat was near the lower Kennebec. A specimen from Matinicus has been verified by Professor Fernald, and deposited in the herbarium of the New England Botanical Club.— C. A. E. LONG, Matinicus, Maine.

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NOTES ON NEW ENGLAND HEPATICAE,— XV.[1]

Alexander W. Evans.

(Plate 126.)

The genus *Nardia* is well represented in New England. Of the six species so far reported *N. hyalina* and *N. obovata* belong to Lindberg's subgenus *Eucalyx*, a group which Breidler has raised to generic rank. Two of the other species, *N. scalaris* and *N. Geoscyphus*, belong to the subgenus *Eunardia*, while the remaining species, *N. crenulata* and *N. crenuliformis*, form a connecting link between *Eucalyx* and *Jungermannia*. For a number of years the writer has been puzzled by a species of *Nardia* which is closely related to *N. hyalina* and *N. obovata*. It has been observed in several mountainous localities, especially in the White Mountains, and seems to retain its distinctive features, even while exhibiting a considerable range of variability. This species is here proposed as new, and the characters of the two allied species are discussed at some length for the sake of comparison. Another interesting addition to be reported is *Cephalozia Loitlesbergeri*, a species recently recorded from Nova Scotia. At the close of the paper a few additions to local state floras and a revised census of New England Hepaticae are given.

1. Nardia hyalina (Lyell) Carringt. Brit. Hep. 35. *pl. 11, f. 36.* 1875. *Jungermannia hyalina* Lyell; Hooker, Brit. Jung. *pl. 63.* 1814. *J. Schmideliana* Hüben. Hep. Germ. 99. 1834. *J. biformis* Aust. Proc. Acad. Philadelphia for 1869: 220. *Solenostoma hyalinum*

[1] Contribution from the Osborn Botanical Laboratory.

Mitt.; Godman, Nat. Hist. Azores 319. 1870. *Southbya biformis* Aust. Hep. Bor.-Amer. *26*. 1873. *Aplozia hyalina* Dumort. Hep. Eur. 58. 1874. *Southbya hyalina* Husnot, Hep. Gall. 16. 1875. *Nardia biformis* Lindb. Acta Soc. Sci. Fenn. **10**: 530. 1875. *Eucalyx hyalinus* Breidl. Mitt. Nat. Ver. Steiermark **30**: 292. 1894. *Mesophylla hyalina* Corbière, Rev. Bryol. **31**: 13. 1904. [Text figs. 1–9.] On banks or earth-covered rocks. Maine: banks of the St. John River, Fort Kent (*A. W. E.*); St. John Pond, upper reaches of the St. John River (*G. E. Nichols*). New Hampshire: Randolph (*A.W.E.*). Vermont: Newfane (*M. A. Howe 32*); Quechee Gulf, Hartford (*A. Lorenz 773*); Brandon (*D. L. Dutton 440, 726*); Rochester, road from Brandon (*A. Lorenz*). Massachusetts: West Newbury (*C. C. Haynes*); Mt. Greylock (*A. L. Andrews*); Granville (*A. Lorenz*). Connecticut: Ansonia (*J. A. Allen*); Middletown (*A. W. E.*); Naugatuck (*A. W. E., G. E. Nichols*); Canterbury (*S. B. Hadley*); Watertown (*A. Lorenz*). Specimens from the following stations outside New England have likewise been examined by the writer: Lime Kiln Falls, Herkimer County, New York (*C. C. Haynes*); near Closter, New Jersey (*C. F. Austin;* distributed in Hep. Bor.-Amer. *28* in part, as *Jungermannia hyalina*); Delaware Water Gap, New Jersey (*C. F. Austin;* distributed in Hep. Bor.-Amer. *26*, as *Southbya biformis*); Milford, Pennsylvania (*G. E. Nichols*); Auburn, Alabama (*F. E. Lloyd & F. S. Earle*); Ohio (*L. Lesquereux;* distributed in Austin's Hep. Bor.-Amer. *28* in part, as *Jungermannia hyalina*); Urbana, Ohio (*Mrs. M. P. Haines*); Thompson Ledge, Geauga County, Ohio (*O. Hecker*); Fayette, Wisconsin (*L. S. Cheney*); dells of the Wisconsin River, Wisconsin (*L. M. Underwood*); valleys of the Montreal and Wisconsin Rivers, Wisconsin (*L. S. Cheney 3659, 3680, 3703, 5128, 5152*); Galesville, Wisconsin (*J. M. Holzinger*); Pacific, Missouri (*N. L. T. Nelson 2024*). Several of these specimens are in the herbarium of the New York Botanical Garden.

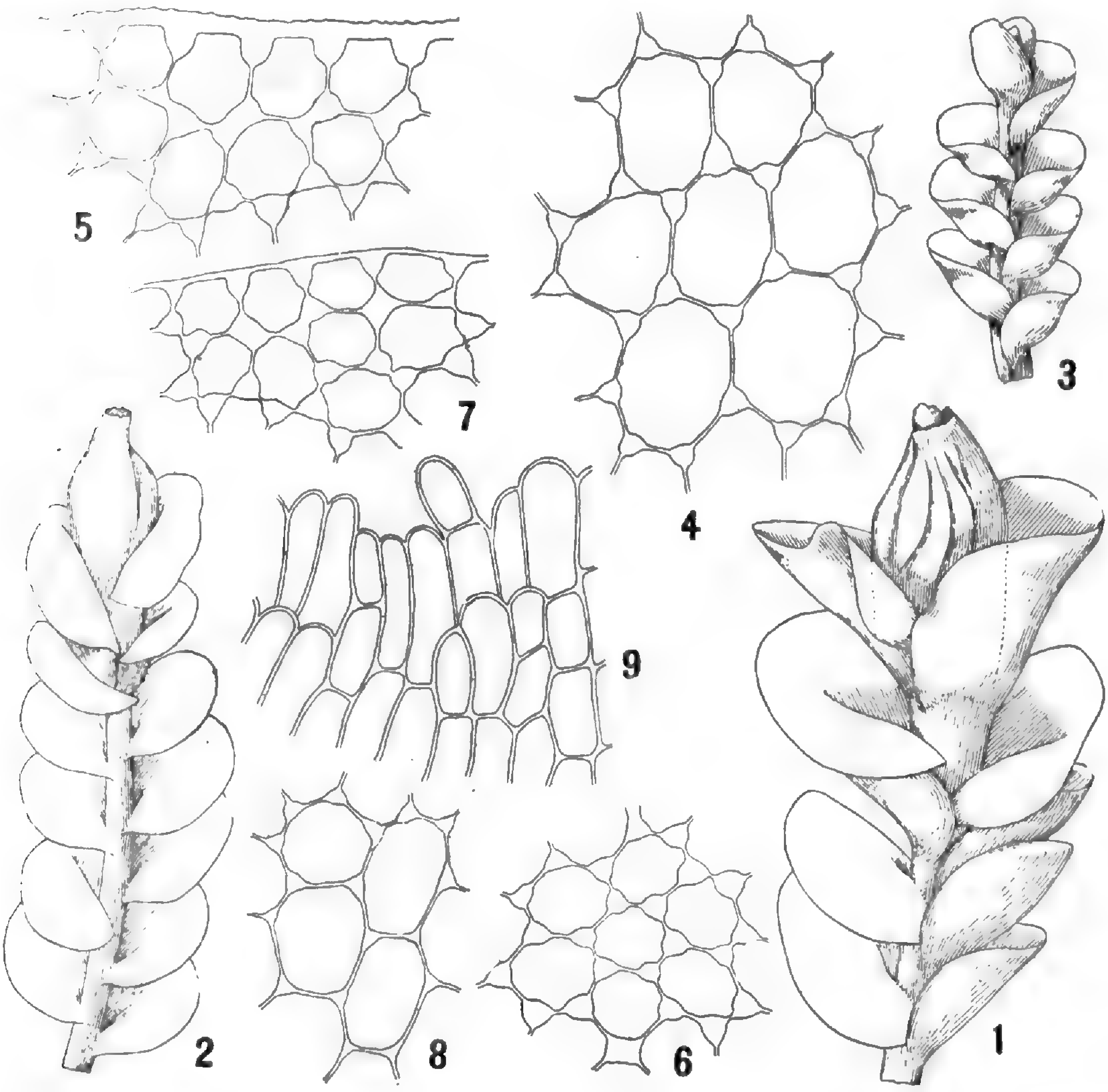
Since the discovery of *Nardia hyalina* in the British Isles, over a century ago, its known range in Europe has gradually been extended until it now includes the greater part of the continent. There, as on this side of the Atlantic, the species prefers low altitudes, rarely ascending above the foothills of the mountains. Outside of Europe it is known in the Old World from the Azores, Madeira and the Canaries, from Tunis, and from the southern shores of the Black Sea. Its range in America is still incompletely known. What is apparently the earliest record for the species was made by Gottsche,[1] in 1863, and was based on specimens collected by F. Müller in the Orizaba region of Mexico. The following year the same author [2] reported it somewhat doubtfully from the province of Bogotá, in Colombia, and specimens from the Andes of Ecuador have since been described by Spruce [3] and distributed in his exsiccatae. The writer has seen no specimens from the tropics which represent unquestioned *N. hyalina*. Spruce's Ecuador specimens are certainly closely related but differ in their more erect habit, in the ventral decurrence of their leaves and in the dense bundle of rhizoids lying along the ventral surface of the stem. Similar specimens from Mexico and the West Indies have also been examined, but whether these should be regarded as a well-marked variety of *N. hyalina* or as a distinct species is not yet clear. Gottsche's Mexican and Colombian specimens have unfortunately not been available for study.

In the United States the earliest report of *N. hyalina* was made in 1873 by Austin,[4] who distributed specimens, correctly determined, from New Jersey and Ohio. In 1891, Underwood [5] accredited the species to California; in 1902 the writer [6] cited specimens from Maine, Vermont, Massachusetts and Connecticut; and in 1908,[7] from New Hampshire. In the same year, in conjunction with Nichols, he [8] listed four new stations for Connecticut and assigned to the species a North American range extending from New England to Minnesota and south to Maryland, this range being based largely on specimens in his own herbarium. Unfortunately, some of the published records for the species were based on plants which prove to have been incorrectly determined. Although definite stations for Maine, New Hampshire and Connecticut are included in the revised list given above, the original records for these states were based wholly or in part on other species, while the specimens from Minnesota and Maryland are either doubtful or incorrect. The confusion regarding the species is due largely to the great variability which *N. hyalina* and its allies exhibit. In the case of sterile material the difficulties of de-

[1] Kongel. Danske Videns. Selk. Skr. V. 6: 185. 1863.
[2] Ann. Sci. Nat. Bot. V. 1: 119. 1864.
[3] Trans. Bot. Soc. Edinburgh 15: 519. 1885.
[4] Hep. Bor.-Amer. *28*. 1873.
[5] Zoe 1: 365. 1891. This record has not been confirmed.
[6] Rhodora 4: 209. 1902.
[7] Rhodora 10: 192. 1908.
[8] Conn. State Geol. & Nat. Hist. Surv. Bull. 11: 51. 1908.

termination are still further increased, and species of other genera with undivided leaves, such as *Jungermannia*, *Jamesoniella* and *Odontoschisma*, are likely to be mistaken for the *Nardia*.

In its typical development *N. hyalina* forms more or less compact tufts, with the stems prostrate to somewhat ascending. The color is a pale or yellowish green, and the living plants show "a peculiar



Figs. 1–9. Nardia hyalina (Lyell) Carringt.

1, 2. Stems with perianths, dorsal view, × 15. 3. Male stem, dorsal view, × 15. 4. Cells from the median portion of a leaf, × 265. 5. Marginal cells from the same leaf, × 265. 6, 7. Median and marginal cells from a leaf of another specimen, × 265. 8. Median cells from another leaf of the second specimen, × 265. 9. Cells from the mouth of a perianth, inner surface, × 200. Rhizoids and the verruculae on the leaf-cells are not shown. Figs. 1, 3, 4, 5 and 9 were drawn from a specimen collected at Brandon, Vermont, by D. L. Dutton *726;* the remaining figures, from a specimen collected at Naugatuck, Connecticut, by the writer.

glistening appearance," which Macvicar[1] mentions and which often aids in their recognition. Sometimes a reddish pigmentation becomes manifest in the axes and leaves, and this may change the appearance of the plants completely. Since, however, a distinctly red plant often gives rise to new growths without pigmentation, the color cannot serve as a basis for distinguishing varieties.

The branches seem to be invariably intercalary in character. They are given off by the lateral segments and take their origin just above the leaves, close to the ventral end of the line of attachment. What induces the formation of branches is not always clear, but the cessation of growth in an axis seems often to stand in a direct causal relation. This cessation may be due to injury or to the development of archegonia. In the latter case, especially in the absence of fertilization, branching is almost sure to occur. The branches sometimes arise at some distance behind the inflorescence, but are more likely to develop as subfloral innovations, either between the perianth and an innermost bract, or between two successive bracts. The basal leaves of a branch are very small but these are succeeded, under favorable conditions, by larger and larger leaves, the branch soon acquiring the appearance of the axis from which it sprang. Schiffner[2] states that he has never seen stolons in *N. hyalina*, and most specimens seem indeed to be quite free from them. The species does not lack them completely, however, and they are sometimes produced in considerable abundance. Even a Bohemian specimen,[3] determined by Schiffner himself, shows an occasional stolon, indicating that these structures are by no means confined to American material. The stolons are somewhat more slender than ordinary stems and tend to grow downward. Their leaves are exceedingly rudimentary, and no cases have been observed where a stolon gave rise to a leafy shoot.

The leaves of *N. hyalina* (Figs. 1, 2) are usually somewhat imbricated, and the lines of attachment are long and oblique, bending abruptly downward at their ventral ends. The leaves are suborbicular, the broadest part being just above the base; they are normally about 1 mm. long and wide, but vary greatly, the extremes being usually between 0.75 mm. and 2 mm. The apex is broad and rounded or

[1] Student's Handb. British Hepatics 134. 1912.

[2] Ann. Naturhist. Hofmus. Wien **23**: 135. 1909.

[3] The label reads as follows: "Flora von Böhmen. Gegend von Hohenfurth — Schwarzwaldburg, Wegböschung, 680m. 1896. 2/9. lgt. et det. Schiffner."

rarely vaguely emarginate, and the margin is quite entire. At the dorsal base there is usually a narrow but distinct decurrent portion, but this is sometimes scarcely evident; it is especially marked when the margin shows an abrupt turn just above the region of decurrence. Although the leaves tend to spread widely from their long lines of attachment, they are sometimes more or less concave and then often assume an ascending or suberect position, the leaves of one side thus approaching those of the other. On vigorous plants the leaves tend further to be undulate, and this condition is usually best marked in the upper leaves of a female branch and in the bracts themselves. This is well shown in the figures published by Macvicar and Müller.[1]

As Schiffner has shown, the species of the subgenus *Eucalyx* exhibit wide extremes in the size of their leaf-cells (Figs. 4–8), and these extremes sometimes manifest themselves in the different leaves of an individual plant. Specific differences based on differences in the size of the cells must therefore be used with caution. The five specimens of *N. hyalina* distributed by Schiffner in his "Hepaticae europaeae exsiccatae" (Nos. 62, 63, 367, 368, 369), and coming from widely scattered localities, gave the following average measurements: marginal cells, 23–34 μ; median cells, 32–41 $\times$ 26–34 μ. These measurements agree essentially with those obtained from North American specimens, although one of the latter showed marginal cells ranging from only 15 μ to 28 μ. Except for a slight difference in size the marginal cells are like the others, and the leaves consequently lack the specialized border which forms so distinctive a feature in *N. crenulata* (Sm.) Lindb., *N. crenuliformis* (Aust.) Lindb. and certain other species of the subgenus. Another feature which will help in distinguishing the species from *N. crenulata* is the constant presence of trigones. These are usually distinct, even when minute, and are often conspicuous with bulging sides. In fresh material the oil bodies in the cells stand out clearly but cannot often be detected in dried specimens. Each cell contains from two to eight of these bodies, which are oval or bluntly fusiform and measure 10–14 μ in length and 5–6 μ in width. They have even outlines but present the appearance of being minutely granular in structure. According to Stephani[2] the cuticle of *N. hyalina* is papulose, but most authors describe it as smooth and thus distinguish it from the striate-verruculose cuticle

[1] Rabenhorst's Kryptogamen-Flora 6: *f. 272.* 1909.
[2] Bull. de l'Herb. Boissier II. 1: 502. 1901.

of the closely related *N. obovata* (Nees) Lindb., a species to be discussed below. Schiffner[1] has pointed out the need of caution in employing differences of this type in separating the species of *Nardia*. In the writer's experience the cuticle of *N. hyalina* is sometimes smooth throughout but often shows minute verruculae, which are exceedingly delicate and inconspicuous. They are narrow and parallel in the basal part of the leaf but gradually become shorter toward the margin and show an oval or circular outline. The verruculae are sometimes confined to certain leaves of a plant or to certain parts of a leaf; they are perhaps a little commoner in American material than in European.

Rhizoids are abundantly produced and often show a beautiful claret color, a feature which has been much emphasized in descriptions of the species. Since, however, the red color is not always present, and since the rhizoids of *N. obovata* and other allied species are sometimes even more deeply pigmented, it is unwise to attach much importance to the color as a specific character. The rhizoids spring mostly from the ventral surface of the stem but occasionally from the leaf-cells near the ventral base or even from the cells of the bracts and perianth. This last condition is especially well seen in a deeply pigmented specimen from Naugatuck, Connecticut, where some of the old perianths are almost shaggy with rhizoids. In certain tropical species the rhizoids show a tendency to grow backwards and to form a compact bundle lying close to the stem, but this tendency is not apparent in *N. hyalina*, the rhizoids growing out irregularly in all directions.

Underleaves are normally absent, as the descriptions indicate, but the ventral segments give rise to ephemeral appendicular organs which are homologous with underleaves. These were described and figured by Leitgeb[2] many years ago. They are in the form of minute clusters of slime-papillae, four or five being usually present in each cluster, and it is easy to demonstrate them by dissecting off the apical portion of a stem and clearing it with potash solution. As Leitgeb pointed out, the papillae are really borne on the margin of a rudimentary scale consisting of only a few cells.

Authors are now nearly unanimous in considering *N. hyalina* a dioicous species. At one time, however, certain hepaticologists

[1] Oesterr. Bot. Zeitschr. 60: 454 (footnote). 1910.
[2] Unters. über Leberm. 2: 8. *pl. 9, f. 10.* 1875.

thought that the inflorescence was variable and that both monoicous and dioicous plants occurred. Carrington,[1] for example, stated that the species "was not always dioicous" and described androecia in the form of "special branches attached to the ventral surface of fertile shoots." Although the occurrence of ventral male branches has apparently not been confirmed, Arnell [2] states that he has observed paroicous individuals in material from Norway and Lower Austria, and Müller admits an occasional paroicous inflorescence in the species. Upon studying paroicous plants from the British Isles, Schiffner noted that this type of inflorescence was associated with larger leaf-cells, larger cells in the walls of the capsule, larger spores and wider elaters. He therefore separated these plants from *N. hyalina* and described them as a new species under the name *N. paroica* Schiffn.,[3] a species which British botanists have been quick to recognize. In all probability the other paroicous plants, which have been referred to *N. hyalina*, belong to Schiffner's new species, although this has not yet been definitely established.

There is no sharp distinction between the leaves of *N. hyalina* and the perichaetial bracts (Figs. 1, 2). A general increase in size and especially in width is to be observed in most cases and often a greater degree of undulation, but these modifications are sometimes scarcely perceptible and even the innermost bracts may be essentially like the leaves. Bracteoles, except as an abnormality, are not developed. According to the descriptions the bracts in *Nardia* are more or less concrete with the perianth. This expression, however, is not wholly correct. There is really formed a shorter or longer perigynium in the form of a cup, upon the outer surface of which the bracts are borne. A similar but much deeper perigynium is characteristic of the genus *Isotachis*, as Goebel [4] has clearly shown. The margin of the cup, within the innermost bracts, gives rise to the actual perianth, the length of which tends to vary inversely with the height of the perigynium. In the case of *N. hyalina* the normal relation is figured by Macvicar.[5] On one side the cup is about a third the length of the perianth, on the opposite side about an eighth. This condition represents one extreme; in the var. *heteromorpha* (Gottsche) Schiffn.,

[1] Brit. Hep. 37. 1874.
[2] Leberm.-Stud. aus nördl. Norwegen 38. 1892.
[3] Lotos 58: 320. 1910.
[4] Flora 96: 141. 1906.
[5] Student's Handb. British Hepatics 133. *f.* 5. 1912.

which represents the other, the cup is about one eighth the length of the perianth on one side and scarcely developed at all on the side opposite.

The perianth may begin to narrow at once or broaden out slightly before narrowing, according to the height of the perigynium. If fertilization has taken place it usually projects well beyond the bracts; if fertilization has failed it remains shorter and often scarcely projects at all. It usually narrows to the mouth without forming a distinct beak. In the upper part and sometimes throughout the greater part of its length, the perianth is deeply and irregularly plicate, the number of folds varying usually from three to five. These folds involve the mouth itself, which has a longer periphery than at first appears. No distinct lobes can be made out upon dissection (except those formed by tearing when the capsule is extruded, but the marginal cells project as crenulations or short cilia (Fig. 9), which often bend inwards, and sometimes small groups of the cells project slightly beyond their neighbors and form vague crenations. In the vicinity of the mouth and sometimes throughout the greater part of its extent the perianth is composed of elongated cells. Usually, however, especially if fertilization has taken place, the basal part is composed of short, almost isodiametric cells, and these occasionally extend almost to the mouth. In the contracted terminal portion the cells on the inner surface (especially along the internal folds) sometimes project slightly as blunt and very short papillae (in Fig. 9 three such cells are shown) and thus help the marginal cells in blocking up the mouth.

A typical male inflorescence has been figured by Müller.[1] The bracts are loosely to closely imbricated and vary in number from one or two pairs to a dozen or more. The cluster is at first terminal but often becomes intercalary by the vegetative elongation of the branch. A bract is usually a little shorter than the vegetative leaves of the same axis and may be much shorter. When viewed from above it presents the appearance of being complicate-bilobed with a rounded keel tending to become straight or concave in the outer part, the dorsal lobe being distinctly smaller than the ventral. This dorsal lobe represents an inflexed dilation of the basal portion of the leaf, which (although slightly decurrent) is less obliquely attached than in normal leaves. The ventral lobe is distinctly concave. In the

[1] Rabenhorst's Kryptogamen-Flora **6**: *f. 272 D.* 1909.

pocket formed between the two lobes two or three antheridia are situated. The typical condition just described is not always realized, as Fig. 3 shows. The keel here is less rounded and the dorsal lobe is almost as long as the ventral, although still much narrower. The antheridia in bracts like these are sometimes borne singly.

According to Müller the stalk of the capsule consists normally of three concentric layers of cells, the outermost numbering twenty in cross-section, the second twelve, and the innermost four. He admits, however, that there are deviations from these numbers, and the writer would refer the stalk to the "type général" of Douin,[1] in which the number of cells present varies according to the robustness of the plants. The capsule shows the usual thickenings in the walls of the cells. Those on the outer surface average about $35 \times 25\ \mu$ and show rod-like thickenings in both longitudinal and transverse walls. On the inner surface the cells average about 13 μ in width and usually measure 30–50 μ in length. Each cell shows from four to ten half-rings, according to its length. The spores are 15–17 μ in diameter and the bispiral elaters average 9 μ in width.

The various forms of *N. hyalina* in Europe have been carefully studied by Schiffner,[2] who recognizes the three following varieties, in addition to the typical form of the species: var. *heteromorpha* (Gottsche) Schiffn., var. *subaquatica* Schiffn., and var. *ovalifolia* Schiffn. These varieties have not yet been distinguished in American material, and the writer is not prepared to designate any of the American forms by varietal names on account of the inconstancy of their characters.

The synonyms of *N. hyalina* should evidently include *N. biformis* (Aust.) Lindb., as indicated above. This species has long been a puzzle to students of the Hepaticae. It was based on male material collected in 1867 by Austin at the Delaware Water Gap, New Jersey, where it grew on steep, wet rocks. The original specimens were distributed in Austin's exsiccatae, and no additional stations for the species have been recorded. According to the original description the species is "remarkable for the closely entangled and matted stems and surculi, and for the leaves of two forms." The leaves of one form, borne on the stems, are said to be obliquely semicircular or broadly ovate, decurrent at the dorsal base, and entire or retuse at

[1] Bull. Soc. Bot. France **55**: 274. 1908.
[2] See Verhandl. Zool.-Bot. Ges. Wien **53**: 418–421. 1904.

the apex; while those of the surculi, arising from the ventral surface of the stems, are said to be half as large as the stem-leaves, ovate or obovate in form, scarcely decurrent, and markedly obtuse at the apex. Austin noted further that the uppermost rhizoids were sometimes red but made no mention of the male bracts. These were detected by Lindberg, who recognized an affinity between *N. hyalina* and *N. biformis*, emphasizing the purple rhizoids, but who made no attempt to reduce the latter species to synonymy.

An examination of Austin's specimens indicates that they represent an environmental modification. Possibly the development of the numerous surculi has been induced by water flooding the prostrate stems. These surculi are not especially distinctive, very similar branches being often present in tufts of typical *N. hyalina*, especially when the plants are crowded. Many of the leaves on the surculi are distinctly though shortly decurrent, and the differences between the two forms of leaves are often less marked than the original description implies. The leaf-cells, as Austin notes, are thin-walled, but some of them show minute trigones and the cuticle is often vaguely verruculose. The male bracts agree closely with those of *N. hyalina*. On the whole there seem to be no trustworthy characters for separating *N. biformis* as a distinct species.

2. **Nardia obscura** sp. nov. Growing in more or less compact tufts, bright green varying to deep blackish purple: stems mostly 1–2 cm. long and 0.2–0.45 mm. in diameter, the older portions prostrate and closely adherent to the substratum, the younger portions usually free from the substratum, sparingly branched, the branches intercalary, arising from the lateral segments just above the ventral leaf-bases, sometimes leafy but often in the form of slender stolons; no subfloral innovations observed; rhizoids usually abundant on the prostrate stems and stolons, rare elsewhere, colorless to deep purple, not forming a ventral bundle; leaves distant to loosely imbricated, slightly decurrent dorsally and sometimes ventrally, attached by oblique lines but usually appearing subtransversely inserted at the dorsal base, broadly ovate to orbicular, mostly 0.9×1.5 mm. long and 0.75–1.5 mm. wide, usually rounded at the apex but sometimes retuse, margin entire; leaf-cells thin-walled but with minute trigones, marginal cells not differentiated, mostly 15–20 μ in diameter, median cells mostly 25–35 μ long and 20–28 μ wide, cuticle smooth to delicately striate-verruculose: underleaves lacking: inflorescence dioicous, the male and female plants sometimes in the same tuft: perichaetial bracts in about two pairs, a little broader and more undulate than the leaves but otherwise very similar; perigynium and perianth

together 1.5–2 mm. long and 0.7–1 mm. wide, the perigynium about as long as the perianth or longer, usually bearing one bract on one side and two on the other; perianth conical, shorter than the bracts, irregularly plicate in the upper part, composed throughout of more or less elongated cells, the mouth minutely crenulate (or short-ciliolate) from projecting cells: androecium short, the bracts mostly in two to six pairs, imbricated, deeply saccate and complicate, the dorsal part usually a little smaller than the ventral but sometimes equalling or surpassing it in size, keel strongly arched throughout or becoming slightly concave in the outer part; antheridia borne singly or in pairs: mature sporophyte not seen. [Plate 126.]

On steep, damp rocks, usually in shaded ravines. Maine: banks of the Carrabassett River, Jerusalem (*J. F. Collins 1609;* listed by the writer as *N. hyalina*, Rhodora **4**: 209. 1902). New Hampshire: banks of the Ellis River, Jackson (*A. W. E.;* distributed in Underwood & Cook's Hep. Amer. *83*, as *N. crenuliformis;* listed by the writer as *N. obovata*, Proc. Washington Acad. Sci. **2**: 298. 1900); the "V," Waterville (*A. Lorenz 203;* listed by the writer as *N. hyalina*, Rhodora **10**: 192. 1908); same locality (*A. W. E.*); between the Greeley Ponds, Waterville (*A. Lorenz*); Profile Brook and the Flume, Franconia Mountains (*C. C. Haynes, A. Lorenz & A. W. E.;* listed by Miss Lorenz as *N. hyalina*, Bryologist **11**: 113. 1908); Coosauk Falls, Triple Falls and the Ice Gulch, Randolph (*A. W. E.*); Huntington Ravine, Mt. Washington (*A. W. E.*). Vermont: Downer's Glen, Manchester (*A. J. Grout;* listed by the writer as *N. obovata*, Rhodora **7**: 58. 1905). Massachusetts: Mt. Greylock (*A. L. Andrews*). Connecticut: Beacon Falls (*A. W. E.;* listed by the writer as *N. hyalina*, Conn. State Geol. & Nat. Hist. Surv. Bull. 11: 51. 1908). New York: Rainbow Falls, Adirondack Mountains (*W. G. Farlow*). The specimen collected by the writer at the "V," Waterville, New Hampshire, on August 18, 1911, may be designated the type.

In some respects *N. obscura* is intermediate between *N. hyalina* and *N. obovata* and it is not surprising that it has been confused with both. It agrees with *N. hyalina* in its dioicous inflorescence and with *N. obovata* in its deep perigynium; all three species have in common the following features: suborbicular entire leaves, normally rounded at the apex; thin-walled leaf-cells with trigones, the marginal cells essentially like the others and therefore not differentiated to form a border; more or less abundant rhizoids, often pigmented with red or purple; and a plicate perianth without a beak, composed (at least in part) of elongated cells.

Although *N. obscura* descends into the lowlands it is more at home in the hills and lower mountains, not ascending above the tree line. It prefers steep rocks in dark shaded ravines, especially where trickling water is present during a part of the year; and the creeping stems and stolons cling so closely to the substratum that it is difficult to separate them. In some cases a sandy sediment collects about the plants, only the tips protruding. In its choice of a habitat it therefore differs from *N. hyalina,* which prefers the lowlands and is almost never directly attached to rocks, growing by preference on sandy banks or in similar situations. There are also certain differences in color to be observed: in *N. obscura* the color is originally a bright green, but the pigmentation, which is purple rather than red, is usually present to a greater or less extent and not infrequently involves the entire plant; in *N. hyalina* the original color is pale or yellowish green, and the pigmentation, which is reddish rather than purple, is often absent altogether and very rarely involves the entire plant. Stolons can nearly always be demonstrated in *N. obscura,* if the plants are carefully dissected apart, while in *N. hyalina* they are often not developed at all.

In the leaves (Figs. 1–5) there are certain differences to be detected when the plants are directly compared, but it is difficult to describe them in words. Although the leaves are attached in both species by long oblique lines, the basal part of the leaf in *N. hyalina* is usually plane or convex, somewhat as it is in *Plagiochila;* in *N. obscura,* on the other hand, it shows a tendency to be appressed to the stem for a short distance and then sharply revolute, giving the effect of a more transverse attachment. Retuse apices are perhaps a little commoner in *N. obscura* than in *N. hyalina,* and sometimes, when taken in connection with the purple pigmentation and the apparent subtransverse insertion of the leaves, produce a vague resemblance to certain species of *Marsupella.* According to the average measurements the leaf-cells of *N. obscura* are a trifle smaller than those of *N. hyalina,* and the cells are further distinguished by slightly smaller trigones (Figs. 6, 7).

The inflorescences, both male and female, yield excellent differential characters. In *N. obscura* the perigynium equals or exceeds the perianth in length (Figs. 1, 2, 8), and the latter organ is composed throughout of more or less elongated cells and does not project beyond the bracts; in *N. hyalina* the perigynium is considerably shorter than the perianth, and the latter organ (at least when fertilized) is composed in part of short cells and projects well beyond the bracts. The male inflorescence in *N. obscura* (Figs. 3–5) tends to be shorter than in *N. hyalina*, the bracts are more deeply saccate, and the dorsal fold (or lobe) often equals or surpasses the ventral in size. It is to be regretted that the capsules present in the material of *N. obscura* are all immature, so that the characters exhibited by the valves and spores are still unknown. The stalk, however, as shown by cross-sections, conforms to Douin's "type général," just as in the case of *N. hyalina*.

An Asiatic species which should be compared with *N. obscura* is *N. subtilissima* Schiffn.[1] This species was based on material collected by Handel-Mazzetti in the province of Trebizond, Asia Minor, where it grew on shaded rocks at an elevation of about 650 meters. According to Schiffner's full description *N. subtilissima* is stoloniferous and dioicous, the perigynium is about as long as the perianth, and the dorsal lobes of the male bracts are larger than the ventral. It has been shown that this last feature is occasionally present in *N. obscura*, and the other characters mentioned are likewise found in the American species. The Asiatic plant, however, is much more delicate than *N. obscura*, and seems to show no signs of pigmentation; the leaves are elliptical, measuring only 0.5 × 0.4 mm., and the thin-walled leaf-cells with very minute trigones usually measure only 18 × 18 μ in the middle of the leaf, rarely attaining a size of 25 × 18 μ.

3. Nardia obovata (Nees) Lindb. Bot. Not. 1872: 167. *Jungermannia obovata* Nees, Naturg. Europ. Leberm. **1**: 332. 1833. *J. flaccida* Hüben. Hep. Germ. 87. 1834. *Southbya obovata* Lindb.; Hartman, Handb. Skand. Fl. ed. 10, **2**: 130. 1871. *Eucalyx obovatus* Breidl. Mitt. Nat. Ver. Steiermark **30**: 291. 1894. *Aplozia obovata* Loeske, Moosfl. des Harzes 59. 1903. *Mesophylla obovata* Corbière, Rev. Bryol. **31**: 13. 1904. [Text figs. 10–14.] On damp or wet rocks. Maine: east slope "saddle," Mt. Katahdin (*J. F. Collins 2186b*); Chimney Pond, Mt. Katahdin (*A. Lorenz*). New Hampshire: Tuckerman's Ravine, Mt. Washington (*J. A. Allen, A. W. E.*); Oakes Gulf, Mt. Washington (*A. W. E.;* distributed in Underwood & Cook's Hep. Amer. *113*, as *Jungermannia cordifolia*); Thompson's Falls, White Mountains (*L. M. Underwood;* distributed in Miss Haynes's Amer. Hep. *6*).

[1] Ann. Naturhist. Hofmus. Wien. **23**: 136. *pl. 7, f. 13–22.* 1909.

The species was based on material collected in the Giant Mountains of Silesia and Bohemia, and is widely distributed in Europe. In America it is recorded in the literature not only from New England but also from Greenland, Nova Scotia, Washington, California and Colombia. It grows in damp or wet localities and is often submerged. In temperate regions it prefers the higher mountains, attaining a vigorous development above the timber line; in more northern regions it sometimes descends to the sea level. It has been the cause of fully as much confusion as *N. hyalina,* and some of the older reports of its occurrence are in need of revision. Even the author of the species, Nees von Esenbeck, sometimes failed to distinguish it from *Jungermannia amplexicaulis* Dumort., a species which is scarcely more than an aquatic form of *J. sphaerocarpa* Hook. By subsequent writers it has perhaps been more confused with *N. hyalina* and other species of *Nardia.* The Colombian record noted above, the only one from South America, was published by Gottsche[1] many years ago and was based on specimens collected by Lindig in the province of Bogotá. Gottsche described these specimens under a special varietal name, *β bogotensis,* showing that he did not regard them as typical; and in all probability they would now be considered distinct from *N. obovata.* The Alaskan and Californian records are likewise open to criticism. The first was based on specimens collected by Trelease[2] at Farragut Bay and Kadiak; the second on specimens collected by Howe[3] at Blue Lake, Humboldt County. In Trelease's specimens it has proved quite impossible to demonstrate a paroicous inflorescence; the plants are in all probability dioicous and therefore do not agree with *N. obovata,* as understood at the present time. In Howe's specimens the writer has found a single young perianth, in which the mouth is contracted to a distinct beak. This would indicate that it belonged to the genus *Jungermannia,* and the specimen in question is evidently very close to *J. sphaerocarpa* Hook., if, indeed, it should not be referred to that species. The record from Washington, based on specimens collected by Foster[4] at Hamilton, seems to be correct, and the same is true of one of the records from Nova Scotia, based on specimens collected by Nichols[5] in the valley of the Barrasois

[1] Am. Sci. Nat. Bot. V. **1**: 119. 1864.
[2] Evans, Proc. Washington Acad. **2**: 298. 1900.
[3] Mem. Torrey Club **7**: 96. 1899.
[4] See Miss Haynes, Bryologist **12**: 67. 1909.
[5] Bryologist **19**: 41. 1916.

River, Cape Breton (*1445*). The other Nova Scotia records for the species, also made by Nichols, represent the closely related *N. subelliptica* Lindb. and will be considered in another connection. No material from Greenland has been available for study, but the published records, made by the Danish botanist, C. Jensen,[1] are undoubtedly trustworthy. Unfortunately, our knowledge, even at the present time, is not always sufficient to render a positive verdict in the case of sterile and aquatic material, in spite of the attention which Schiffner and other European students have given to modifications induced by an aqueous environment.

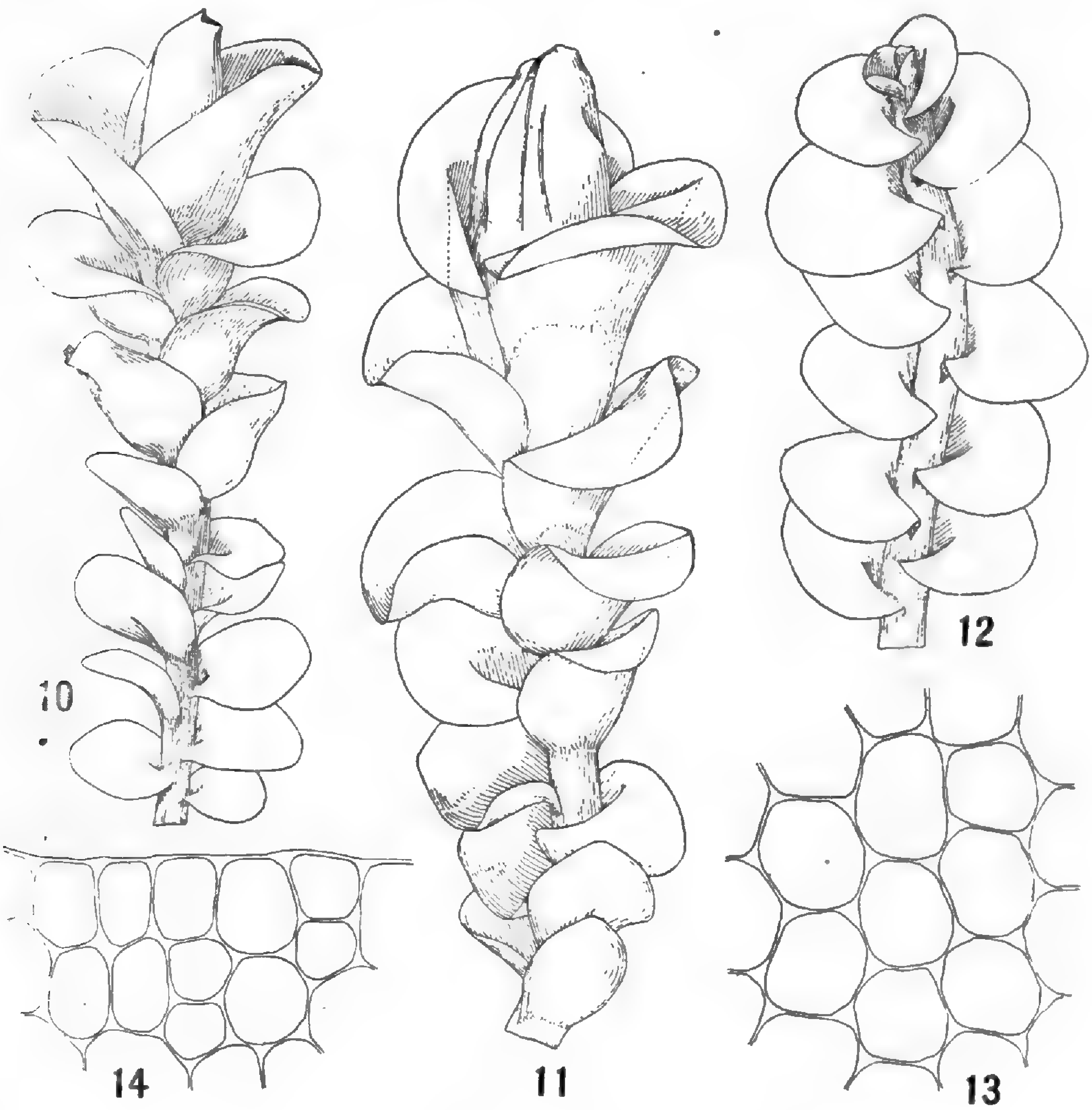
The general habit of *N. obovata* is not unlike that of *N. obscura;* the older stems cling to the substratum, while the younger stems are free or nearly so. There is therefore a tendency for the rhizoids to be restricted to the older stems and to the stolons, which are usually produced in abundance. The branching is the same as in the two preceding species, but no subfloral innovations have been observed even in the absence of fertilization. The color of the plants is originally a deep dull green, but brownish or reddish pigmentation is often present, and in extreme cases a distinct crimson hue becomes apparent in transmitted light. The plants never show the deep purple color which is often associated with *N. obscura.* The rhizoids are usually red but may be pale or even colorless; no tendency to form a ventral bundle is to be observed.

The leaves (Figs. 10–12) are distant to loosely imbricated and are about as large as those of *N. hyalina.* From a long series of measurements the length was found to be between 0.75 and 1.17 mm. and the width between 0.7 and 1.55 mm. There is a tendency for the leaves to be a little longer than broad, but many of the leaves measured were as broad as long and a few were even broader than long. In most cases the shape might be described as broadly ovate with a rounded apex. The line of attachment is normally oblique but sometimes the obliquity is slight and a subtransverse attachment is approximated, especially in the dorsal part. In this respect it often exceeds the condition found in *N. obscura.* At the dorsal base the leaves are decurrent, sometimes for a considerable distance; at the ventral base the decurrence is often equally distinct. In what may be regarded as the most typical cases, the leaves spread widely and

[1] Meddel. om Grønland **15**: 381. 1897; **30**: 309. 1906.

abruptly from the line of attachment, but many deviations from this condition are to be expected, even on an individual stem.

The leaf-cells agree pretty closely with those of *N. hyalina* in their measurements. A series of about fourteen specimens, both European



Figs. 10–14. Nardia obovata (Nees) Lindb.

10, 11. Stems with male bracts and perianths, dorsal view, × 15. 12. Sterile stem, dorsal view, × 15. 13. Cells from the median portion of a leaf, × 265. 14. Marginal cells from another leaf of the same specimen, × 265. Rhizoids and the verruculae on the leaf-cells are not shown. Fig. 10 was drawn from a specimen collected at Thompson's Falls, White Mountains, New Hampshire, by L. M. Underwood, and distributed by Miss Haynes, Amer. Hep. *6;* the remaining figures were drawn from a specimen collected in Oakes Gulf, Mt. Washington, New Hampshire, by the writer, and distributed by Underwood & Cook, Hep. Amer. *113*, as *Jungermannia cordifolia.*

and North American, gave the following average dimensions: marginal cells, 15–36 μ; median cells, 27–49 × 22–39 μ. The trigones can nearly always be demonstrated but are usually much smaller than those of *N. hyalina*, agreeing better with those of *N. obscura* (Figs. 13, 14). The cuticle is usually distinctly striate-verruculose, at any rate in the basal part of the leaves.

The paroicous inflorescence (shown clearly in Fig. 10) will serve to distinguish *N. obovata* from most of its immediate allies. The male bracts are not numerous, only two or three pairs being present in most instances, and the modifications which they show are less striking than in either of the preceding species. They are, however, of the same general character, a basal sac being formed by the inflexion of the dorsal part, thus giving the appearance of a complicate-bilobed leaf. The keel is usually somewhat arched but may be almost straight, and the dorsal lobe is usually smaller than the ventral, although sometimes approximating it in size. According to Müller each bract encloses two antheridia.

The perichaetial bracts, which immediately succeed the male bracts, usually number three or four, although sometimes only two are present. They are not very distinctive, but tend to be larger than the vegetative leaves and even more nearly transverse in their attachment, so that they often clasp the perianth at the base. The upper part usually flares widely and may be somewhat reflexed. The bracts, with the possible exception of the most basal one, are borne on the perigynium. The latter organ is about as long as the perianth in case fertilization has taken place; in the absence of fertilization it remains much shorter. The perianth projects slightly beyond the bracts and usually begins to narrow from the very base. Throughout its entire length it is deeply and irregularly plicate, much as in *N. hyalina*, and the mouth itself is somewhat contracted, although no beak is ever formed. If the apical portion of the perianth is carefully spread out the mouth is seen to be minutely and irregularly lobulate, the individual lobules being more or less crenulate or ciliolate from projecting cells. Throughout its entire extent the perianth is composed of somewhat elongated cells, but the elongation is less marked than in *N. obscura* and an isodiametric condition is sometimes approached.

Müller's description of the stalk of the capsule is very definite. He states that three concentric layers of cells are present, the outermost numbering sixteen in cross-section, the second eight and the innermost four. In the writer's experience these numbers are inconstant. In a section cut from the Oakes Gulf material the outermost layer showed eighteen cells, the second twelve and the innermost seven. It is evident, therefore, that the stalk belongs to Douin's "type général," agreeing in this respect with *N. hyalina* and *N. obscura*. The cells of the capsule-wall are much like those of *N. hyalina*. Those of the outer layer average about $55 \times 20\ \mu$, and the thickenings in the transverse walls are infrequent; those of the inner layer average about $11\ \mu$ in width and usually measure $40–70\ \mu$ in length. These measurements are slightly different from those given for *N. hyalina*, but the measurements of the spores and elaters are essentially the same in the two species.

Some of the differences between *N. obovata* and the two preceding species have already been brought out in the above discussion. In distinguishing it from *N. hyalina* the very unlike habitats should be borne in mind, *N. hyalina* preferring sandy banks and *N. obovata* damp or wet rocks. The differences in habit and in color are likewise significant, *N. hyalina* being usually prostrate, adherent to the substratum and pale, while *N. obovata* tends to be ascending, free from the substratum and dark. The plants are further remarkable for their curious turpentine-like odor, although this peculiarity is found also in *N. obscura*. In distinguishing *N. obovata* from this latter species, which likewise grows on rocks, the larger size, the lack of a purple pigmentation, the more exerted perianth, the less elongated cells of the same and the lobulate mouth will prove especially helpful. Perhaps the paroicous inflorescence, which distinguishes *N. obovata* from both these species is the most important of its differential characters. This character, however, is shared by several other species of *Nardia* and also by *Jungermannia sphaerocarpa* and its allies. Fortunately there is little danger of confusing *N. obovata* with many of these paroicous species. The only ones which approach it closely are *N. paroica* and *N. subelliptica*, which need not be considered further at the present time.

The great variability of *N. obovata* is well described by C. Jensen,[1] in connection with its occurrence on the Faroe Islands. "Near the coast," according to his account, "the small forms — fruiting abundantly during spring — are frequent in crevices and on the ground among rocks. In the mountains the plants gradually become stouter

[1] Bot. of the Faeröes **1**: 135. 1901.

in size and habit, but less abundant in fruit, until they above 300–400 m. form large, deep, dark purplish-brown, barren tufts in rills and round springs." Schiffner recognizes the following varieties by name: var. *bipartita* (K. Müll.) Schiffn., var. *elongata* (Nees) Schiffn., and var. *rivularis* Schiffn. The first of these is known from a single locality in the Vosges Mountains of France. The second, which is commoner, is not very clearly distinguished and seems to intergrade with the typical form of the species; Collins's specimens from Mt. Katahdin and Allen's from Mt. Washington represent it fairly well. The third is not yet definitely known from North America; it was based on sterile, completely submerged specimens from Bohemia, collected by Schiffner, and the opinion is expressed by its author that it may represent a distinct specific type. Schiffner[1] has lately referred to this variety, as a forma *flaccida*, the *Jungermannia flaccida* of Hübener, a species from Germany and Norway, which had long ago disappeared from the literature. If the specific status of the variety should ever be established the plant should of course bear Hübener's specific name.

4. *Cephalozia Loitlesbergeri* Schiffn. In bogs. New Hampshire: Mt. Lafayette and Lonesome Lake, Franconia Mountains, July, 1908 (*C. C. Haynes*). Connecticut: Norfolk. June 10, 1919 (*A. Lorenz & A. W. E.*). Widely distributed in Europe and recently collected by G. E. Nichols[2] on Cape Breton Island, Nova Scotia. The species has recently been discussed at length by the writer,[3] so that it will be sufficient to compare it here with the closely related *C. connivens* (Dicks.) Lindb. Both species are characterized by a pale color, deeply bilobed leaves, with sharp connivent lobes, an autoicous inflorescence and a perianth with a long-ciliate mouth. They may be at once distinguished, however, by their leaf-cells. In *C. Loitlesbergeri* these average about 30 μ in diameter; in *C. connivens*, about 50 μ. In all probability *C. Loitlesbergeri* will be found to have a wide distribution in eastern North America.

The additions to local state floras, not already mentioned in the preceding pages, are as follows: —

For Maine: *Jungermannia sphaerocarpa*, Clearwater Falls, Megantic

[1] Oesterr. Bot. Zeitschr. **60**: 271. 1910.
[2] Bryologist **19**: 42. 1916.
[3] Bryologist **20**: 22. 1917.

Corporation, Franklin County (*A. Lorenz*); *Calypogeia sphagnicola*, Mt. Desert (*A. Lorenz*); *Notothylas orbicularis*, West Farmington (*A. Lorenz*).

For Massachusetts: *Riccardia pinguis*, Richmond (*A. W. E.*); *Pellia Neesiana* and *Lophocolea alata*, Tolland (*A. Lorenz*).

The census of New England Hepaticae now stands as follows: total number of species recorded, 191; number recorded from Maine, 142; from New Hampshire, 151; from Vermont, 129; from Massachusetts, 121; from Rhode Island, 79; from Connecticut, 145; from all six states, 62.

Explanation of Plate 126.

Nardia obscura Evans.

1, 2. Stems with perianths, Fig. 1 showing also a stolon, dorsal view, × 15. Figs. 3–5. Male stems, dorsal view, × 15. 6. Cells from the median portion of a leaf, × 265. 7. Marginal cells from the same leaf, × 265. 8. Longitudinal section of a young sporophyte and surrounding parts, × 25. Only a few of the rhizoids are represented, and the verruculae on the leaf-cells are not shown. Figs. 4 and 5 were drawn from a specimen collected at Beacon Falls, Connecticut, by the writer; the remaining figures, from the type specimen, collected at the "V," Waterville, New Hampshire, also by the writer.

Sheffield Scientific School, Yale University.

The Variations of Ranunculus repens.— The commonly naturalized Swamp Buttercup, *Ranunculus repens* L., is so variable that American botanists are often perplexed to reconcile the extreme variations. These have been clearly differentiated in Europe and it may be useful to American students to have the following brief key to the more pronounced varieties.

A. Middle leaflet of the basal leaves cuneate to subtruncate at base: petals 5–9: stamens numerous B.
  B. Lobes and teeth of the leaves deltoid or ovate to oblong, obtuse or bluntish.
    Trailing or repent branches or stolons present.
      Stems and petioles distinctly pubescent.
        Pubescence appressed .... *R. repens* L. (typical).
        Pubescence wide-spreading .... Var. *villosus* Lamotte.
      Stems and petioles glabrous or nearly so .... Var. *glabratus* DC.
    Trailing or repent branches wanting .... Var. *erectus* DC.
  B. Lobes and teeth of the much-cleft leaves lanceolate to linear, acuminate. Var. *linearilobus* DC.
A. Middle leaflet of the basal leaves rounded or subcordate at base: petals very numerous, forming a "double" flower... Var. *pleniflorus* Fernald.

M. L. Fernald, Gray Herbarium.

NOVEMBER FLOWERS IN NORTHERN VERMONT.

Inez Addie Howe.

The unusually wet, mild weather of October and November 1918 induced the second or continued blooming of so many species of flowering plants that I think it will be of interest to New England botanists to read the list noted in this part of northern Vermont.

Gramineae:
  Phleum pratense.
  Poa annua.
Urticaceae:
  Pilea pumila.
Polygonaceae:
  Polygonum aviculare.
  Rumex crispus.
Carophyllaceae:
  Stellaria media.
  Cerastium vulgatum.
Ranunculaceae:
  Ranunculus acris.
  Caltha palustris.
Cruciferae:
  Brassica campestris.
  " arvensis.
  Capsella bursa-pastoris.
  Lepidium virginicum.
Hamamelidaceae:
  Hamamelis virginiana.
Rosaceae:
  Potentilla argentea.
  Rubus idaeus var. aculeatissimus
  Fragaria virginiana.
  " vesca var. americana.
Leguminosae:
  Trifolium pratense.
  " repens.
Oxalidaceae:
  Oxalis corniculata.
Malvaceae:
  Malva rotundifolia.
Umbelliferae:
  Zizia aurea.
Cornaceae:
  Cornus canadensis.
Boraginaceae:
  Myosotis laxa.
Labiatae:
  Lamium amplexicaule.
  Galeopsis tetrahit.
Plantaginaceae:
  Plantago major.
Lobeliaceae:
  Lobelia inflata.
Compositae:
  Tanacetum vulgare.
  Achillea millefolium.
  Erigeron canadensis.
  " philadelphicus.
  Solidago nemoralis.
  " canadensis.
  " juncea.
  Aster puniceus.
  " undulatus.
  " cordifolius.
  " ericoides.
  Taraxacum officinale.
  Rudbeckia hirta.
  Gnaphalium polycephalum.
  " uliginosum.

The forty-four species in the above list were exhibited on the Flower Table at the Fairbanks Museum, St. Johnsbury, Vermont, between November 1 and 22, all having been collected within a short distance of the Museum, a very unusual record for northern Vermont.

Fairbanks Museum.

Coreopsis rosea Nutt., forma **leucantha**, n. f., ligulis lacteis. Ligules milk-white.— Massachusetts: wet sandy lower beach and inundated margin, Buck Pond, Harwich, August 30, 1918, *Fernald & Long*, no. 17,594 (type in Gray Herb.).

Typical *Coreopsis rosea* has, as its name implies, roseate ligules, these varying on the one hand to intense rose-purple, on the other to a pale pink, but at Buck Pond where the ordinary pink-rayed form makes a veritable border of color at the margin of the pond, the milk-white form, with no trace of pink in the rays, is also abundant, the two suggesting a garden-border of pink and white Cosmos.— M. L. Fernald, Gray Herbarium.

Nichols's Vegetation of Northern Cape Breton.[1]— Among those who follow this kind of investigation there will be no dissent from the statement that Prof. Nichols's work on Cape Breton represents by far the most important ecological study yet made on the vegetation of northeastern America. The author has chosen a distinctive and attractive new field, applied to its problems the most modern spirit and method, worked it through parts of four seasons on the basis of earlier acquaintance, and embodied his results in a clear, orderly, and well-illustrated synoptical monograph. After an introduction on the general problem, the physical factors involved, and his plan of ecological classification and nomenclature, there follows the systematic description of all the vegetation groups of the region. The climax vegetation is of course forest, which falls into the two types of deciduous and evergreen. These are separately and fully described, and then traced as to their development through the successional series of xerarch and hydrarch formation types. The floristic side of the study receives full attention, with every evidence of the trustworthiness of the identifications. The treatment of the vegetation groups is remarkably even throughout, for which reason it is hardly possible to select any parts for special comment, which in any case, so far as the present reviewer is concerned, would be wholly favorable. No striking new discoveries or major conclusions are announced, though various special topics receive full discussion; and diverse current views are tested in light of the observations and found sometimes adequate and sometimes wanting. In the present stage of ecological progress, theoretical deductions have little more than a temporary and hypothetical value, but exact records of fact are the

[1] Nichols, George E. The Vegetation of Northern Cape Breton Island, Nova Scotia. *Trans. Conn. Acad. Arts and Sciences*, **22**, 249–467, 1918.

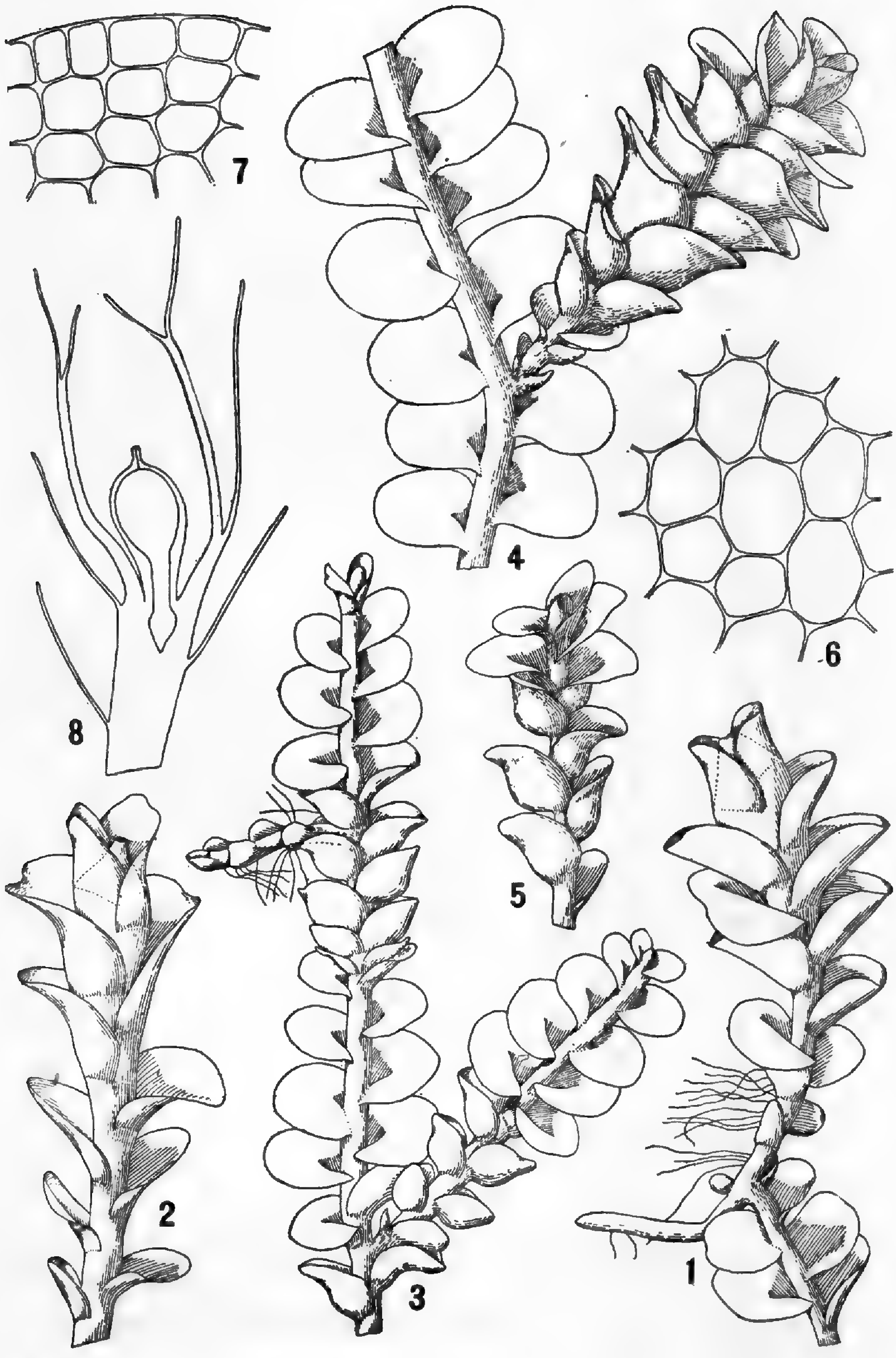
permanent foundations of science, and of such, for its region and problem, the present work is a treasury.

In this as in others of his writings Professor Nichols shows generous appreciation of earlier ecological investigation, which he does not insist upon judging by present day standards. He corrects mistakes on the merits of the evidence, and is wholly above that form of weakness which consists in using the errors of others as a foil to show forth by implication one's own cleverness.

Any criticism of the paper would center in two minor points. The reproduction of the illustrations is in many cases not wholly adequate to the obvious value of the originals. This is a common fault in our ecological publications, and we should insist upon better results. Again, the system of ecological nomenclature, while perfectly logical, is, to the reviewer at least, lacking in clear definition and therefore somewhat confusing in use. An ideal nomenclature would measure up in differentiation to the distinctness of the groups themselves.— W. F. Ganong, Smith College.

A Flora of Northeastern Pennsylvania.— A reliable local flora is, in the present stage of knowledge of the distribution of plants in North America, always most welcome. Very many areas are as yet not blessed with such detailed publications and every addition to the list of carefully prepared reference works is to be commended. Recently, we have received a copy of the "Flora of Northeastern Pennsylvania" by Alfred Twining, published by the Everhart Museum of Natural History, Science and Art of Scranton, Pennsylvania. The work bears such evidence of painstaking care in securing accurate verification of the most technical groups of plants that a copy should be in the hands of everyone who is specially interested in working out detailed ranges. The region covered is only 50 to 100 miles west of southwestern New England and the botanists, particularly of Connecticut and western Massachusetts, will be specially interested in it. —M. L. F.

Vol. 21, no. 248, including pages 133 to 148, was issued 7 August, 1919.



A. W. E. del.

NARDIA OBSCURA Evans.

Rhodora

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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

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CHANGES IN THE NOMENCLATURE OF THE GRAY'S MANUAL FERNS.

C. A. Weatherby.

In the course of preparing, as their second report, a preliminary list of the New England *Polypodiaceae, Schizaeaceae,* and *Osmundaceae,* the Committee on Floral Areas of the New England Botanical Club has been confronted with certain questions of taxonomy and nomenclature. As a result, the names used in their list will differ considerably from those in the 7th edition of Gray's Manual. The following has been written by way of explanation of these changes and in the hope that it may be of some service to users of the Manual to have the matter relating to them brought together in one place.

There is probably no other family of plants in which the accepted basis of classification has been so radically changed within the past few years as in the *Polypodiaceae.* The ferns, though an ancient group, have proved exceptionally conservative; their evolutionary variation has been confined within narrow limits and they present today a complex of closely inter-related groups, merging more or less into one another. They offer, therefore, especial difficulties in classification. All of the very different systems proposed by the older writers have been artificial to a greater or less degree and have suffered from laying too much emphasis on single characters or single kinds of characters. It is only within about twenty years that Diels has devised a system based on combinations of characters — a system which, so far as our present knowledge shows, seems essentially natural and which has gradually won its way to practically unanimous acceptance. It is because of these conditions in general and, in particular, of a considerable activity in the study of American ferns since 1908 that the changes discussed below are called for.

Aspidium.— It is a very great pity that in his work on the indispensable Index Filicum and on what promises to be his classical monograph of the shield ferns, Christensen should have overlooked the earliest valid name for this genus. The name which he took up, *Dryopteris* Adans., has long been the subject of controversy. As has several times been pointed out,[1] its publication was inadequate under the International Rules: for that reason, it was rejected by the editors of the Manual and the next earliest name known to them, *Aspidium* Sw., taken up. In 1910, however, Nieuwland discovered that there exists an entirely valid name, *Thelypteris* of Schmidel, applied to the marsh fern, *Acrostichum Thelypteris* L., and published in 1762, a year earlier than *Dryopteris,* with three or four pages of description and comment and two very excellent plates.[2]

There can be little question that this is the correct name for the shield ferns. Farwell has, indeed, put forward a rival in *Filix* Hill (1755).[3] Hill, however, merely uses the doubtful binomials *Filix Mas* and *Felix Foemina* as the headings of paragraphs in his Family Herbal containing popular descriptions in English of the male fern and the bracken respectively.[4] Such use can hardly constitute publication under any nomenclatorial code, certainly not under the International Rules. *Thelypteris* remains the earliest valid name for *Aspidium* of the Manual: and, much as one regrets adding another to the numerous names this genus has already borne, it must be taken up. Rules are of no use unless conscientiously followed.

Fernald[5] has pointed out that *Aspidium spinulosum,* var. *dilatatum,* f. *anadenium* differs from typical var. *dilatatum* of Europe not only in the absence of indusial glands but also in the characters of its scales, and that it should be regarded as a coördinate geographic variety. As such it was given a name, var. *americanum* by Fischer in 1848.

Asplenium.— the lady ferns and their allies.— Recent study has pretty conclusively shown that *Athyrium* is a good genus, differing constantly from *Asplenium* in the character of its scales, the anatomy of its stipe and its general habit and appearance. It constitutes a

[1] For instance, in Rhodora xxi. 10 (foot-note) (1919).
[2] Am. Midland Nat. i. 226 (1910).
[3] Ann. Rep. Mich. Acad. Sci. xviii. 79 (1917).
[4] Hill, Family Herbal 141 (1755).
[5] Rhodora, xvii. 44 ff. (1915).

group more primitive than the true Aspleniums and standing between them and *Thelypteris* in the evolutionary sequence, as we now construct it. The section *Athyrium,* then, of the Manual becomes a genus to which the last three species under *Asplenium* are to be transferred. Butters[1] has recently pointed out that (as in many similar cases) it is the lady fern of western America, heretofore generally known as *Athyrium* or *Asplenium cyclosorum,* not that of the eastern states, which is really conspecific with the original *A. Filix-femina* of Europe and should bear that name; and that our northeastern plants comprise two species, *A. angustum* and *A. asplenioides,* distinct from it and from each other and long ago recognized and named by Willdenow and Michaux. He also points out that *Asplenium angustifolium* and *A. acrostichoides* of the Manual belong rather with the tropical group *Diplazium* than with typical *Athyrium* (the lady ferns); but since there is doubt if *Diplazium,* though rather generally accepted, ought to be separated as a genus, it seems best to leave them, for the present at least, under the older name *Athyrium.*

Dicksonia.— The pasture fern and its congeners were long referred to *Dicksonia* because of a similarity in the structure of the indusium. They differ widely from it, however, in habit and, what is more important, in the structure of the sporangia, which is altogether that of the *Polypodiaceae,* not of the *Cyatheaceae* to which the true Dicksonias belong. Our fern should bear the name *Dennstaedtia* given it more than a century ago by Bernhardi.

Onoclea.— The two sections of *Onoclea,* as treated in the Manual, are now regarded by most authors as genera. The present writer confesses to some doubt as to the propriety of this segregation; but the weight of opinion is for it. The name *Onoclea* remains with *O. sensibilis.* The earliest generic name for the ostrich ferns, *Struthiopteris* Willd. (1809) is invalid because of an earlier *Struthiopteris* Scop. (1760). Nieuwland[2] has recently pointed out that the name usually taken up, *Matteuccia* Todaro (1866), is also long antedated by the obscurely published *Pteretis* Raf. which is the correct name for the genus. Fernald[3] has shown that the American ostrich fern is specifically distinct from the European and should bear the specific name *nodulosa,* given it by Michaux. *Pteretis nodulosa* (Michx.) Nieuwl. becomes the name for our ostrich fern.

[1] Rhodora, xix. 178ff. (1917).
[2] Am. Midland Nat. iii. 194ff. (1914).
[3] Rhodora, xvii. 161ff. (1915).

Osmunda.— The American royal fern differs from the European in the shape of its pinnules, a difference not altogether constant, but enough to make desirable its recognition as a geographic variety, *O. regalis*, var. *spectabilis* (Willd.) Gray.

Phegopteris.— From the point of view of the new classification, *Phegopteris* has always been an artificial genus. Our four northeastern species, indeed, seem, taken by themselves, to constitute a separable group; but when the related tropical species are taken into consideration, they are seen to be part of a series of forms which, in all other characters than the absence of an indusium, are readily referable to one or another sub-genus of *Thelypteris*. Diels, followed by Christensen and many others, seems to have been entirely correct in reducing *Phegopteris* to that genus; our species should be transferred to it and placed, in the Manual arrangement, between *T. noveboracensis* and *T. fragrans*.

Pteris.— *Pteridium* Scop. (1760), based on *Pteris aquilina* L., though slow to win recognition as a genus, is a very natural group, differing constantly from true *Pteris* in the usually double indusium, the anatomy of the stipe, the presence of basal trichomes instead of scales and one or two other minor characters. Scopoli's name should be taken up for our bracken. Britton[1] indeed, though accepting its segregation as a genus, retains the name *Pteris* for it, on the ground that *P. aquilina* is the type of the Linnaean genus. The only apparent reason for this is a provision in the American Code that, in the absence of other means of fixing a generic type, it should be chosen from species indigenous from the point of view of the author. There would seem to be a theoretical difficulty in determining what species are indigenous from the point of view of an author who, like Linnaeus, was describing the vegetation of the entire world; however, this need not concern followers of the International Rules. By them, the name *Pteris* must be retained for the larger, chiefly tropical group represented by *Pteris longifolia* L.

Not only the genus *Pteridium*, but its constituent species, have been slow of recognition, probably because of lack of attention to the excellent characters offered by the outer indusium, basal trichomes and pubescence. Instead of one cosmopolitan species, as so long supposed, it comprises at least six in different parts of the earth. Our bracken of the Manual region proves to be specifically distinct from

[1] Fl. Bermuda, 419 (1918).

the European in habit and characters of root-stock and indusium. Its distinctness was long ago recognized by Desvaux who gave it a name under *Pteris*. It should be known by the recently published combination, *Pteridium latiusculum* (Desv.) Maxon.

Scolopendrium.— In taking up the name *Phyllitis* for this genus, Christensen cited as its place of publication Ludwig, Instit., ed. 2. 142 (1757). Ludwig's description, however, is almost ludicrously inadequate, consisting of the single phrase "folio simplici" and applicable to the hart's-tongue rather than to any other simple-leaved fern only because of the mention under it of "*lingua cervina.*" *Phyllitis* was therefore rejected in the Manual and the well-published *Scolopendrium* Sm. (1793) substituted. It appears, however, that *Phyllitis* was well and properly published in Scopoli's Flora Carniolica (1760). It should be taken up, but with the author citation Gleditsch ex Scop. instead of Ludwig. Under *Phyllitis* the correct specific combination is *P. Scolopendrium* (L.) Newman, based on *Asplenium Scolopendrium* L.

It may be observed that, of the thirty changes here recorded, eighteen are purely nomenclatorial, due to the discovery of earlier names than those previously in use — a somewhat sad comment on the wisdom of the Brussels Congress in refusing to adopt a list of nomina conservanda in ferns.

In the following summary, the Manual names, arranged alphabetically and printed in italics, come first under each number. They are followed, immediately after the = sign, by the names to be substituted for them, printed in small capitals or, in the case of the few new combinations necessary, in bold-faced type. The accepted names are followed, in turn, by any needed synonymy in italics.

1. *Aspidium* Sw. (1801) = Thelypteris Schmidel, Icon. Pl. ed. 2, 45, pls. 10 and 13 (1762). *Dryopteris* Adans. Fam. Pl. ii. 20 (1763).

2. *Aspidium Boottii* = Thelypteris Boottii (Tuckerm.) Nieuwl. Am. Mid. Nat. i. 226 (1910).

3. *Aspidium cristatum* = Thelypteris cristata (L.) Nieuwl. l. c.

4. *Aspidium cristatum*, var. *Clintonianum* = Thelypteris cristata, var. **Clintoniana** (D. C. Eaton), n. comb. *Aspidium cristatum*, var. *Clintonianum* D. C. Eaton in Gray's Man. ed. 5, 665 (1867).

5. *Aspidium Filix-mas* = Thelypteris Filix-mas (L.) Nieuwl. l. c.

6. *Aspidium fragrans* = Thelypteris fragrans (L.) Nieuwl. l. c.

7. *Aspidium Goldianum* = Thelypteris Goldiana (Hook.) Nieuwl. l. c.

8. *Aspidium marginale* = Thelypteris marginalis (L.) Nieuwl. l. c.

9. *Aspidium noveboracense* = Thelypteris noveboracensis (L.) Nieuwl. l. c.

10. *Aspidium simulatum* = Thelypteris simulata (Davenp.) Nieuwl. l. c.

11. *Aspidium spinulosum* = Thelypteris spinulosa (O. F. Muell.) Nieuwl. l. c.

12. *Aspidium spinulosum*, var. *concordianum* = Thelypteris spinulosa, var. **concordiana** (Davenp.), n. comb. *Nephrodium spinulosum*, var. *concordianum* Davenp. Rhodora, vi. 33 (1904).

13. *Aspidium spinulosum*, var. *dilatatum*, f. *anadenium* = Thelypteris spinulosa, var. **americana** (Fisch.), n. comb. *Aspidium spinulosum americanum* Fisch. ex Kze. Am. Journ. Sci. ser. 2, vi. 84 (1848).

14. *Aspidium spinulosum*, var. *intermedium* = Thelypteris spinulosa, var. **intermedia** (Muhl.), n. comb. *Polypodium intermedium* Muhl. ex Willd. Sp. Pl. v. 262 (1810).

15. *Aspidium Thelypteris* = Thelypteris palustris Schott, Gen. Fil. note under pl. 10 (1834). *Acrostichum Thelypteris* L. Sp. Pl. 1071 (1753).

16. *Asplenium acrostichoides* = Athyrium acrostichoides (Sw.) Diels, Nat. Pfl. i. pt. 2, 223 (1899). *Athyrium acrosticoideum* Bory in Mérat, Fl. Paris, ed. 4, i. 471 (1836) is no bar to the use of the above combination, since it was merely a renaming of the earlier *Polypodium Leseblii* Mérat and therefore invalid from its inception, being a clear case of the so-called nomen abortivum.

17. *Asplenium angustifolium* = Athyrium angustifolium (Michx.) Milde, Bot. Zeit. (1866) 376. *Asplenium angustifolium* Michx. Fl. Bor. Am. ii. 265 (1803), not Jacq. Coll. i. 121 (1786). *Asplenium pycnocarpon* Spreng. Anleit. iii. 112 (1804). *Athyrium pycnocarpon* Tidestrom, Elys. Marianum, 36 (1906).

18. *Asplenium Filix-femina* = a. Athyrium angustum (Willd.) Presl, Rel. Haenk. i. 39 (1825). *Aspidium angustum* Willd. Sp. Pl. v. 277 (1810). b. Athyrium asplenioides (Michx.) Desv. Mém. Soc. Linn. Paris, vi. 266 (1827). *Nephrodium asplenioides* Michx. Fl. Bor. Am. ii. 268 (1803).

19. *Dicksonia punctilobula* = Dennstaedtia punctilobula (Michx.) Moore Ind. Fil. xcvii (1857).

20. *Onoclea Struthiopteris* = Pteretis nodulosa (Michx.) Nieuwl.

Am. Midland Nat. iv. 334 (1916). *Onoclea nodulosa* Michx. Fl. Bor. Am. ii. 272 (1803). *Onoclea Struthiopteris* and *Matteuccia Struthiopteris* Am. auth., not *Osmunda Struthiopteris* L.

21. *Osmunda regalis* = OSMUNDA REGALIS L., var. SPECTABILIS (Willd.) Gray, Man. ed. 2, 600 (1856). *Osmunda spectabilis* Willd. Sp. Pl. v. 98 (1810).

22. *Phegopteris Dryopteris* = THELYPTERIS DRYOPTERIS (L.) Slosson ex Rydb. Fl. Rocky Mts. 1044 (1917).

23. *Phegopteris hexagonoptera* = THELYPTERIS **hexagonoptera** (Michx.), n. comb. *Polypodium hexagonopterum* Michx. Fl. Bor. Am. ii. 271 (1803).

24. *Phegopteris polypodioides* = THELYPTERIS PHEGOPTERIS (L.) Slosson ex Rydb. Fl. Rocky Mts. 1043 (1917). *Polypodium Phegopteris* L. Sp. Pl. 1089 (1753).

25. *Phegopteris Robertiana* = THELYPTERIS ROBERTIANA (Hoffm.) Slosson ex Rydb. Fl. Rocky Mts. 1044 (1917).

26. *Pteris* = PTERIDIUM Gled. ex Scop. Fl. Carn. 169 (1760).

27. *Pteris aquilina* = PTERIDIUM LATIUSCULUM (Desv.) Maxon, Am. Fern Journ. ix. 43 (1919). *Pteris latiuscula* Desv. Mém. Soc. Linn. Paris vi. 303 (1827). *Pteris aquilina* and *Pteridium aquilinum* Am. auth., not *Pteris aquilina* L.

28. *Pteris aquilina*, var. *pseudocaudata* = PTERIDIUM LATIUSCULUM, var. PSEUDOCAUDATUM (Clute) Maxon, Am. Fern Journ. ix. 44 (1919).

29. *Scolopendrium* Sm. (1793) = PHYLLITIS Gled. ex Scop. Fl. Carn. 171 (1760).

30. *Scolopendrium vulgare* = PHYLLITIS SCOLOPENDRIUM (L.) Newman, Hist. Brit. Ferns, ed. 2, 10 (1844). *Asplenium Scolopendrium* L. Sp. Pl. 1079 (1753).

EAST HARTFORD, CONNECTICUT.

THE HISTORY OF THE POPULAR NAME "FLOWER DE LUCE" OR "FLEUR DE LIS" OF THE IRIS.

Theo. Holm.

While reading some descriptions of American wild flowers, published in the National Geographic Magazine (May, 1915), I came across some statements about the meaning of the popular name "fleur de lis" for the *Iris*, which was said to be a corruption of "fleur de Louis," the flower of Louis!" — Moreover it was stated that the iris, or blue flag, is really meant when one speaks of the lily of France.

Having had the opportunity recently to study the history of various old plant-names, I have found some notes relative to the real meaning of a name, that has always puzzled me, namely the "flower de luce" applied to the genus *Iris* by several of our leading botanisst, Gray, Torrey, Nuttall and others. It is true that the name "fleur de lis" is also, and not infrequently, applied to this plant, but as will be demonstrated in the following, "lis" is not a corruption of "Louis," and the word "luce," although in itself a corruption, is nearer than any of the others to give us the explanation.

The old French name for the lily (*Lilium*) is "lys"[1]; the more modern is "lis"; "fleur de lis" refers to the flower in the French coat of arms, and this emblem is believed to date back to Louis VII. However, the history of heraldry tells us that the actual figure, once explained as representing a lily-flower, does suggest interpretations of very different nature. For instance, the figure resembles the points of a spear; furthermore the figure has been explained as representing a bee, judging from the designs, poorly carved on the old tombstones. Last not least, the figure has been considered to represent the flower of the yellow iris of Europe, *Iris Pseudacorus*, of which the popular name, many years ago, was "fleur de Lys."

For many centuries the yellow *Iris* is known to have grown in abundance in Flanders on the shores of the river Lys, and the popular name dates back to the year 486, when the Francs left Flanders,

[1] Compare: Cannart-d'Hamale: Essai d'une histoire littéraire des Lis. (La Belgique horticole Vol. 1. Liège 1851, p. 199.)

their old home, to invade and conquer Gallia, and establish the kingdom of France. In commemoration of their birthplace the Francs selected this flower for their emblem. In other words "fleur de Lys" is an abbreviation of "fleur de la Lys" i. e. "de la rivière de la Lys."

Clinton, Maryland.

PHANEROTAENIA, A NEW GENUS OF UMBELLIFERAE.

Harold St. John.

A few scraps of an umbelliferous plant sent by a bee-keeper in Texas, have involved the writer in a study of the genus *Polytaenia*.[1] As now treated this consists of one species, *P. Nuttallii* DC., which ranges from Michigan, Iowa, and Kansas southward to Alabama and Texas. There is also the var. *texana* C. & R. from Texas and Oklahoma. *P. Nuttallii* has corky-thickened lateral wings, more prominent than the depressed back of the mericarp; conspicuous calyx-teeth; oil-tubes superficially indistinct, several in the intervals, in the corky wings, and 4–6 on the commissural side. The var. *texana* has thin lateral wings, not corky-thickened, and less prominent and thinner than the body of the mericarp, which is dark-lined by the large prominent oil-tubes; the calyx-teeth concealed in the emarginate tip of the mature fruit; oil-tubes single in the intervals and 2 on the commissural side. There are several other differences, in the shape of the fruit and the cutting of the leaves, but these are all of a varietal or specific nature. On the contrary, the differences in the structure of the fruits of these two plants are so fundamental that the two should be treated as distinct genera. The new description follows:

Phanerotaenia gen. nov. Calycis dentes 5 inconspicui in apice fructus summersi. Petala lineari-oblonga emarginata, praemature caduca. Stamina dorsifixa. Fructus obovatus emarginatus a dorso valde plano-compressus glaber; juga lateralia ampla tenuia aliformia;

[1] This genus was renamed as *Pleiotaenia* by Coulter and Rose, Contrib. U. S. Nat. Herb. xii. 447 (1909), because of the existence of *Polytaenium* Desv., Mém. Soc. Linn. Paris vi. 218 (1827), which antedates by two years *Polytaenia* DC., Mém. Ombell. 53 (1829). This change is not necessary under the International Rules, since *Polytaenia* and *Polytaenium* differ by two letters, even though they are of the same derivation. Internat. Rules Bot. Nomen. Sect. 7, Art. 57 (1906).

juga dorsalia filiformia obscura. Vittae conspicuae fuscae ad valleculas solitariae fructus partem seminiferam longitudine aequantes, vittae commissurales 2. Stylopodium ad anthesin cylindratum humile, ab fructu deest. Carpophorum liberum bipartitum. Semen complanatum.— Herba perennis. Folia omnia alterna ternatim decomposita. Umbellae terminales. Involucrum nullum. Bracteae involucellorum lineari-subulatae pedunculos aequantes.

Calyx 5-toothed, the teeth sunken and inconspicuous on the mature fruit. Petals linear-oblong, emarginate, quickly deciduous. Stamens dorsifixed. Fruit obovate, emarginate, strongly compressed dorsally, glabrous; with broad thin, wing-like lateral ribs; the dorsal ribs filiform, obscure. The intervals each with one large, dark-colored, conspicuous oil-tube, running the full length of the body of the mericarp; the commissural face with two oil-tubes. Stylopodium on young flowers low, cylindrical, wanting on the fruit. Carpophore free, two-cleft. Seed fat.— A perennial herb. Leaves all alternate, ternately dissected. Umbels terminal. Involucre none. Involucels linear-subulate, as long as the peduncles.

Phanerotaenia belongs in the *Peucedaneae* of Bentham and Hooker's and of Drude's treatment of the family. There are no related genera with which it could be confused. *Oxypolis, Sphenoscadium* and *Heracleum* all differ in having conical stylopodia, while *Phanerotaenia* has the stylopodium wanting on the mature fruit. *Eurytaenia* has a depressed stylopodium, 3-cleft or pinnately dissected involucels and involucral bracts, and pinnately dissected leaves, while *Phanerotaenia,* with no stylopodium on the mature fruit, has simple involucels, no involucral bracts, and ternately dissected leaves. *Lomatium* is acaulescent, has the lateral wings adherent till maturity, 1-∞ oil-tubes in the intervals and 2–10 on the commissural side, while *Phanerotaenia* is caulescent, has the lateral wings free before maturity, oil-tubes single in the intervals, and 2 on the commissural side. *Euryptera* is acaulescent or nearly so, has the fruit cordate or emarginate at base, the lateral wings coherent till maturity, the oil-tubes 1-∞ in the intervals, the leaflets broad or broad in outline, while *Phanerotaenia* is caulescent, has the fruit cuneate or rounded, not emarginate at base, the lateral wings free before maturity, the oil-tubes single in the intervals, and the leaflets bluntly serrate.

Phanerotaenia **texana** (C. & R.) n. comb. *Polytaenia Nuttallii* DC., var. *texana* C. & R., Contrib. U. S. Nat. Herb. vii. 192 (1900); *Pleiotaenia nuttallii texana* C. & R., Contrib. U. S. Nat. Herb. xii. 448 (1909). Caulescent perennial, rising from a deep tap-root, 5–10 dm.

tall: basal leaves one to several, short-petioled, 1–2 dm. long, once ternate and imperfectly pinnate, the segments broad, obtusely serrate, on broadly winged rhachises, glabrate, thick and oily to the touch: cauline leaves small, glabrate, and less dissected, but the segments similarly broad, obtusely serrate, and with broadly winged rhachises: umbels several, 6–16-rayed: fruit obovate, emarginate, 8–13 mm. long.— Texas and Oklahoma. TEXAS: near Industry, 1895, *H. Wurzlow* (TYPE in U. S. Nat. Herb.); San Antonio, 1882, *V. Havard,* no. 234; Kerrville, Kerr Co., June 25, 1894, *A. A. Heller,* no. 1,669; limestone hill near Bracken, Bexar Co., July 1, 1903, *B. H. A. Groth,* no. 36; 1848, *Charles Wright; Wright;* Austin, 1919, *G. A. Bahm;* Bexar Co., *G. Jermy;* wet prairie, Houston, June 16, 1872, *Elihu Hall,* no. 257; near Houston, May 6, 1899, *J. N. Rose,* no. 4,900; Enchanted Rock, Gillespie Co., *G. Jermy,* no. 138; Fort Chadbourne, 1856, *Dr. Swift;* wet soil, San Leon, June 6, 1915, *George L. Fisher,* no. 1,535. OKLAHOMA: Wichita Mountains, July 1852, *Marcy's Expedition;* Muskogee, April 25, 1891, *M. A. Carleton,* no. 56.

The writer is indebted to Mr. W. R. Maxon of the National Museum for the loan from the government collections of a series of specimens very helpful in clarifying the generic segregation here discussed.

GRAY HERBARIUM.

NYMPHOZANTHUS THE CORRECT NAME FOR THE COW LILIES.

M. L. FERNALD.

THE names of the water lilies have had an unfortunately disconcerting history, briefly summarized in RHODORA by Conard [1] who demonstrates that, after many decades of application to the white and pink water lilies, then a quarter-century of application to the cow lilies, the name *Nymphaea* really belongs, after all, to the white and pink water lilies to which it had so long and so appropriately been applied. Conard's most important reasoning, following an earlier discussion by Briquet,[2] was based on the fact that, long before others had generically separated the European white water lily, *Nymphaea alba* L., from the European cow lily, *N. lutea* L., Linnaeus himself made the

[1] Conard, RHODORA, xviii. 161–164 (1916).
[2] Briquet, Prodr. Fl. Corse, 577–599 (1910).

differentiation, in 1764 redefining[1] *Nymphaea* to include only *N. alba* and clearly to exclude *N. lutea.* This interpretation of *Nymphaea,* to cover only *N. alba* and its congeners, was also indorsed by Jussieu[2] sixteen years before the publication of *Castalia* by Salisbury.[3] It is thus clear that *Nymphaea* as emended by Linnaeus himself must stand for the later-published *Castalia.*

It is unfortunate, however, that, although we can go back with assurance to the long-established and most satisfactory use of the name *Nymphaea,* we cannot correctly take up again for the cow lilies the almost equally traditional name, *Nuphar.* To be sure, in his discussion of the subject Conard draws the comforting conclusion that "Smith was right, therefore, in retaining Nymphaea L. emend., for the white waterlilies, and restoring the old prelinnean name Nuphar for the cow-lily group. For this latter group had not previously received a valid generic name in postlinnean times." But, although citing Mr. James Britten's article[4] in which attention was definitely directed to L. C. Richard's name *Nymphozanthus*[5] and its clear priority over *Nuphar,*[6] Conard, it would seem, quite overlooked this essential fact, that *Nymphozanthus* was well published many months before Smith's genus *Nuphar. Nuphar,* as shown by Britten, did not appear until the very last of the year 1808 or the beginning of 1809, while *Nymphozanthus* was published in May, 1808. On page 63 of his *Analyse du Fruit* Richard spelled the name *Nymphozanthus,* on page 68, where it was formally proposed for the genus, he spelled it *Nymphosanthus,* and on page 103, in the index, he again spelled it with a *z.* That the second spelling may be considered a typographical error is evident from the fact that in his later publication on the genus, in 1811, Richard formally made the combination *Nymphozanthus vulgaris*[7] for *Nymphaea lutea* L. There seems no need, then, to perpetuate the spelling *Nymphosanthus* as some have done nor to change it to *Nymphoxanthus* as is done by Post & Kuntze[8] nor to *Nymphosanthos* as is done by Britten. That the name, however spelled, clearly antedates *Nuphar* has been sufficiently demonstrated.

[1] L. Gen. Pl. ed. 6, 264 (1764).
[2] Juss. Gen. Pl. 68 (1789).
[3] Salisb. in Kön. & Sims, Ann. Bot. ii. 71 (1805).
[4] J. Britten, Journ. Bot. xxvi. 7 (1888).
[5] L. C. Richard, Anal. du Fruit, 63, 68, 103 (May, 1808).
[6] Smith in Sibth. & Sm. Fl. Graec. Prodr. i. 361 (late 1808 or early 1809).
[7] L. C. Richard, Ann. Mus. Par. xvii. 230 — reprint 8 (1811).
[8] Post & Kuntze, Lex. Gen. Pl. 393 (1904).

It is interesting, however, that this fact was recognized by Desvaux in 1818, when, by clerical error apparently, he called the genus *Nymphanthus*[1] and called *Nymphaea lutea Nymphanthus europaeus*, with the comment: "Ces deux genres sont parfaitement distincts," etc., and again in 1827 when he corrected the name to *Nymphosanthus* with the note: "nous croyons que le nom de *Nymphosanthus* proposé by C. L. Richard est antérieur à celui de *Nuphar*."[2]

The status of the generic names of the cow lilies seems to be as follows.

NYMPHOZANTHUS L. C. Richard, Anal. du Fruit, 63, 68 (as *Nymphosanthus*), 103 (May, 1808); Ann. Mus. Par. xvii. 230 — reprint 8 (1811); Desv. Fl. de l'Anjou, 80 (1827).

Nymphaea L. Sp. Pl. i. 510 (1753), in part; Greene, Bull. Torr. Bot. Cl. xiv. 177–179, 257–258 (1887) and most subsequent authors; not L. Gen. Pl. ed. 6, 264 (1764), nor Juss. Gen. Pl. 68 (1789).

Nuphar Sm. in Sibth. & Sm. Fl. Graec. Prodr. i. 361 (late 1808 or early 1809).

Nenuphar Hayne, Getreue Darstel. und Beschreib. Arzneik. iv. t. 36 (1816).

Nymphanthus Desv. Obs. Pl. Angers, 83 (1818).

Clairvillea Hegetschweil. in Labram & Hegetschweil. Samml. Schweiz. Pflanz. t. 21 (1826–1834).

Blepharia Sm. Mem. & Corr. i. 576 (1832).

Rophalon Raf. New Fl. N. Am. ii. 17 (1836).

Nenufar Peterm. Fl. Lips. 396 (1838).

Nufar Wallr. Erst. Beitr. Fl. Hercyn. 212 (1840) and in Linnaea, xiv. 582 (1840).

Nyphar Walp. Rep. i. 108 (1842).

Nymphona Bubani, Fl. Pyr. iii. 260 (1901).

The principal species[3] of *Nymphozanthus*, chronologically arranged, are the following:

NYMPHOZANTHUS **luteus** (L.), n. comb. *Nymphaea lutea* L. Sp. Pl. i. 510 (1753)— misprinted *N.* "*lusea.*" *Nymphaea umbilicalis* Salisb. in Kön. & Sims, Ann. of Bot. ii. 71 (1805). *Nuphar lutea* (L.) Sm. in Sibth. & Sm. Fl. Graec. Prodr. i. 361 (late 1808 or early 1809). *Nymphozanthus vulgaris* L. C. Richard, Ann. Mus. Par. xvii. 230 — repr.

[1] Desv. Obs. Pl. Angers, 83 (1818).

[2] Desv. Fl. de l'Anjou, 80 (1827).

[3] The writer has seen no material of several recently proposed species which he consequently omits from the present enumeration.

8 (1811). *Nenuphar lutea* (L.) Hayne, Getreue Darstel. und Beschreib. Arzneik. iv. t. 36 (1816). *Nymphanthus europaeus* Desv. Obs. Pl. Angers, 84 (1818). *Clairvillea lutea* (L.) Hegetschweil. in Labram & Hegetschweil. Samml. Schweiz. Pflanz. t. 21 (1826–1834). *Nymphosanthus europaeus* Desv. Fl. de l'Anjou, 80 (1827). *Nufar systylum* Wallr. Erst. Beitr. Fl. Hercyn. 212 (1840) and in Linnaea, xiv. 582 (1840). *Nyphar luteum* (L.) Walp. Rep. i. 108 (1842). *Nymphona lutea* (L.) Bub. Fl. Pyr. iii. 260 (1901).— Eurasia.

Nymphoz. **sagittifolius** (Walt.), n. comb. *Nymphaea sagittifolia* Walt. Fl. Carol. 155 (1788). For further synonymy see Miller & Standley, Contrib. U. S. Nat. Herb. xvi. 95 (1912).— North America.

Nymphoz. **advena** (Ait.), n. comb. *Nymphaea advena* Ait. Hort. Kew. ii. 226 (1789). *Nymphaea arifolia* Salisb. in Kön. & Sims, Ann. Bot. ii. 71 (1805). *Nuphar advena* (Ait.) Ait. f. Hort. Kew. ed. 2, iii. 295 (1811). *Nenuphar advena* (Ait.) Link, Enum. Hort. Berol. ii. 70 (1822). *Nuphar advena β. tomentosa* Torr. & Gray, Fl. N. Am. i. 58 (1838), fide Miller & Standley, Contrib. U. S. Nat. Herb. xvi. 89 (1912). *Nuphar tomentosa* Nutt. ex Torr. & Gray, l. c. (1838). *Nyphar advena* (Ait.) Walp. Rep. i. 108 (1842). *Nuphar americana* Provancher, Fl. Canad. i. 28 (1862), a substitute for the inappropriate name, *N. advena* — see Fernald & St. John, Rhodora, xvi. 138–141 (1914).— North America.

Nymphoz. advena, var. **macrophyllus** (Small), n. comb. *Nymphaea macrophylla* Small, Bull. Torr. Bot. Cl. xxv. 465 (1898). *Nymphaea advena macrophylla* (Small) Miller & Standley, Contrib. U. S. Nat. Herb. xvi. 89 (1912).— North America.

Nymphoz. **pumilus** (Timm), n. comb. *Nymphaea lutea β. pumila* Timm, Mag. für Naturk. Meckl. ii. 256 (1792). *Nymph. lutea β. N. minima* Willd. Sp. Pl. ii. 1151 (1799). *Nymph. pumila* (Timm) Hoffm. Deutschl. Fl. ed. 2, 1, pt. 1, 241 (1800). *Nuphar minima* (Willd.) Sm. Engl. Bot. xxxii. t. 2292 (1811). *Nymph. minima* Willd. Enum. Hort. Bot. Berol. Suppl. 38 (1813). *Nenuphar minimum* (Willd.) Link, Enum. Hort. Berol. ii. 70 (1822). *Nenuphar pumila* (Timm) Bluff & Fingerh. Consp. Fl. Germ. i. 705 (1825). *Nyphar pumilum* (Timm) Walp. Rep. i. 108 (1842).— Eurasia.

Nymphoz. **microphyllus** (Pers.), n. comb. *Nymphaea lutea* L. Sp. Pl. i. 510 (1753), as to Kalm plant only. *Nymph. lutea β. Kalmiana* Michx. Fl. Bor.-Am. i. 311 (1803), in large part. *Nymph. microphylla* Pers. Syn. ii. 63 (1807). *Nymph. Kalmiana* (Michx.) Sims in Curt. Bot. Mag. t. 1243 (1809). *Nuphar Kalmiana* (Michx.) Ait. f. Hort. Kew. ed. 2, iii. 295 (1811). *Nuphar lutea β. Kalmiana* (Michx.) Torr. & Gray, Fl. N. A. i. 58 (1838). *Nyphar luteum β. Kalmianum* (Michx.) Walp. Rep. i. 108 (1842). *Nuphar microphyllum* (Pers.) Fernald, Rhodora, xix. 111 (1917).— North America.

The material in the Michaux herbarium shows 2 sheets of his *Nymphaea lutea β Kalmiana*. One contains material from "Rivièrre Chicoutoumé" and from "Lac Champlain" and is the plant usually identified as *Nuphar Kalmianum* or *Nymphaea microphylla.* The second sheet, from "Rivièrre Chicoutoumé" is the plant later described as *Nuphar rubrodiscum* by Morong.

Nymphoz. **japonicus** (DC.), n. comb. *Nymphaea lutea* Thunb. Fl. Jap. 223 (1784), excl. syn., not L. *Nuphar japonica* DC. Syst. ii. 62 (1821). *Nymphaea japonica* (DC.) Kuntze, Rev. Gen. 12 (1891).— Asia.

Nymphoz. **sericeus** (Lang), n. comb. *Nuphar sericeum* Lang in Syll. Ratisb. i. 180 (1824). — Europe.

Nymphoz. **intermedius** (Ledeb.), n. comb. *Nuphar intermedium* Ledeb. Fl. Alt. ii. 274 (1830). *Nyphar intermedium* (Ledeb.) Walp. Rep. i. 108 (1842). — Eurasia.

Nymphoz. **polysepalus** (Engelm.), n. comb. *Nuphar polysepalum* Engelm. Trans. Acad. St. Louis, ii. 283 (1865). *Nymphaea polysepala* (Engelm.) Greene, Bull. Torr. Bot. Cl. xv. 84 (1888).— North America.

Nymphoz. **subintegerrimus** (Casp.), n. comb. *Nuphar japonicum,* var. *subintegerrimum* Casp. in Miq. Ann. Mus. Bot. Lugd.-Bat. ii. 254, t. 8, figs. 1–10 (1865–66). *N. subintegerrimum* (Casp.) Makino, Bot. Mag., Tokyo, xxiv. 141 (1910). — Asia.

Nymphoz. **variegatus** (Engelm.), n. comb. *Nuphar variegatum* Engelm. according to Durand in Ann. Rep. Univ. N. Y. xix. 73 (1866). *Nuphar advena,* var. *variegatum* Engelm. in Gray, Man. ed. 5, 57 (1867). *Nymphaea variegata* (Engelm.) G. S. Miller, Proc. Biol. Soc. Wash. xv. 13 (1902). *Nymph. advena,* var. *variegata* (Engelm.) Fernald, Rhodora, x. 49 (1908). *Nymph. americana* Miller & Standley, Contrib. U. S. Nat. Herb. xvi. 78, (1912), as to plant, hardly *Nuphar americana* Provancher, Fl. Canad. 28 (1862) — see Fernald & St. John, Rhodora, xvi. 138–141 (1914). — North America.

Nymphoz. **rubrodiscus** (Morong), n. comb. *Nymphaea lutea* β. *Kalmiana* Michx. Fl. Bor.-Am. i. 311 (1803), in part. *Nuphar advena,* var. *hybrida* Peck, Ann. Rep. N. Y. Mus. Nat. Hist. xxxiv. 53 (1881). *Nuphar advena,* var. (?) *minor* Morong, Bot. Gaz. xi. 167 (1886). *Nuphar rubrodiscum* Morong, l. c. (1886). *Nymphaea rubrodisca* (Morong) Greene, Bull. Torr. Bot. Cl. xv. 84 (1888). *Nymph. Fletcheri* Lawson, Proc. and Trans. Roy. Soc. Can. sect. 4, vi. 119 (1888). *Nymph. hybrida* Peck. Bull. N. Y. State Mus. vi. 75 (1899).— North America. Often considered a fertile hybrid of *N. microphyllus* and *N. variegatus.*

Morong's *Nuphar advena* var. (?) *minor* was based solely on "Specimens without leaves. . .in Herb. Gray," but with flower and fruits which Morong described, with the final statement: "They are labelled 'Smith's Pond, Herkimer Co., Litchfield, New York.' Further material is very desirable." But Miller & Standley cite the name of this variety in the synonymy of their *Nymphaea americana* (*Nymphoz. variegatus*) and in the synonymy of *Nymphaea rubrodisca* say: "*Nuphar advena minus* Wats. & Coult. in A. Gray, Man. ed. 6, 56. 1889, not Morong." Nevertheless, they correctly cite under *Nymphaea rubrodisca* the Gray material from Smith's Pond, Herkimer Co. It should be obvious, since this material was the sole basis of Morong's *Nuphar advena*, var. (?) *minor*, that his variety is correctly referred to *Nymphozanthus rubrodiscus.*

Nymphoz. **affinis** (Harz), n. comb. *Nuphar affine* Harz, Bot. Centralb. liii. 224 (1893). *Nymphaea affinis* (Harz) Hayek, Fl. Steierm. i. 437 (1908). *Nymphaea lutea*, var. *affinis* (Harz) Schuster, Bull. Herb. Boiss. sér. 2, viii. 69 (1908).— Europe.

Nymphoz. **juranus** (Magnin), n. comb. *Nuphar juranum* Magnin, Ann. Soc. Bot. Lyon, xix. 1893–94, Compt. Rend. 5 (1894).— Europe.

Nymphoz. **orbiculatus** (Small), n. comb. *Nymphaea orbiculata* Small, Bull. Torr. Bot. Cl. xxiii. 128 (1896).— North America.

Nymphoz. **centricavatus** (Schuster), n. comb. *Nuphar centricavatum* Schuster, Allgem. Bot. Zeitschr. xi. 145 (1905).— Europe.

Nymphoz. **fluviatilis** (Harper), n. comb. *Nymphaea fluviatilis* Harper, Bull. Torr. Bot. Cl. xxxiii. 234 (1906).— North America.

Nymphoz. **bombycinus** (Miller & Standley), n. comb. *Nymphaea bombycina* Miller & Standley, Contrib. U. S. Nat. Herb. xvi. 102, t. 42 F and 45 B (1912).— North America.

Gray Herbarium.

Deam's Trees of Indiana.[1]— When the first edition of the report of the Indiana State Board of Forestry for 1911 was issued, the Board had the foresight to plate that part of it relating to the trees of Indiana. Since the original edition of 10,000 copies is now exhausted, it has been possible for Mr. Deam to publish a revision of his excellent report, with numerous corrections and additional notes, largely based on the results of his own thorough study of the Indiana flora. Probably no American botanist covers more of his chosen field in the course of one season than Mr. Deam. His automobile, fitted up as residence and laboratory, takes him to every corner of the State, and enables him to keep his large private herbarium fully representative of the State flora. His appointment as State Forester has given him especial opportunity to prosecute his studies in what has always been his

[1] The Trees of Indiana. By Chas. C. Deam. Bulletin No. 3, State Board of Forestry of Indiana. Indianapolis, March, 1919. p. 299.

favorite group. The present revision is an admirable example of popular treatment which does not sacrifice essential scientific accuracy. In all, 125 species are described, representing 49 genera in 28 families. The term "tree" is interpreted as including all woody plants that usually attain a diameter of 10–15 cm. — an arbitrary division that will not always prove satisfactory, since *Hamamelis virginiana, Euonymus atropurpureus* and *Kalmia latifolia* would seem to have at least as much right to be represented as *Ilex decidua* or *Cornus alternifolia*. *Crataegus* heads the list with 18 species (as might have been expected when it is explained that the genus was revised for this work by Eggleston!) and *Quercus* is a close second with 17. No less than 15 species which have been referred to Indiana are rejected as unconfirmed. Confirmation of included species is made by simple citation of collector and county of collection, without herbarium numbers, dates, or place of deposit. Each species is given a simple and untechnical description, followed by a discussion of its distribution, economic uses, and horticultural value; and each is illustrated by a careful drawing, showing a leafy branch with fruit or flowers, or both together. The solitary photograph of *Fraxinus Michauxii* makes us wish that the general habit of other species might have been illustrated in the same way. Two valuable tables are added, one showing the specific gravity of the wood of each species (ranging from 0.8372 for *Hicoria ovata* to 0.3164 for *Thuja occidentalis*), and the other giving measurements of 49 species, showing *Platanus occidentalis* ranking first in circumference (maximum 48 ft.) and *Liriodendron Tulipifera* in height (190 ft.). A map of the State is added to make the distribution more clear. The key to the families is constructed without regard to floral characters, and is based primarily on the leaves, so that all natural relationships are lost to view, as in Dr. Mosher's recent study of the Grasses of Illinois. Doubtless the popular appeal of these manuals is intensified by these unscientific keys, but it is an open question whether systematic accuracy has not been sacrificed to ease of determination.

The author makes a praiseworthy attempt to attach definite meanings to the terms ordinarily used to express degree of frequency, which have been sadly lacking in scientific precision. He suggests the following scale: "Very common," more than 25 trees to the acre; "common," 5–25 trees to the acre; "frequent," 1–5 trees to the acre; "infrequent," 1 tree to 2–10 acres; "rare," 1 tree to every 11–100 acres; "very rare," 1 tree to more than 100 acres; "local," when the distribution is circumscribed or in spots. While this is of course wholly arbitrary, it is at least a step in the right direction.

The nomenclature is said by the author to conform "to that of the United States Forest Service", which means that the provinciality of the so-called "American" Code is unfortunately perpetuated. Accordingly, we are treated to such absurdities as *Catalpa Catalpa* and *Sassafras Sassafras*, while substitutions such as *Hicoria* for *Carya* and *Forestiera* for *Adelia* are maintained. Some "splitting" of families not in accordance with Gray's Manual is observed, such as the separation of Ulmaceae and Moraceae from Urticaceae, Malaceae and Amygdalaceae from Rosaceae, and Caesalpinaceae from Leguminosae. *Liquidambar* is placed in Altingiaceae, and *Aesculus* in Aesculaceae. *Malus* is separated from *Pyrus*, and *Padus* from *Prunus*. The genus *Cynoxylon* is revived for *Cornus florida*.

Betula papyrifera Marsh. is recognized as of specific rank, instead of being treated as a variety of *B. alba*. *Celtis pumila* (Muhl.) Pursh seems hardly worth specific rank. Michaux's *Acer nigrum*, reduced by Britton to a variety of *A. saccharum*, is restored to the rank of a species. *Fraxinus Michauxii* Britt., although no synonymy is cited, seems to replace *F. profunda* Bush. Eggleston's treatment of *Crataegus* shows several departures from the views set forth in his exposition of this genus in the last edition of Gray's Manual, and makes us wonder if this much-tortured group is ever going to return to stable conditions. *C. pausiaca* Ashe is replaced by *C. cuneiformis* (Marsh.) Eggleston; *C. macracantha* Lodd. var. *succulenta* (Schrad.) Eggleston is raised to specific rank; *C. deltoidea* Ashe is replaced by *C. rugosa* Ashe; *C. coccinea* L. var. *oligandra* Torr. & Gr. becomes *C. Gattingeri* Ashe; *C. coccinea* L. seems to be regarded as identical with *C. pedicellata* Sarg., and we are left in doubt as to what name should now be given to the *C. coccinea* of the Manual; and two species not mentioned in the Manual, *C. neo-fluvialis* Ashe and *C. Calpodendron* (Ehrh.) Medic., make their appearance.

A few errors in the citation of authors are noted. *Ostrya virginiana* (Mill.) K. Koch is cited as a synonym of *O. virginiana* (Mill.) Willd.; but Willdenow's name for the species seems to have been *virginica*. *Betula lutea* is ascribed to the elder rather than the younger Michaux, and in the same way *Cornus alternifolia* to the elder instead of the younger Linnaeus. *Alnus incana* is credited to Muenchhausen, perhaps from confusion of the abbreviation "Muench." with the name Moench. *Quercus palustris* is credited to DuRoi instead of Muenchhausen. *Toxylon pomiferum* was never given valid publication by Rafinesque, and the adherents of the "American" Code would if consistent have to use the name *Ioxylon*. The accent of scientific names is indicated by the use of grave and acute accents, as in Gray's Manual; but the following names of genera: *Liriodendron, Robinia, Aesculus, Tilia, Nyssa, Diospyros;* and of species: *lucida* (p. 39), *heterophylla* (pp. 47, 242), *ovata* (p. 62), *fulva* (p. 137), *velutina* (p. 127), *Michauxii* (p. 259), remain unmarked. An attempt has been made to indicate the etymology of generic names; but out of 49 genera only 22 are so explained, and some of these derivations are decidedly suspicious. The apparent relation between *Populus* and the Latin *populus*, the common people, is wholly deceptive, as also between *Acer* and *acer*, sharp. The attempt to show a "Celtic" origin for such classical Latin words as *Salix, Quercus, Carpinus, Betula* and *Alnus* seems to be based more on unsupported theory than demonstrated fact. *Ostrya* is said to be "from the Greek ostreon, a scale or shell, in allusion to the fruit"; but ὄστρεον means oyster, and the Greek word for the hornbeam is ὀστρύα. *Morus* is "from the Greek morea, the mulberry." The two are probably cognate, but neither one is "from" the other. *Viburnum* is said to be "from the Latin, meaning the wayfaring" [sic]. The origin is much in doubt, but the derivation from *viere*, to plait, seems a possibility. The spelling Simaroubaceae hardly seems in accord with the best usage. *Larix laricina* appears as "laricia" in the title to the plate on p. 27.

On the whole, the book is unusually free from typographical errors, and presents an attractive appearance. It will be welcomed by every lover of our native trees, and could be used to great advantage as a text-book in the schools. Mr. Deam has rendered a distinct service to dendrology by reissuing his admirable bulletin; and the data which he has painstakingly gathered will become more and more valuable as the process of deforestation of our native woodlands goes on.— J. C. Nelson, Salem, Oregon.

Field Meeting of the Vermont Botanical Club.—The Vermont Botanical Club held its annual field meeting this year at North Hero on Lake Champlain, August 5–6, conjointly with the Vermont Bird Club. Thirty members were present, which is a very good attendance.

On the 5th trips were made to Pelot's Bay and to a smaller bay opening out of it, both being rich in water-weeds of various sorts, such as Potamogetons, Myriophyllums, etc. Here were found *Potamogeton heterophyllus, P. zosterifolius, P. dimorphus, P. Richardsonii, P. perfoliatus, Myriophyllum spicatum, M. alterniflorum,* and the stiff White Water Crowfoot, *Ranunculus circinatus.* On the muddy shores were several species of sedges, *Scirpus validus, S. heterochaetus,* and *S. occidentalis* being among the number.

The morning of the 6th was rainy, but in the afternoon a trip was made to "The Gut," as the passage between North and South Hero Islands is called. The Moonseed, *Menispermum canadense,* and the Sanicle, *Sanicula trifoliata,* among a host of other plants, were growing in the woods bordering the Lake, and on its muddy shore were found the Water Pimpernel, *Ilysanthes dubia,* the Creeping *Eragrostis, E. hypnoides,* the Arrowheads, *Sagittaria arifolia* and *S. graminea,* and best of all the Waterwort, *Elatine americana,* new to the state, and the little *Littorella uniflora,* for which this is the fourth station in the state. These were certainly good finds for one afternoon.

Owing to the war and the prevalence of influenza the Club has held no winter meeting since 1917 and as the summer meetings of 1917 and 1918 have not been reported in Rhodora perhaps its readers will be interested in a few words about them.

The meeting of 1917 was held at Mt. Mansfield on July 1st with a good attendance. The summit was explored and though nothing new can be reported, such plants as *Diapensia lapponica, Vaccinium Vitis-Idaea* var. *minus, V. pennsylvanicum* var. *angustifolium, V. caespitosum,* and *V. uliginosum,* as well as some of the mountain sedges and grasses, as for instance *Carex brunnescens, C. paupercula* var. *pallens,* and *Hierochloë alpina,* were found in good condition and proved interesting to all.

One day was devoted to a tramp by the Long Trail to Smuggler's Notch, where on the cliffs on both sides grow such rare plants as *Saxifraga Aizoon, S. aizoides, S. oppositifolia, Woodsia glabella, W. alpina, Asplenium viride, Festuca ovina* var. *brevifolia,* and, at Big Spring, which pours forth as a small brook, was found *Listera convallarioides.* In passing it may be said that *Aspidium fragrans* grows near the summit.

The summer meeting of 1918 was held at Wilmington early in July. It rained much of the time, but some collecting was done, the most notable finds being the Arrow Arum, *Peltandra virginica,* growing at Lake Sadawga in Whitingham. There were floating islands in this lake but no boats available to reach them, so it was necessary to be content with one still anchored to shore. Here, in addition to the *Peltandra,* were all the orchids, sedges, heaths, and other plants common to our sphagnum-swamps.

One day was given to climbing Haystack Mountain, but out of a wealth of vegetation nothing new to the state was found unless by the blackberry specialists, who may have a word to say on that point, as a bulletin on the group will soon be issued by the University of Vermont.

The next winter meeting will be held at Burlington, probably in the latter part of January. For the summer meeting of 1920 many members of the Club are in favor of the Averil Lakes in Essex County, a region that has been very little if at all explored botanically.— (Mrs.) Nellie F. Flynn, Burlington, Vermont.

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Rhodora

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RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price, *$1.50* per year (domestic and foreign); single copies 15 cents. Prices of Volumes 1 and 2 (1899 and 1900) on application. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

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LOMATOGONIUM THE CORRECT NAME FOR PLEUROGYNE.

M. L. Fernald.

The name *Pleurogyne* has become so fixed in the literature of northern and alpine floras that it is disconcerting to discover that it is clearly antedated by *Lomatogonium*. There is, however, a degree of satisfaction in the fact that, while the generic name *Pleurogyne* had a very irregular genesis, *Lomatogonium* was carefully and properly published as a genus. Briefly, the situation is as follows. In 1826, Chamisso & Schlechtendal, in enumerating the species of *Gentiana* collected by the Romanzoff expedition, divided that genus into four sections, indicated respectively by 1, 2, 3 and 4 asterisks. The fourth section was

"**** *Corolla rotata 4-5 fida, faux breviter fimbriata, stigmata duo utrinque longitudinaliter ovario adnata (suturae valvularum s. spermophoro insidentia). Genus Pleurogyna Eschsch. in litt.*"[1]

Then follow the species: *Gentiana rotata,* based upon *Swertia rotata* L.; *Gentiana Stelleriana,* based upon Steller material from eastern Asia and upon the *Swertia rotata* of Pallas, not of Linnaeus; and *Gentiana carinthiaca,* based upon *Swertia carinthiaca* Wulfen.

In 1830, Alexander Braun, in an article entitled "*Lomatogonium; ein neues Genus für Gentiana carinthiaca Froehl.,*"[2] formally established the genus *Lomatogonium,* clearly differentiating it from both *Gentiana* and *Swertia;* and in the next year, 1831, Reichenbach took up *Lomato-*

[1] Cham. & Schl. Linnaea, i. 187 (1826).
[2] A. Br. Flora, xiii. 221 (1830).

gonium and made the combination, *L. carinthiacum*.[1] In 1836, however, Grisebach, in his preliminary publication upon the *Gentianaceae*, instead of adopting the properly published *Lomatogonium*, took up for the genus the Eschscholtz name but modified to *Pleurogyne*,[2] ascribing it to Eschscholtz and citing *Lomatogonium* as a synonym; and this name was later used by Grisebach in his more extended work.[3] And, although the original form of the name, *Pleurogyna*, was preferred by George Don[4] and has been adopted in *Index Kewensis*, the name *Pleurogyne* has been in general use up to the present time. In the same year, 1836, that Grisebach formally put forward *Pleurogyne* as a genus, Rafinesque published *Narketis*,[5] based upon *Swertia rotata*, *Gentiana carinthiaca*, etc. But, since *Pleurogyna* was published by Chamisso & Schlechtendal only as a synonym for a section of *Gentiana* and consequently, as Professor Briquet says in a letter to the present writer, "must be considered as a *genus non rite publicatum*," and since neither *Pleurogyne* nor *Narketis* were published as generic names until 1836, it should be clear that the first properly published name for the genus is *Lomatogonium* A. Br. (1830).

The correct bibliography of the genus seems to be, then

Lomatogonium A. Br. Flora, xiii. 221 (1830); Reichenb. Fl. Germ. Excurs. 421 (1831); Kostel. All. Med.-Pharm. Fl. iii. 1047 (1834).

Pleurogyna Eschsch., published as a synonym for a section of *Gentiana* and ascribed to Eschscholtz by Chamisso & Schlechtendal, Linnaea, i. 187 (1826); first taken up as a genus by G. Don, Gen. Syst. iv. 188 (1837).

Pleurogyne Eschsch. ex Griseb. Observ. Gent. 31 (1836) and Gen. et Sp. Gent. 309 (1839).

Narketis Raf. Fl. Tell. iii. 26 (1836).

In North America there is a single polymorphous, boreal species, *Lomatogonium rotatum* (L.) Fries, the synonymy of which follows.

Lomatogonium rotatum (L.) Fries ex Nyman, Consp. Fl. Eur. iii. 500 (1881). *Swertia rotata* L. Sp. Pl. i. 226 (1753). *S. sulcata* Rottb. Act. Hafn. x. 438, t. 1, fig. 4 (1770). *Gentiana rotata* (L.) Froel. Gent. 105 (1796). *G. sulcata* (Rottb.) Willd. Sp. Pl. i. 1351 (1798).

[1] Reichenb. Fl. Germ. Excurs. 421 (1831).
[2] Griseb. Observ. Gent. 31 (1836).
[3] Griseb. Gen. et Sp. Gent. 309 (1839).
[4] G. Don, Gen. Syst. iv. 188 (1837).
[5] Raf. Fl. Tell. iii. 26 (1836).

S. pisilla Pursh, Fl. Am. Sept. i. 101 (1814). *L. sulcatum* (Rottb.) Reichenb. ex Kostel. All. Med.-Pharm. Fl. iii. 1048 (1834). *Narketis rotata* (L.) Raf. Fl. Tell. iii. 26 (1836). *N. hyperborea* Raf. l. c. (1836). *Pleurogyna sulcata* (Rottb.) G. Don, Gen. Syst. iv. 188 (1837). *Pleurogyne rotata* (L.) Griseb. Gen. et Sp. Gent. 309 (1839). *P. Purshii* Steud. Nom. ed. 2, ii. 355 (1841). *P. carinthiaca*, var. *pusilla* (Pursh) Gray, Syn. Fl. N. A. ii. pt. 1, 124 (1878). *P. fontana* A. Nels. Proc. Biol. Soc. Wash. xvii. 177 (1904).

The plant of eastern America,— southwestern Greenland, southern Labrador, Newfoundland and eastern Quebec[1]— is extremely variable. Some individuals beautifully match Gmelin's plate[2] of the Siberian plant originally taken up by Linnaeus as *Swertia rotata*, a plant with lance-attenuate leaves and calyx-segments. Others, the majority, have the blunter, more oblong-lanceolate leaves of *Pleurogyne rotata*, var. *americana* Griseb;[3] while more extreme individuals have the leaves and sometimes the calyx-segments oval and quite obtuse. These extremes, often occurring in the same colonies and connected by abundant transitional specimens, are not varietally distinct but at most can be recognized merely as somewhat striking forms.

Neither does it seem possible to distinguish clearly *Pleurogyne rotata*, var. *tenuifolia* Griseb.,[4] which is apparently identical with *P. fontana* A. Nelson.[5] The latter plant is usually taller and more fastigiate than the maritime individuals and it has more slender leaves and calyx-segments. Nelson argues, furthermore, that it cannot be *P. rotata* because "That species seems to skirt the northern boundary of the continent, from Labrador and Greenland to Alaska," while "*P. fontana* seems to be closely circumscribed, being probably confined to north central Colorado and the adajcent border of Wyoming." He further says that "the most obvious difference is the different arrangement of the leaves; *P. fontana* being relatively naked below while in *P. rotata* the leaves are crowded or even rosulate at base."

Now, looking into these characters in the order of their importance, we find that of 42 individuals seen from Colorado and Wyoming 14

[1] Pursh's *Swertia pusilla* was said by him to come from "the alpine regions of the White-hills of New Hampshire. . . . In the Banksian Museum are specimens from Labrador, in every respect agreeing with the New Hampshire plant." But no material of Pursh's plant from New Hampshire is known nor is it probable that the plant occurs southwest of the lower St. Lawrence. There it is confined to brackish sands or springy borders of saline marshes.

[2] Gmel. Fl. Sib. iv. t. liii, fig. 1 (1769).

[3] Griseb. Gen. et Sp. Gent. 309 (1839).

[4] Griseb. l. c. (1839).

[5] A. Nelson, Proc. Biol. Soc. Wash. xvii. 177 (1904).

show rosulate basal leaves, while of the 210 individuals in the Gray Herbarium from Scandinavia, Siberia, Alaska, and from Greenland to Newfoundland and the Magdalen Islands fully one-third lack such rosulate foliage; and, incidentally, the Gmelin plate shows the original Siberian material naked at base. Although, as already stated, the plant of Colorado and Wyoming, as well as of Alberta and Manitoba, is inclined to be taller and more fastigiate and to have more slender leaves and calyx-segments than most other material, it would be most difficult to distinguish plants from Como, Colorado (coll. *Hughes*) with lanceolate leaves from Gmelin's plate or from many specimens from Labrador, Anticosti or Gaspé, while the more extreme Rocky Mountain plant is well matched by a specimen sent out by Besser from Irkutsk on the Angara River entering Lake Baikal in Siberia. The occurrence of this extreme form with linear leaves near the mouth of Angara River is significant, since Gmelin, who illustrated a broader-leaved individual, said of the original collection of *P. rotata* "Planta haec in palustribus ad ANGARAE fluvui ostium in lacum *Baical* et deinceps *Bargusini* occurrens" (Gmel. l. c. 112). In other words, *P. fontana*, although the more general form in the Rocky Mountains, is also found in the type-region of *P. rotata*. The anthers of many Colorado specimens are longer than those of many maritime or more boreal plants, but some Colorado plants show small anthers; and some plants from about the Gulf of St. Lawrence, differing in no other character from the plants with small anthers, have anthers quite as long as in the more extreme Rocky Mountain individuals. The writer is, therefore, unable to keep apart even varietally the Rocky Mountain plant.

Nelson (and others before him), in supposing *Pleurogyne rotata* (or *Lomatogonium rotatum*) "to skirt the northern boundary of the continent, from Labrador and Greenland to Alaska," makes a considerable assumption. Outside Colorado and adajcent Wyoming the species is definitely known in America from southwestern Greenland, southeastern Labrador, Newfoundland and eastern Quebec (south to the Magdalen Islands); on the southwest shores of Hudson Bay in Keewatin, thence locally across Manitoba and Saskatchewan to Alberta, and somewhere on the Mackenzie; and from southern and western Alaska into Siberia. In other words, we have no definite knowledge that *L. rotatum* skirts "the northern boundary of the continent from Labrador. . . to Alaska," for east of an indefinite station on the Mackenzie, its northernmost stations seem to be Hopedale, Labrador (lat. 55° 27′), Churchill, Keewatin (lat. 58° 40′) and Edmonton Alberta (lat. 53° 30′).

The forms of *Lomatogonium rotatum* may be designated as follows.

Lomatogonium rotatum (L.) Fries, forma **typicum.** *Swertia rotata* L. Sp. Pl. i. 226 (1753).— Leaves and calyx-segments lanceolate or lance-linear, acuminate.

L. rotatum, forma **americanum** (Griseb.), n. comb. *Pleurogyne rotata, γ americana* Griseb. Gen. et Sp. Gent. 309 (1839).— Leaves and calyx-segments oblong or oblong-lanceolate, bluntish.

L. rotatum, forma **ovalifolium**, n. f., foliis laciniis calycisque ovalibus vel ovato-oblongis obtusis. Type from Magdalen Islands: grassy bank near shore, Amherst Island, August 25, 1914, *St. John*, no. 1970 (herb. Gray).

L. rotatum, forma **tenuifolium** (Griseb.), n. comb. *Pleurogyne rotata, β. tenuifolia* Griseb. l. c. (1839). *P. fontana* A. Nelson, Proc. Biol. Soc. Wash. xvii. 177 (1904).— Leaves and calyx-segments linear-attenuate.

Many species have been described, chiefly from Asia, while only one species besides *L. rotatum* is known in Europe and a single species on Madagascar. Several of the proposed Asiatic species seem to be minor variants rather than true species and some, naturally, are now considered quite inseparable from earlier-described species. So far as the writer has been able to recognize the species they are as follows; but fuller material will doubtless show that several recently proposed species with which he is unfamiliar are to be recognized.

Lomatogonium rotatum (L.) Fries. See above.

L. carinthiacum (Wulf.) Reichenb. Fl. Germ. Excurs. 421 (1831). *Swertia carinthiaca* Wulfen in Jacq. Misc. ii. 53, t. 6 (1781).— The type of *Lomatogonium*, but the specific combination not definitely made by A. Braun.

L. carinthiacum (Wulf.) Reichenb., var. **Stellerianum** (Cham. & Schl.), n. comb. *Gentiana Stelleriana* Cham. & Schl. Linnaea, i. 188 (1826). *Pleurogyne himalayensis* Klotsch in Klotsch & Garcke, Bot. Ergeb. Waldem. Reise, 91, t. 68 (1862).

L. **Forresti** (Balf. f.), n. comb. *Pleurogyne Forresti* Balf. f. Notes Roy. Bot. Gard. Edinb. no. xvii. 78, t. 18 (1907).

L. **brachyantherum** (C. B. Clarke), n. comb. *Pleurogyne brachyanthera* C. B. Clarke in Hook. f. Fl. Brit. Ind. iv. 120 (1885).

L. **Thomsoni** (C. B. Clarke), n. comb. *Pleurogyne Thomsoni* C. B. Clarke in Hook. f. Fl. Brit. Ind. iv. 120 (1885).

L. **macranthum** (Diels & Gilg), n. comb. *Pleurogyne macrantha* Diels & Gilg in Futterer, Durch Asien, Bot. Repr. 17, t. 2 (1903).

L. **spathulatum** (Kerner), n. comb. *Pleurogyne spathulata* Kerner, Ber. Naturw. Ver. Innsbruck, i. 104 (1870).

L. **diffusum** (Maxim.), n. comb. *Pleurogyne diffusa* Maxim. Bull. Acad. Pétersb. xxxii. 510 (1888).

L. **Lubahnianum** (Vatke), n. comb. *Pleurogyne Lubahniana* Vatke, Bremen, Abh. ix. 127 (1885).

L. **minus** (Griseb.), n. comb. *Ophelia minor* Griseb. in DC. Prodr. ix. 126 (1845).

Gray Herbarium.

AN EXCURSION TO MT. WASHINGTON, MASSACHUSETTS, AND BASH-BISH FALLS.

Clarence H. Knowlton.

When the New England Botanical Club made its 1919 spring excursion to southern Berkshire County, Mr. Charles Schweinfurth and I received as our first day's assignment the southwestern corner of the County and State, the township of Mt. Washington, especially the region of Hudson River drainage. We found about 200 species in identifiable condition, and collected them for the Club Herbarium. My partner selected pteridophytes and woody plants while I gathered the others. This article is based on our common experiences and observations on May 30. I am much indebted to Mr. Schweinfurth for notes and suggestions in writing this.

The township consists of a somewhat detached group of the Taconic Mountains. The central plateau is about 1600 feet above sea-level, with higher points at the edges, especially the east, Mt. Everett reaching 2624 feet, and Mt. Race 2395 feet. The interior is drained by several brooks, which join Bash-Bish brook and flow westward into the Hudson. The general contours and elevation are strikingly similar to another Taconic section 150 miles further north, in Tinmouth, Vermont. The country rock is mica-schist, although casual plants of *Cystopteris bulbifera, Ranunculus allegheniensis, Viola rostrata* and *Senecio obovatus* indicate the presence of lime, perhaps in the glacial drift.

Starting from South Egremont we climbed 900 feet to the central plateau by a sinuous and difficult road, with occasional glimpses of white birches and *Rhododendron canescens,* the latter in full bloom. In this high region we made our first collections — *Castanea dentata, Corylus rostrata, Quercus alba, Q. ilicifolia, Amelanchier canadensis, Prunus virginiana, P. serotina, P. pennsylvanica, Vaccinium vacillans, V. canadense, Kalmia latifolia, Lyonia ligustrina, Diervilla Lonicera, Smilax herbacea, Clintonia borealis, Geum rivale, Polygala paucifolia, Pedicularis canadensis,* and *Senecio aureus,* with other familiar plants, not very different from those seen in similar acid areas in the Fitchburg plateau region.

The next halt was by a school-house. Happy children, with woods and fields and a real brook to play in! In the brook grew *Stellaria borealis* Bigel., var. *isophylla* Fernald and *Geum virginianum,* with *Zizia aurea* close by, while in the light woods were *Uvularia perfoliata* and the inevitable *Aralia nudicaulis.* Around an old house-site were several introduced plants of which *Levisticum officinale* may deserve the honor of a record, along with an apparently transplanted native, *Viburnum Opulus,* var. *americanum.*

We now coasted rapidly into the Vale of Bash-Bish. Here were the rich woods we expected, with *Tsuga canadensis, Betula lutea* and *B. lenta, Fagus grandifolia, Ulmus fulva, Tilia americana* and *Acer saccharum,* together with the following shrubs: *Taxus canadensis, Hamamelis virginiana, Dirca palustris, Ribes Cynosbati, Acer pennsylvanicum, Lonicera canadensis, Viburnum alnifolium* and *Sambucus racemosa.*

There were dry woods, too, mainly oak with some chestnut and a few white pines. In the rocky woods above the falls *Quercus Prinus* was very abundant, with some specimens of *Fraxinus americana.* In this region were brilliant flowering clumps of *Silene pennsylvanica* in the driest places. *Quercus alba* and *Q. rubra* were further down the gorge. With these trees grew *Myrica asplenifolia, Rubus allegheniensis, Ceanothus americanus, Rhus typhina, Cornus florida, Vaccinium stamineum* and *Viburnum acerifolium.*

The greatest surprise of the day was the striking contrast between the northern sunny side of the gorge, and the shaded southern side.— To find *Oxalis americana* and *Acer spicatum* on one hand, and then only a few yards away *Gerardia virginiana* and *Scirpus planifolius* was indeed strange. The following lists of herbaceous plants emphasize the contrast further.

Rich Woods.

Adiantum pedatum
Aspidium marginale
" noveboracense
" spinulosum, var. intermedium
Phegopteris Dryopteris
" polypodioides
Polystichum acrostichoides
Botryichum virginianum
Brachyelytrum erectum
Carex bromoides
" gracillima
" laxiflora, var. blanda
" leptonervia Fernald
" scabrata
Luzula saltuensis
Maianthemum canadense
Polygonatum biflorum
Smilacina racemosa
Trillium erectum
Laportea canadensis
Asarum canadense
Actaea alba
" rubra
Ranunculus recurvatus
Ranunculus abortivus
" " var. encyclus
Caulophyllum thalictroides
Dentaria diphylla
Mitella diphylla
Tiarella cordifolia
Fragaria vesca, var. americana
Rubus odoratus
Amphicarpa monoica
Oxalis americana
Viola blanda
" canadensis
" eriocarpa Schwein.
" pubescens
Circaea alpina
Sanicula marilandica
Osmorhiza Claytoni
Trientalis americana
Hydrophyllum americanum
Collinsonia canadensis
Mitchella repens
Aster acuminatus
" divaricatus
Erigeron philadelphicus
Solidago latifolia

Dry Woods.

Oryzopsis asperifolia
Carex communis
" digitalis
" pedunculata
" pennsylvanica, var. lucorum
Scirpus planifolius
Silene pennsylvanica
Thalictrum dioicum
Hepatica americana
Saxifraga virginiensis
Hypericum punctatum
Lysimachia quadrifolia
Satureja vulgaris
Gerardia virginica
Veronica officinalis
Antennaria neodioica
" " var. grandis
Solidago caesia

The Bash-Bish Falls are most interesting. The brook descends through a narrow ravine for several hundred feet, then down through a deep gorge in the schist, then near the State Line falls in a beautiful cataract some forty feet. The region is picturesque and well worth a visit but automobilists should approach it warily, and from the splendid road on the New York side, for the State Line is guarded by a monumental "thank-you-marm." Our springs apparently stood the test, only to disintegrate some days later in Vermont.

On dry ledges high above the falls grew *Woodsia ilvensis;* on shaded ledges the familiar *Polypodium vulgare.* Near the foot of the falls was one good plant of *Adlumia fungosa,* and a nice sod of *Sagina procumbens,* while *Campanula rotundifolia* was frequent in moist crevices. A single plant of *Arabis lyrata* nestled among the stones of the gorge wall, while in the sandy bank higher up grew *A. laevigata* and *Tussilago* still showing a few blooms. Along the stream were beds of *Tiarella,* with *Rhus Toxicodendron* and *Rubus triflorus,* and in the stream itself clumps of *Poa saltuensis* Fernald, *Carex torta, Cardamine pennsylvanica, Chrysosplenium americanum* and *Steironema ciliatum.* We found one *Gentiana* but whether *G. Andrewsii* Griseb. or *G. clausa* Raf. did not yet appear.

The region comes within the New York floral area and has been visited by New York botanists as may be seen by articles relating to it.[1]

Some contributors to its literature have raised a troublesome question of synonymy by writing of Copake Falls, N. Y. when they mean Bash-Bish Falls, Mass. The lists of Mr. Stewart H. Burnham and Mr. Sereno Stetson are very interesting, as both are evidently keen collectors, and their visits took place earlier and later in the season than ours of May 30.

Plants on Mr. Burnham's list which we did not find are:

Asplenium Trichomanes
Panicum latifolium
Muhlenbergia tenuiflora
Hystrix patula
Carex brunnescens Poir., var. gracilior Britton
" trisperma
" mirabilis
Quercus coccinea
Cerastium nutans
Clematis verticillaris
Pyrus Americana
Rosa blanda
Desmodium bracteosum
Aralia hispida
Cornus circinata
Asclepias phytolaccoides
Pycnanthemum incanum
Mentha gentilis
Helianthus divaricatus

Mr. Stetson viewed the general region as one geographic unit, paying very little attention to the State Line, so it is not possible to

[1] The Rare Mosses of Bash-Bish Falls. Elizabeth G. Britton, Torreya I, 9, 1901.
The Flora of Copake Falls, N. Y. Sereno Stetson, Torreya XIII, 121–133, 1913.
A Supplementary List of the Plants of Copake Falls, N. Y. Stewart H. Burnham, Torreya XIII, 217–19, 1913.
1913 notes on the Flora of Copake Falls, N. Y. Sereno Stetson, Torreya XIV, 42–45, 1914.

know absolutely which of his plants grew in Massachusetts. He explored the western slopes of the hills very thoroughly, and in many cases it would be hard to ascertain on just which side of the invisible line his specimens grew. The following are selected as perhaps within our limits.

Juniperus virginiana
Corallorrhiza maculata
" trifida
Cypripedium acaule
" parviflorum, var. pubescens
Habenaria hyperborea
Claytonia virginica
Desmodium paniculatum
" nudiflorum
Lespedeza frutescens
Gentiana quinquefolia
Monarda didyma
" fistulosa
Gerardia flava
Veronica americana
Cuscuta Coryli
Orobanche uniflora
Aster patens
" prenanthoides
Eupatorium urticaefolium
Solidago erecta
" hispida
" squarrosa

The neighboring region of New York furnished us several additional species. In dry woods just inside Copake, we found good specimens of *Polygala Senega,* while in a calcareous swamp near the State road just north of Copake village grew *Salix candida* and *S. serissima, Carex limosa* and *C. diandra* var. *ramosa.* These interesting plants do not appear on the New York lists.

This day of exploration brought us very little that was new, but the region proved most interesting from the large number of species and the unexpected contrasts. We secured so many plants not on the Copake lists that further explorations should bring out still other rarities, for the area is extensive, there being many ravines and slopes, with decided differences in altitude and in moisture content.

Hingham, Massachusetts.

CHINESE MARINE ALGAE.

F. S. Collins.

There has recently been submitted to me by Mr. W. R. Maxon of the herbarium of the U. S. National Museum, a small collection of marine algae from China, gathered by Mrs. Spencer Lewis in the summer of 1915, at Pei Tai Ho, Gulf of Pechili, Chihli Province. The algae are mounted on small cards, and were apparently selected for their beauty and attractiveness, but the preparation was well and carefully done, and the plants are in excellent condition for examination. The following is the list, in systematic order and with the serial numbers corresponding to the specimens.

33. *Enteromorpha intestinalis* (L.) Grev.
35. *Enteromorpha prolifera* (Fl. Dan.) J. Ag.
34. *Enteromorpha plumosa* Kütz.
32. *Cladophora* sp.?
29. *Codium fragile* (Suringar) Hariot.
30, 31. *Bryopsis pennata* Lamour.
27. *Colpomenia sinuosa* (Roth) Derbès & Solier.
25. *Chordaria flagelliformis* (Fl. Dan.) Ag.
26. *Chordaria Cladosiphon* Kütz.
28. *Dictyota indica* Sonder.
8. *Goniotrichum elegans* (Chauvin) Le Jolis.
1, 52, 59. *Gelidium australe* J. Ag.
19. *Gracilaria multipartita* (Clementi) Harv.
20. *Gracilaria confervoides* (L.) Grev.
36. *Campylaephora hypneoides* J. Ag.
18. *Laurencia obtusa* (Huds.) Lamour.
4,5. *Antithamnion cruciatum* (Ag.) Näg.
10–17. *Ceramium Boydenii* Gepp.
7, 24. *Ceramium japonicum* Okamura.
6. *Pleonosporium Borreri* var. *fasciculatum* (Harv.) Holmes & Batters.
8, 9. *Symphyocladia gracilis* (Martens) Falk.
22, 23. *Grateloupia affinis* (Harv.) Okamura.
37, 38. *Grateloupia filicina* (Wulf.) J. Ag.

39. *Grateloupia ramosissima* Okamura.
21. *Polysiphonia ferulacea* Suhr.
48. *Isoptera regularis* Okamura.
2, 3. *Dasya pedicellata* Ag.
41–47. *Corallina officinalis* L.
40. *Melobesia* sp.?
47. *Sargassum* sp.?

In all 27 determined specifically, 3 only as to genus. Not an extensive list, but 17 of the 27 are reported for the first time from China. If we except the genus *Sargassum*, for reasons to be stated later, only 28 can be safely retained from older lists, giving a total of 45. *Polysiphonia ferulacea* is epiphytic on *Gracilaria confervoides*, *Goniotrichum elegans* on *Symphyocladia gracilis* and *Colpomenia sinuosa* on *Gelidium australe*. The *Gelidium* is a quite slender and delicate appearing plant, but apparently not distinct from the coarser form of California and Australia. *Laurencia obtusa* is taken in a broad sense; in all probability several species now pass under that name, but we are not in a position clearly to distinguish them; *L. botryoides* and *L. thuyoides*, recorded on the Chinese coast, probably should be included in *L. obtusa*, in this sense. *Antithamnion cruciatum*, *Pleonosporium Borreri* var. *fasciculatum* and *Dasya pedicellata*, well known North Atlantic plants, now appear for what seems to be the first time in the Pacific. In each case the characters are quite those of the Atlantic plant.

Our previous knowledge of Chinese marine algae is very scanty. The first work of importance is that of Martens[1] in which are included previous records; unfortunately most of the older records are rather uncertain and cannot safely be compared with the present list. The next list is by Debeaux.[2] This includes 26 species from Chefoo and Hongkong. The author was not a specialist in algae, and most of his identifications were made by René Lenormand, and unless confirmed from other sources, cannot be safely accepted. More recently Mrs. Gepp has published a list[3] containing 22 named species, 2 of them with an "(?)" and 6 only generically determined, from Wei-hai-wei and Swatow.

[1] Georg v. Martens. Die Preussische Expedition nach Ost-Asien. Botanische Theil. Berlin, 1866.

[2] O. Debeaux. Algues marines recoltées en Chine pendant l'expédition française de 1860–62. Actes Soc. Linn. de Bordeaux, Vol. xxx, 1875.

[3] Ethel S. Gepp. Chinese marine algae. Jour. of Bot., Vol. XLII, p. 161, 1904.

A general list of the marine algae of China, to include all that seem sufficiently authenticated to the writer from these four sources, is quite meager for so long a coast, and especially in contrast with our knowledge of the flora of Japan. For the latter we have, in addition to a number of papers by European authors, many publications of recent years by Japanese phycologists, Yendo, Okamura, and others. The Icones of Japanese Algae, of which the fourth volume is now being issued by Okamura, is an illustrated work of the first rank, and is indispensable to any student of North Pacific algae. In this list, as given below, the important genus *Sargassum* is omitted; even more than with other genera it is impracticable to assimilate the different records. In Agardh's monograph[1] localities are given vaguely, as "Mari Japonico et Chinensi." Grunow's posthumous notes[2] would probably give the needed information, but having been issued during the late war, are not accessible in this country. Abbreviations used in the list for Chinese localities are, C, Cheefoo.[3] H, Hongkong. P, Pei-tai-ho. S, Swatow. W, Wei-hai-wei. To show relationships, a note on the further distribution of each species is added.

General List of the Marine Algae of China.

Rivularia atra Roth. W.	General.
Ulva Lactuca L. C. S.	General.
Enteromorpha intestinalis (L.) Grev. C. P.	General.
Enteromorpha prolifera (Fl. Dan.) J. Ag. P.	N. Atlantic.
Enteromorpha plumosa Kütz. P.	N. Atlantic.
Codium fragile (Suringar) Hariot. C. P. W.	Pacific.
Bryopsis pennata Lamour. P.	Warm waters.
Ectocarpus siliculosus (Dillw.) Lyng. W.	General.
Leathesia difformis (L.) Aresch. C. S. W.	N. Atlantic.
Colpomenia sinuosa (Roth) Derbès & Solier. P.	Warm waters.
Chordaria flagelliformis (Fl. Dan.) Ag. C. P.	N. Atl. & Pac.
Chordaria Cladosiphon Kütz. P.	Australia.
Chordaria firma Gepp. W.	Endemic.

[1] J. G. Agardh. Species Sargassorum Australiae. Kgl. Svenska Vet.-Akad. Handl. Stockholm, Vol. XXIII, No. 3, 1889.

[2] A. Grunow. Additimenta ad cognitionem Sargassi. Verh. k.k. Zool.-Bot. Ges. Wien.

[3] The different forms used for the same Chinese name present some difficulty, but it is assumed that Cheefoo, Tschifu and Tché-fou, refer to the same place.

Cystophyllum Thunbergii (Mert.) J. Ag.	C. W.	Japan.
Cystophyllum fusiforme Harv.	W.	Japan.
Cystophyllum Swartzii (Ag.) J. Ag.	C.	Japan.
Dictyota indica Sonder.	P.	W. Indies.
Dictyota dichotoma (Huds.) Lamour.	W.	Warm waters.
Goniotrichum elegans (Chauv.) Le Jolis.	P.	General.
Gelidium australe J. Ag.	P.	Australia, Pac.
Gymnogongrus japonicus Suringar.	S.	Japan.
Cystoclonium armatum Harv.	W.	Japan.
Gracilaria multipartita (Clementi) Harv.	P.	General.
Gracilaria confervoides (L.) Grev.	C. P. W.	General.
Campylaephora hypneoides J. Ag.	C. P.	Japan.
Champia parvula (Ag.) Harv.	W.	N. Atlantic.
Acanthophora orientalis J. Ag.	S.	Australia, Asia.
Laurencia obtusa (Huds.) Lamour.	C. P.	Warmer waters.
Polysiphonia ferulacea Suhr.	P.	Warmer waters.
Polysiphonia japonica Harv.	W.	Japan.
Polysiphonia urceolata (Lyng.) Grev.	(?) W.	N. Atl. & Pac.
Rhodomela subfusca (Woodw.) Ag.	W.	N. Atlantic.
Rytiphloea sinensis Debeaux.	C.	Endemic.
Symphyocladia gracilis (Mart.) Falk.	C. P.	Japan.
Dasya pedicellata Ag.	P.	N. Atlantic.
Isoptera regularis Okamura.	P.	Japan.
Leveillea bidentata Martens.	C.	Endemic.
Antithamnion cruciatum (Ag.) Näg.	P.	N. Atlantic.
Ceramium Boydenii Gepp.	P. W.	Japan.
Ceramium japonicum Okamura.	P.	Japan.
Pleonosporium Borreri var. *fasciculatum* (Harv.) Holmes & Batters.	P.	Europe.
Grateloupia affinis (Harv.) Okamura.	P.	Japan.
Grateloupia filicina (Wulf.) J. Ag.	C. P. S.	Warmer waters.
Grateloupia ramosissima Okamura.	P.	Japan.
Corallina officinalis L.	C. P.	General.

SPECIES RECORDED FROM CHINA BUT UNVERIFIED AND IMPROBABLE.

REPORTED BY MARTENS.

Ectocarpus littoralis.
Haplosiphon filiformis.
Spermatochnus australis.
Laminaria saccharina.
Haliseris polypodioides.
Polysiphonia spinescens var. *sinensis.*
Griffithsia corallina
Gelidium cartilagineum.
Lophura floccosa.
Gastroclonium uvarium.
Hypnea nigrescens.

REPORTED BY DEBEAUX.

Padina Pavonia.
Rytiphloea capensis.
Champia Kotschyana.
Gelidium cartilagineum.
Gelidium corneum var. *sericeum.*
Rhodymenia palmata var. *sinensis.*
Dumontia filiformis var. *tenuis.*
Bryopsis plumosa.
Bryopsis arbuscula.
Enteromorpha compressa.

REPORTED BY GEPP.

Halosaccion microsporum.

NORTH EASTHAM, MASSACHUSETTS.

DICRANOWEISIA CRISPULA IN THE WHITE MOUNTAINS.— Lesquereux and James's Manual of the Mosses of North America (1884, p. 57) gives no record of this species from eastern North America. Mr. R. S. Williams in North American Flora (xv, 96, 1913) credits it to "Greenland; Labrador; Mt. Marcy, New York," leaving the impression that it does not occur in New England. It was found by Prof. A. W. Evans and the writer Aug. 3, 1917 by the Cold Brook of King's Ravine in the White Mountains of New Hampshire. Cold Brook emerges from the ice-filled talus of the head of King's Ravine a short distance above the little falls popularly known as Mossy Falls, and it was just below this place of emergence, between it and the falls that a vigorous fruiting tuft of the moss grew. Careful search of the northern part of the Presidential Range in the summers of 1917 and 1918, including a trip to the Ice Gulch further north in Randolph[1] failed to discover it elsewhere, and it is certainly not an abundant plant in the White Mountains. There is however one earlier specimen at present in the Herbarium of the New York Botanical Garden, of which Mrs. Britton has kindly sent me a portion. It was collected in August, 1889 in

[1] Though *Tetrodontium Brownianum* (Dicks.) Schwaegr. has long been known from the White Mts., in view of its limited number of New England stations it is perhaps worth recording that it occurs in the Ice Gulch. It was found in limited quantity on a few loose rocks in cold parts of the Gulch July 27, 1917, by Prof. Evans, Prof. A. S. Pease and the writer.

Tuckerman's Ravine by L. M. Underwood and correctly determined by him. Prof. L. W. Riddle has kindly looked through the Cryptogamic Herbarium of Harvard University, the Herbarium of the New England Botanical Club and the personal collection of the late Professor Farlow and reports no specimens from the White Mts., the only eastern ones being from Newfoundland (Waghorne) and the one from Mt. Katahdin, Maine collected by J. F. Collins July 8, 1900 and recorded in Rhodora, iii, 180, 182 (1901). The specimen from Mt. Marcy, New York was collected by Mrs. E. G. Britton, Aug. 29, 1892.— A. LeRoy Andrews, Ithaca, New York.

Ranunculus Boraeanus in eastern New York.— Very early in the spring of 1919. I noted, in a meadow numerous plants which had finely dissected leaves. As these leaves were unlike any I could recall, careful watch was kept of them. By the last of April the blossom-stalk proved the plant to be a *Ranunculus*. The first week in May the first blossom opened. The plant resembled *Ranunculus acris* L., but flowered earlier, was less stout, had finely dissected leaves, little pubescence, and that appressed, and a very short beak to the achene.

A specimen was sent to Harvard and pronounced to be *Ranunculus Boraeanus* Jordan, a species of continental Europe, the appearance of which has not before been noted in America. "It is considered by some authors as doubtfully distinct from *Ranunculus acris* L." but Professor Fernald, after giving the points of difference, notes: "Your point that with you it flowers so very much earlier than *Ranunculus acris* L. also seems to indicate that it is a fairly marked species." — Orra Parker Phelps, Gansevoort, New York.

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NOTES ON THE AMERICAN OCCURRENCE OF CREPIS BIENNIS.

Bayard Long.

The large genus *Crepis* is represented in the eastern United States by certain species of the Old World. These are weedy plants with somewhat the aspect of Hieraciums and are found introduced on roadsides, in fields, and about waste places. Of various species of the genus collected in this country from time to time all but a few have proved to be merely waifs. There has been a concensus of opinion, however, that four species have become sufficiently well established here to be recognized as elements of our flora. With the exception of *Crepis pulchra,* known only very locally from Virginia, there are commonly accredited to our region: *Crepis tectorum,* well characterized by involute cauline leaves; *C. capillaris* (*C. virens* of the older manuals) and *C. biennis,* both with plane stem-leaves, the former with small heads of flowers and 10-ribbed achenes, the latter with rather large heads and 13-ribbed achenes.

In the Philadelphia area these plants are to be considered as rather rare introductions, or at least only locally frequent. The greater part of our material is from ballast ground, collected many years ago, but recently scattered specimens have been coming in to the Herbarium of the Philadelphia Botanical Club from roadsides and cultivated ground — frequently grass-lands or newly-seeded lawns. In the absence of any personal experience in the field with the genus these specimens had never aroused sufficient interest to cause them to be more than very casually examined. In the early autumn of 1915 at

Toms River, New Jersey, an acquaintance with a conspicuous roadside weed belonging to this genus supplied the requisite interest to make a more careful study of these plants.

In critically examining at the Academy of Natural Sciences the American material of these introduced species of *Crepis*, a point of some interest was brought to light. It was seen that of the three species credited to our area the greater number of specimens by far represented *C. capillacea;* a lesser number, *C. tectorum;* but none, *C. biennis!* It was somewhat disconcerting to have found no *C. biennis*. The material from this country bearing the name "Crepis biennis" had indubitably fallen into *C. tectorum*. From descriptions and from European material in the Academy Herbarium *C. biennis* had been found to be a robust, more or less rough-hairy plant with large heads of flowers (involucre about 1 cm. tall, with its bracts pubescent on the inner faces), and achenes about 4–5 mm. long, olivaceous, 13-ribbed, not beaked — a well marked plant, very different superficially, as well as in its more obscure and technical characters, from the other Old World species accredited to America.

A unanimity of opinion was seen in our American manuals in crediting the plant with a more or less extended range: in *Gray's New Manual*, "N. E. to Pa. and Mich." and in the new edition of the *Illustrated Flora*, "Vermont to Pennsylvania, Michigan, and in ballast about the seaports." An interest naturally centered in the Pennsylvania occurrence.

In Taylor's *Flora of the Vicinity of New York* it was found with some surprise to be "more common in Pa. than elsewhere." [1] Reference to Keller and Brown's *Flora of Philadelphia and Vicinity* showed their knowledge of the plant to be based entirely upon two records in Porter's *Flora of Pennsylvania* — one for Easton, in Northampton County and another for Chester County.[2] On being verified in Porter's *Flora* these were found to constitute the entirety of his records for the state.[3]

The Porter Herbarium had then only recently arrived at the Academy, and although in rather a disorganized condition for locating a small series like *Crepis*, the fact of two definite records in his *Flora* was incentive enough to search diligently for the basis of these records.

[1] Taylor, Fl. Vic. N. Y. 645 (1915).
[2] Keller & Brown, Fl. Phila. & Vic. 311 (1905).
[3] Porter, Fl. Pa. 305 (1903).

With the passing of Professor Porter's guardianship, his herbarium, with its loose plants and labels, in many groups had suffered much from careless handling, but fortunately the thin covers of *Crepis* in the Pennsylvania series had been quite undisturbed. In the cover labelled "Crepis biennis L." were two plants: one ticketed in pencil "Coll. Grounds, '69," presumably those of Lafayette College and thus the basis of the Easton record for Northampton County; the other from Wm. M. Canby with the data, "Introduced, Chester Co., Pa. 1863." The "Coll. Grounds" specimen though named "Crepis biennis" in Porter's hand (the rest of the label, however, doubtfully his) is a plant quite different from that species. It is low, scapose, with a single, rather large head, superficially somewhat resembling a dandelion and apparently referable to *Leontodon hispidus*. The Canby specimen had been named originally "Apargia autumnalis L." but Porter, in the process of doubtless numerous examinations of this strange plant, had crossed through Canby's identification, transferred it to *Leontodon*, affixed a large "?", affirmed a "No!", written "Crepis" in ink and penciled "biennis?" and then finally inked in "biennis L." The specimen shows a branch of evidently a robust plant, rough-pubescent, and with plane stem-leaves. Unfortunately it is only in bud and insects had wrought havoc with the immature achenes, but from the large size of the buds and the pubescent character of the inner faces of the involucral bracts it seems clear that this is indeed authentic *Crepis biennis.*

Further search in Philadelphia, at the College of Pharmacy and the University of Pennsylvania, produced no other material — except a fine specimen of *Sonchus arvensis* masking under the name of "Crepis biennis."

It had become quite evident by this time that *Crepis biennis* was far from being a plant familiar to Philadelphia botanists. Taylor's assertion of its greater frequence in Pennsylvania than elsewhere thus naturally led to an inquiry concerning the basis of this statement. Mr. Taylor kindly wrote me that his data consisted of apparently only the Porter records. With a deficiency of material at the New York Botanical Garden and two definite records from Pennsylvania his statement was readily verified — but not very happily phrased, it was felt, for information on the supposed occurrence of the species.

With the Pennsylvania records for the range of the species apparently satisfactorily reviewed, a brief search indicated that the New

England occurrence was probably based upon the notation of "Vermont, *Pringle,*" in the *Synoptical Flora* [1] (amplified in the recent *Flora of Vermont* to the definite station, Charlotte) [2] and "Mass." in Watson and Coulter's Edition of Gray's *Manual.*[3] Michigan appeared to originate in the new Gray's *Manual.* The specimen bases of these records all probably being still extant at the Gray Herbarium, Professor Fernald's interest was evoked, but pleading an unfamiliarity with the group, on being pressed for critical opinions on the identities of these plants, he enabled me to borrow the material — and to draw my own conclusions.

The bases of the records for Vermont, Massachusetts, and Michigan happily were all found preserved in the Gray Herbarium. The first is labelled: "Hieracium? Charlotte, Vt. (a casual) June 7th, 1875. C. G. Pringle," and the sheet marked twice with Gray's identification, "*Crepis biennis,*" and a small "Syn. Fl. N. Amer." ticket attached. There are three good, essentially complete, specimens crowded upon the sheet. It is at once evident that this is not a homogeneous series representing a single species. One of the plants, with rather few, notably large heads, is recognizable as characteristic *C. biennis.* The remaining two, although superficially somewhat similar to *C. biennis,* show inflorescences of more numerous, appreciably smaller heads, and, except for the rough pubescence on stems and leaves, might readily be taken offhand for *C. capillacea.* On more critical examination they are found to have the inner faces of the involucral bracts glabrous, the achenes 10-ribbed, and about 3–3.5 mm. long — which conclusively shows that these plants cannot be *C. biennis.* One of them has pinnatifid leaves, similar to those of *C. biennis,* but the other has entire or remotely toothed leaves. There is also a decided difference in pubescence, especially on the inflorescence. They are both apparently referable, however, to *C. Nicaeensis* Balb.— the plant with the uncut foliage probably representing the form called *β. integrifolia* Lamt. in Rouy's treatment.[4] The Massachusetts record is based upon two specimens with the label, in the hand of Sereno Watson, reading: "Crepis biennis, L. Wianno, Mass., sandy soil, near a dwelling. Miss L. M. Hill — June 1887." These appear to have the

[1] Gray, Syn. Fl. i. pt. ii. 430 (1884).
[2] Flora of Vermont. Vt. Agr. Exp. Sta. Bull. 187. 253 (1915).
[3] Gray, Man. ed. 6. 300 (1890).
[4] Rouy, Fl. Fr. ix. 227 (1905).

technical characters of *C. Nicaeensis.* They certainly do not represent *C. biennis.* The Michigan basis rests upon a sheet of two specimens, labelled: "Herbarium, Agricultural College, Mich. Crepis biennis L. In meadow on the College farm seeded with orchard grass seed imported from France. Coll. C. F. Wheeler, 15–VI–97." These again apparently represent *C. Nicaeensis.*[1]

The material from the Missouri Botanical Garden, loaned me through the kindness of Dr. Greenman, showed no specimens of the desired species; but that from the National Herbarium, generously sent me by Mr. Standley for examination, produced a specimen from a new locality. This is labelled as collected at Asheville, North Carolina in 1888 by Gerald McCarthy. The specimen is a nearly complete plant in full flower showing the characteristic large heads of the species. As an indication of the size and general appearance of the expanded heads it is interesting to note that the original label reads: "Cynthia virginica" — which, however, has been crossed out and "Crepis biennis" written above in pencil.

In the general search for records of a definite occurrence of *Crepis biennis* it was noted that in Piper and Beattie's *Flora of the Northwest Coast* this species is reported from Vancouver Island on authority of Macoun.[2] A specimen collected by John Macoun and so named has been seen from Vancouver Island in the United States National Herbarium. Similar material, collected at a later date and then named *Crepis virens* by Macoun, is contained in the Herbarium of the Missouri Botanical Garden. Superficially, in habit, leaf-shape and generally hispid character, these plants suggest in some measure a reduced *Crepis biennis,* but the technical characters of glabrous inner faces of the involucral bracts and generally 10-ribbed achenes, coupled with the smaller size of the heads and of the achenes, show that they represent further American material of what appears to be *C. Nicaeensis.*

It is quite possible of course that continued search in the herbariums of the country might reveal a few more specimens of authentic *C. biennis,* but when the large collections already examined were able to

[1] It is pertinent to note that Rouy in the *Flore de France* indicates that the species is introduced with lucernes throughout Central Europe, Great Britain, Denmark and southern Sweden. One cannot but speculate whether *C. Nicaeensis* has not arrived in this country in a similar way and is to be classed with the various other European species that, as waifs, are picked up usually in clover-, alfalfa-, or grain-fields, or grass-lands.

[2] Piper & Beattie, Fl. Nw. Coast. 359 (1915).

show only three meager specimens, it seems very unlikely that sufficient material could be found to warrant the belief that this is a species worthy of an unchallenged place in all our manuals. It must not be forgotten, moreover, that these three specimens all represent distinctly ancient collections and that detailed information on their occurrence at these stations is quite lacking, except in the case of Pringle's collection. From his reference to the species at Charlotte as a casual and the fact of his collection consisting of three different forms, it is no great stretch of the imagination to visualize a weedy field planted with imported seed and containing scattered plants of *Crepis* and doubtless various other foreign species. It surely would have been difficult, except in some such habitat, to pick up three such unusual forms in one collection. Every collector knows the value to be attached to the occurrence of introductions of this type. It is equally well known how frequently an unusual introduction occurs as a single plant or a small colony and how familiar the circumstance is of its failure to reappear the following year. At times, of course, the collector is himself the cause of this but more often it is only the regular course of a strange plant failing to establish itself. Whether this species actually occurs at any of these localities at the present day is a matter open to very considerable doubt. In all probability it is not of a vigorous and weedy character and has long since died out at all three stations.

It seems scarcely necessary to suggest that the conclusion to be drawn from these notes is that much new evidence is needed on the presence of *Crepis biennis* on this continent to maintain it satisfactorily as an element of our flora. Until conclusive information is obtained of its actual establishment with us, it seems only just that it should be classed with the various other species of the genus (and is *C. tectorum* above suspicion?) that appear from time to time, chiefly in cultivated fields, and disappear within a year or two. There is no question of the interest attaching to strange and curious weeds that are found on lawns or among alfalfa, grain or other crops, but it is urgently desirable that these waifs be not confused with introductions that really have become naturalized.

Academy of Natural Sciences of Philadelphia.

THE NEW GENUS BROMELICA (THURB.) FARWELL.

James C. Nelson.

The arguments adduced by Mr. Farwell in support of his proposed new genus *Bromelica* (Rhodora **21**: 76–78) are very convincing as long as the delimitation of *Melica* is based on the characters taken by most American authors as distinctive. Certainly if the genus is established primarily on the texture of the lemmas and the arrangement of the uppermost into a club-shaped mass, it becomes very difficult to construct any key that will place the species *striata, Smithii, aristata, subulata, Harfordii* and *Geyeri* under the genus. Yet, as Mr. Farwell points out, this is just what American botanists have done, with results that have led to much inconsistency and confusion. If these are indeed the characters that distinguish *Melica* from its allies, a subdivision of the genus seems inevitable.

But the question arises whether the characters above stated are correctly taken as those on which the genus is established. Undoubtedly it is excluded from Aveneae for the reasons advanced by Mr. Farwell, i. e., the glumes are *shorter* than the lower floret, and the rachilla is not prolonged. Clearly then it belongs in Festuceae, as long as that tribe is delimited as at present. Just as clearly it is separated from *Festuca* by the bifid apex of the lemma. Apparently then *Bromus* is its nearest ally among the North American grasses. But cannot some less minute character than the pubescence of the grain or its adherence to the palet be found to distinguish *Melica* from *Bromus*, which will at the same time permit the retention of the species of Mr. Farwell's *Bromelica* under the original *Melica?*

After a careful study of Hackel's key to the Festuceae (in Engler & Prantl, Nat. Pflanzenfam. ii. Abt. 2, 61–64), I cannot feel that he regarded the texture or arrangement of the lemmas as determining characters, or that he would have accepted the prevailing American delimitation of the genus. The essential facts seem to him to be (1) the *presence* of imperfect florets on the upper part of the spikelet; (2) the *number* of such florets — not their texture or arrangement. The genera in which these sterile or empty lemmas are uniformly *two or more* might then be set off from those in which normally only *one,* and that the uppermost, lemma is sterile or empty — in which group both *Festuca* and *Bromus* would be found. Those in which two or more imperfect florets exist might be further subdivided into

(a) Lemmas 1–3-nerved, including *Eragrostis, Sphenopholis, Koeleria,* and *Catabrosa.*

(b) Lemmas 3–5-many-nerved, including *Diarrhena* and *Melica,* as well as the South American *Anthochloa,* the African *Harpachne,* and the Australian *Ectrosia* and *Heterachne.*

It must not be overlooked that occasionally specimens of *Festuca* or *Bromus* are found with more than one empty lemma; but these are the exception rather than the rule. Tribal and generic differences must be based on *prevailing* rather than *universal* characters, and there can be no doubt that the *single* empty lemma predominates in *Festuca* and *Bromus,* just as in *Melica* and its allies the existence of more than one imperfect floret is fairly constant.

If these characters be taken as the basis of our dichotomy, the subgenus *Bromelica* may still remain in *Melica,* because it agrees in having uniformly more than one imperfect floret; and the membranous texture and more remote arrangement of the upper lemmas become characters of subgeneric rank. The nearest ally of *Melica* among American grasses would then not be *Bromus* or *Festuca,* but *Diarrhena,* from which it would be easily distinguished by its three stamens (*Diarrhena* having 2 or rarely 1) and 1 lodicule (*Diarrhena* having 2).

Melica would further be distinguished from the other genera with more than one imperfect floret as follows: *Heterachne* and *Harpachne* have lemmas and glumes *keeled, Anthochloa* has the lemmas *fan-shaped, Lophatherum* and *Ectrosia* have the sterile lemmas *awned.*

But the attempt to distinguish *Melica* on texture and arrangement of the upper lemmas alone will, as Mr. Farwell has pointed out, never be satisfactory. I am inclined to think, however, that the problem is not to be solved by a segregation of the genus, but by an attempt to find a different set of characters on which to base the delimitation; and this cannot be done until we consider the genus in wider relations than those afforded by its North American allies.

Salem, Oregon.

TWO COLOR FORMS OF LOBELIA CARDINALIS L.

HAROLD ST. JOHN.

AN unusual rose-colored form of *Lobelia cardinalis* L. was recently sent from Jaffrey, New Hampshire, by my friend, Miss E. M. Parker. In the Gray Herbarium is a specimen of the same form from East Jaffrey, collected by E. L. Rand and B. L. Robinson in 1901. This rose-colored form, then, appears repeatedly, if not continuously in Jaffrey. In the first edition of his Manual, Dr. Gray says [1] of *Lobelia cardinalis* L., "rarely varying to rose-color! (Plymouth, *Mr. Gilbert*)," and in the Gray Herbarium is an old sheet of this form, with imperfect data, that is presumably Mr. Gilbert's plant from Plymouth, or specimens raised from seed obtained from Mr. Gilbert. In 1871 this plant was mentioned in the Torrey Bulletin,[2] "flesh colored variety, 1868, *Meriam.*" Later, in 1912, Dr. Witmer Stone noted,[3] "Near Green Creek I have found a plant with pale salmon pink flowers." Striking color-forms such as this attract the attention of any observer, so they may well be designated by a name.

LOBELIA CARDINALIS L., f. **rosea** n. f., floribus roseis. Flowers rose-colored. NEW HAMPSHIRE: flowers roseate, mountain stream, East Jaffrey, Aug. 31, 1901, *E. L. Rand & B. L. Robinson,* no. 1,007 (type in Gray Herb.); brookside near East Jaffrey, Aug. 29, 1919, *Miss E. M. Parker.*

Like most colored flowers, *Lobelia cardinalis* L. has an albino form. It is of occasional occurrence, and it has often been mentioned in the botanical journals and in the floras from the time of Muhlenberg [4] who indicates it by "*Corolla*

$$\left.\begin{matrix}\text{alb.}\\ \text{cocc.}\end{matrix}\right\}\text{5. cardinalis,"}$$

and by Pursh,[5] "I have seen a white variety of it," down to the present time. This should be known as:

[1] Gray, Asa: Man. Bot. N. U. S., ed. 1. 253 (1848).
[2] Bull. Torr. Bot. Club ii. 12 (1871).
[3] Stone, Witmer: Pl. of S. N. J. 715 (1911).
[4] Muhlenberg, Henry: Cat. Pl. Am. Sept. 22 (1813).
[5] Pursh, Frederick: Fl. Am. Sept. ii. 448 (1814).

Lobelia cardinalis L., f. **alba** (A. Eaton), n. comb. *L. cardinalis* L., var. *alba* A. Eaton, Man. Bot. N. Am., ed. 7, 375 (1836). *L. cardinalis* L., β *alba* Wood, Class-Book of Bot. ii. 227 (1845). *L. cardinalis* L., γ *candida* Wood, Am. Botanist and Florist 195 (1870).

Gray Herbarium.

FURTHER NOTES ON PHILOTRIA.

R. W. Woodward.

In a recent issue (Rhodora **21:** 114), the writer reported what appeared to be *Philotria angustifolia* growing in brackish water at Old Lyme, Connecticut. The station was revisited in August, 1919, and both flowers and fruit were examined while fresh, so that they can be described in more detail than was possible from dry specimens. Experience proves these parts of Elodeas to be unsatisfactory in the dry state, even when great care is used in preparing them.

At this station the plant occurs as a narrow fringe at the extreme edge of low water, and cannot well be collected except for a short time at the turn of the tide. Hundreds of staminate flowers were seen floating on the slowly moving water as it began to return. Many of these were surrounded by pollen grains, moving along with them, while others that had not yet discharged their pollen, emitted a copious pollen shower at the slightest jar. In these expanded flowers, the three purplish, or purple-flecked, somewhat ventricose, obovate sepals, which are barely united at base, are so strongly reflexed that they meet beneath and resemble a thin, wide peduncle. The narrower petals are similarly reflexed. Consequently the whorls of nearly sessile anthers are raised in effect above the perianth, and the latter cannot impede the flight of the pollen when it is ejected. Possibly also the reflexed perianth, traveling in the water, steadies the rest of the flower and keeps it upright above the surface and in the best position to scatter its pollen. The anther cells are 0.8–1.1 mm. long and very plump, and the firm pollen grains are noticeably large. As the perianth, if spread out flat, could hardly exceed 3 mm. in breadth, it appears that the anthers are large for the size of the flower, and the amount of pollen correspondingly great. In fact, when floating on the water, the whorls of anthers are the conspicuous part of the flower.

In the pistillate flowers, the three obovate, ventricose, purplish calyx-lobes ascend between the three stigmas, while their tips are sharply incurved and form a cup-shaped depression at the base of the stigmas. The whitish, wider petals are recurved and nearly concealed beneath the broad recurved stigmas. As will be seen, the whole forms a minute depression, or bowl, at the surface of the water, and is well adapted to intercept floating grains of pollen and bring them into contact with the stigmatic surfaces. The calyx-lobes are smaller in the pistillate flowers, which are 2 mm. broad, when expanded. Staminodia were observed.

Since the delicate spathe is easily ruptured, the fruit readily escapes and is borne away or sinks into the mud, and is hard to find. In the brief interval at the turn of the tide, more than twenty five specimens of good fruit were secured. In the former note, the fruit was called globose. It should be described rather as blunt plano-convex. The plane side is distinctly flat and has a thin, rather wide, continuous wing. The ridge of the convex surface is truncate and this smaller plane is also winged. In outline lengthwise, the fruit varies from circular to oblong but is prevailingly oblong. It is 1.5–1.7 mm. long and about 1 mm. (exceptionally 1.5 mm.) broad.

In the twenty or more cases where it could be measured accurately, the tubular, two-toothed spathe was found to be 5–7 mm. long.

The writer has not had opportunity to compare the plant with authentic material of *Philotria angustifolia*, and cannot affirm that it is that species but it would seem to be the same, or at least close to it.

It is a pleasant picture to recall,— a quiet August morning, the incoming tide mirror-like in its smoothness and bearing on its flood flowers that are so seldom seen. Many of these, perhaps one hundred, were collected, but they were so elusive and the shore shelved so abruptly, that hardly one in ten could be secured of those that were floating past. It was a fortunate combination of circumstances, which might not occur again in a season, possibly, not in a lifetime.

New Haven, Connecticut.

Vol. 21, no. 251, including pages 193 to 208, was issued 8 December, 1919.

ERRATA.

Page 7, line 34, *for* Britton *read* Britten.
" 10, " 41, for HYDBOPHILA read HYDROPHILA.
" 75, " 11, for *Nejas* read *Najas*.
" 114, " 28, for *elodea* read *Elodea*.
" 116, " 1, for *Hierochloeodorata* read *Hierochloe odorata*.
" 125, " 14, for *lacinata* read *laciniata*.
" 145, " 30, for *Coleopleurum* read *Coelopleurum*.
" 170, " 15, for *Carophyllaceae* read *Caryophyllaceae*.
" 178, " 13, for **americana** (Fisch.), n. comb. read AMERICANA (Fisch.) Nieuwl.
" 182, " 21, for *Sphenoscadium* read *Sphenosciadium*.
" 208, " 12, dele the period after 1919.

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New scientific names are printed in full face type.

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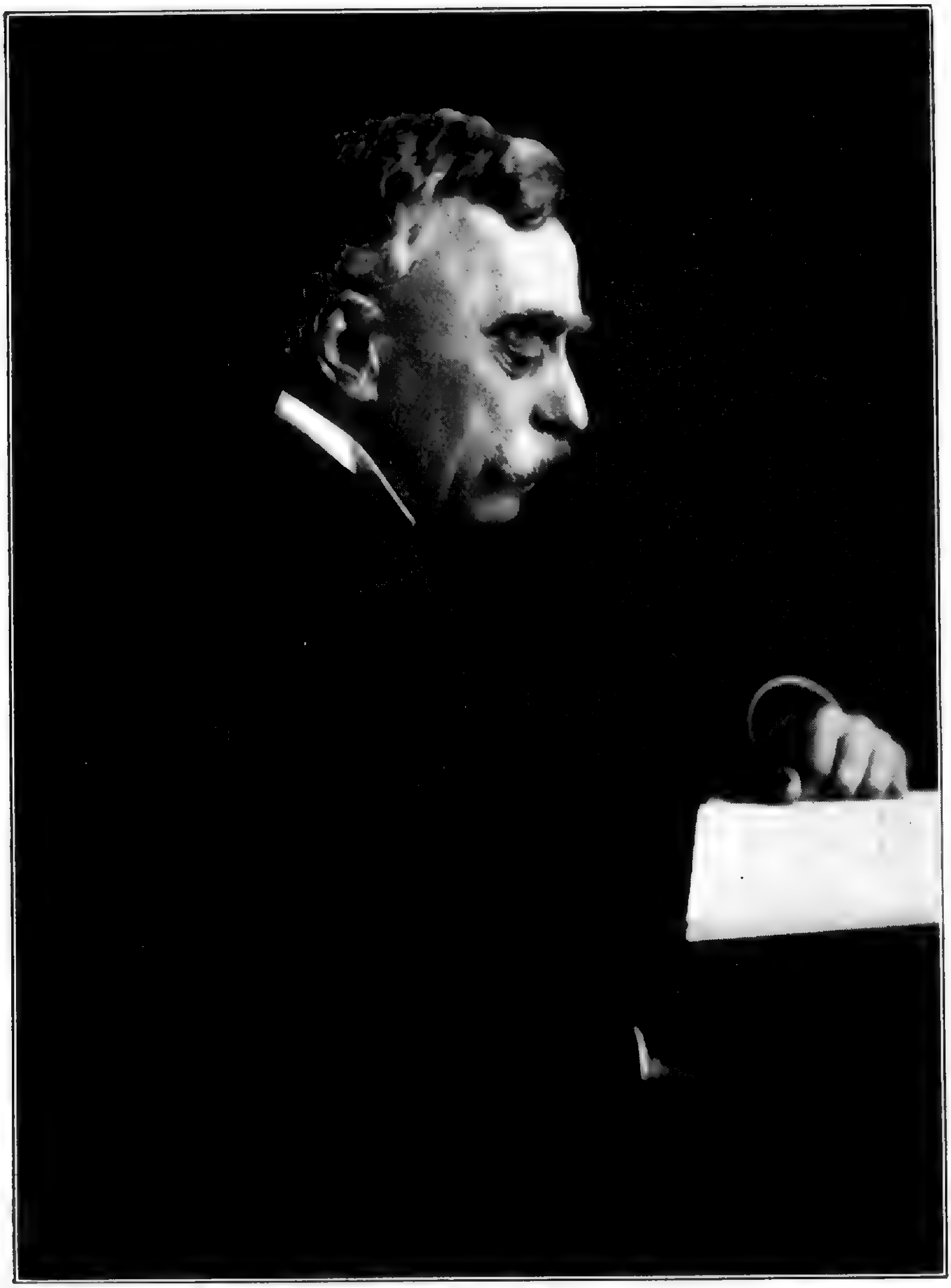

Yours truly,
W. G. Farlow.

Rhodora

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WILLIAM GILSON FARLOW.

L. W. RIDDLE.

(With portrait[1].)

DR. WILLIAM G. FARLOW was born in Boston, December 17, 1844, and died in Cambridge, June 3, 1919. His father, John S. Farlow, was a successful Boston business man, and at the same time a lover of nature, of books, and of music. The library of the Massachusetts Horticultural Society is largely indebted to his interest and generosity. It was from his father that Dr. Farlow inherited or acquired the dominant interests of his life. His mother was Nancy Wight Blanchard, the daughter of an old Massachusetts family. In 1858, the Farlow family moved to Newton, where John Farlow had purchased an estate of such an extent as would enable him to satisfy his love for plants. The house stood in the midst of gardens and orchards, in what was then the country. Here the subject of this sketch passed the next four years, and the family tradition runs that his discovery of Hepatica in the neighboring woods proved to be the stimulus which awakened the desire for a knowledge of plants. At all events, his interest in Natural History was already established when he entered Harvard College in 1862. During his college days he took the courses offered by Professor Asa Gray, and served as president of that venerable institution, the Harvard Natural History Society.

[1] For permission to use the plate from which this portrait of Prof. Farlow is printed RHODORA is indebted to the courtesy of the editorial management of the Harvard Graduates' Magazine.

Upon graduation from college, with the class of 1866, he decided to make Botany his life-work. This subject was still, at least in America, chiefly the pursuit of ministers, such as the Rev. Francis Wolle and the Rev. M. A. Curtis, or of practitioners of medicine. Acting upon Dr. Gray's advice "to study medicine first because the possibility of gaining a living by Botany was so small that one should always have a regular profession to fall back upon," he spent the next four years in the Harvard Medical School, receiving the degree of M. D. in 1870. Dr. Gray, who already appreciated Dr. Farlow's genius, at once gave him an assistantship. This enabled him to begin that study of the lower plants which was to be his main interest for nearly fifty years. From 1870 to 1872, he worked on the collections of cryptogams at the Gray Herbarium and gave some instruction in Cryptogamic Botany. This work, however, made him realize the deficiencies in his knowledge, and in 1872 he decided to go to Europe for further study, there being no opportunities at that time in the United States.

In 1872, Anton DeBary had recently opened a laboratory for advanced students in the reorganized University of Strasburg. DeBary had reached the height of his fame through his researches on the development and methods of reproduction of the Algae and Fungi. A brilliant band of students gathered around him, and it is fair to say that Dr. Farlow was one of the most gifted of these. From DeBary, Dr. Farlow acquired as thorough a knowledge of the fungi as it was possible to get at that time, and he also received valuable training in the technical manipulation of material, which must always play an important part in the study of micro-organisms. From Strasburg he went to Geneva to study the lichens with J. Mueller; and to Antibes on the Mediterranean coast of France, where he had the rare privilege of studying marine algae with Bornet and Thuret. In addition to these months of study, he travelled extensively, meeting many noted botanists, with whom he afterwards maintained a lasting friendship and an active correspondence. His letters written to Dr. Gray during this period are full of interesting comments on the botany and the botanists of the day.

The reaction against the almost exclusive attention to systematic botany during the century following Linnaeus was in full swing in Germany. Like most such movements it was being carried too far there, just as it has been in many of our American institutions during more recent years. In one letter, Dr. Farlow writes to Dr. Gray: "Systematic Botany is entirely discouraged [in DeBary's laboratory] * * * development and microscopic anatomy exclude everything else." And in another letter: "I have been to see Prof. Pfitzer, who is a pupil of Hanstein, the man who doesn't think it of any consequence to study the forms of common plants, but much better to mope over the 'Vegetationspunkt.' Dr. Hillebrand and I agree that, at the rate the Germans are going on, in twenty years there won't be a botanist in Germany who knows anything about the flora of the country." Dr. Farlow, with the admirable judgment that always characterized him, saw the value of the new studies of development, but without losing sight of the continued importance of systematic botany. He appreciated also the difficulties of the latter subject as applied to the lower plants. In a letter written in May, 1874, to Dr. Gray, he says: "As to the naming common toadstools, they are none the easier to name because they are common. You are certainly not very modest in your demand that I shall be able to name fungi, algae, and lichens. When you consider that there is not a single botanist in Europe who can do that, it is not very likely at my age that I shall be able to do it."

During these two years, Dr. Gray's friendship was actively shown in many ways. In one letter, Dr. Farlow writes: "I cannot express my obligations for the expressions of interest in me contained in your last letter." And it was at least partly due to Dr. Gray that, upon his return from Europe in the summer of 1874, Dr. Farlow received an appointment as assistant professor of Botany at Harvard, an appointment which was followed by that of professor of Cryptogamic Botany in 1879, a position that he held during the rest of his life. Through his training, his genius, and his industry, bearing fruit in a series of important papers during the decade from 1875 to 1885, it may be said without exaggeration that Dr. Farlow created the science of Cryptogamic Botany in America. It will be worth while, therefore, to dwell somewhat upon this period of his life.

He has left a record of his own inclinations in 1870 in these words: "Had it been possible for me to do as I pleased, I should never have studied anything but marine algae." Previous to the date mentioned, the only important work on the seaweeds of our coast had been that of Harvey, published between 1852 and 1858. That Dr. Farlow lost no time in following his inclination is shown by his publication a year after his return from Europe of "A list of the Marine Algae of the United States."[1] This was merely an annotated list but it was followed in 1881 by the "Marine Algae of the New England and the adjacent coast" which included keys, descriptions, critical notes, and plates. This still remains our only scientific manual of the seaweeds of this region.

At the same time, the fresh-water algae received his attention and he was one of the first to recognize the practical importance of these plants in connection with water-supplies, as shown by his paper entitled: "Remarks on some Algae found in the Water-Supplies of the City of Boston."[2] To the Annual Report of the Massachusetts State Board of Health for 1879, he contributed a longer paper on the same subject. This has been reprinted by Prof. G. C. Whipple as "one of the classics on state sanitation."[3] The paper is not a technical one but is intended for general reading and is written in a clear style and enlivened by some characteristic passages. It was the period when, through the work of Pasteur and Koch, the germ-theory of disease was becoming prominent. The public was easily alarmed by anything that suggested germs. This led Dr. Farlow to say: "It is desirable that all who, in any sense, have charge of the public health, should have some familiarity with the common forms of plants likely to pollute drinking-water; because, as the matter now stands, the public are at the mercy of any person who, armed with a compound microscope and a supply of Latin and Greek names, chooses to alarm the neighborhood by the announcement of the appearance in the water-supplies of plants whose injurious nature is supposed to be in direct proportion to the length and incomprehensibility of their names."

Probably no field of Cryptogamic Botany is attracting more attention and more workers at the present time than the study of the fungous diseases of economic plants. In this field, also, Dr. Farlow was a pioneer. A paper in 1875 on "The Potato Rot"[4] was based on the first of a series of important studies, in connection with which the fungi were investigated both from the practical and the system-

[1] Proc. Amer. Acad. Arts and Sci. **10**: 351–380. 1875.
[2] Bull. Bussey Inst. **2**: 75–80. 1877.
[3] G. C. Whipple, State Sanitation, **2**: 39–46. Harvard Univ. Press. 1917.
[4] Bull. Bussey Inst. **1**: 319–338. 1875.

atic point of view. These studies resulted in the publication of a number of monographs, and Dr. Farlow came to be recognized as our foremost authority not only on the algae, but also on the fungi.

It is appropriate that the pages of RHODORA should record such early contributions to the study of "the local flora" as his "List of Fungi found in the vicinity of Boston"[1] in which were recorded 363 species, all of his own collecting, and supplemented by valuable critical notes; and his "Notes on the Cryptogamic Flora of the White Mountains,"[2] which in addition to enumerating a considerable list of interesting species, gave descriptions of eight new species.

Dr. Farlow's constant interest in the flora of New England led to his taking a prominent part in the movement to organize the New England Botanical Club. The first meeting was held at his house. He was unanimously elected president, and served in that capacity at all the meetings of the Club held during the first year of its existence.

While possessed of an unusual technical knowledge, Dr. Farlow was always ready to present his subject in a way that would make it generally available. But he never sacrificed accuracy to popularity. When the popular interest in mushrooms was awakened about 1894, Dr. Farlow contributed to Garden and Forest some "Notes for Mushroom-Eaters," a paper which was (to use his own words) "freed from the technicalities familiar to the expert botanist, although accurate as far as it goes."

During all these years, the instruction of students also claimed his attention. As a teacher his influence was great. His mastery of his subject, the clearness and liveliness with which he presented it, and his obvious human qualities, could not fail to win the interest of his students. Even as the students in DeBary's laboratory at Strasburg went out inspired and trained to do creative work in many fields of Botany, so as the years went by a considerable number of the men who studied with Dr. Farlow have contributed to the development of science in America.

In 1896, Dr. Farlow retired from the instruction of undergraduates, but continued to direct the work of such graduate students as desired his assistance. During the last twenty-three years of his life, his time was fully occupied with three large undertakings: a bibliograph-

[1] Bull. Bussey Inst. 1: 430–439. 1876, and 2: 224–252. 1878.

[2] Appalachia 3: 232–251. 1884.

ical index of North American fungi, illustrations of mushrooms, and the development of his already great herbarium. The bibliographical index had been started before 1880, and was intended to include all references to North American species of fungi. It was made in the form of a card catalogue, with the idea of ultimate publication. The magnitude of the undertaking may be realized when it is stated that at the time of Dr. Farlow's death the index included approximately 350,000 references. A first part of the index was published in 1905. Then the botanical congresses held at Vienna in that year and at Brussels in 1910 led to the postponement of further publication in the hope that the nomenclature of the fungi would be put upon a stable basis which might be employed in the index. For the illustrations of mushrooms, Dr. Farlow had employed the assistance of exceptionally skilful botanical artists and more than one hundred colored plates of great beauty and scientific value had been prepared and printed. It is to be hoped that the publication of both of these works may be possible in the near future.

Dr. Farlow's keenness as a collector, his exhaustive knowledge of cryptogams, his wide acquaintance with botanists in all parts of the world, and his financial resources, all contributed to the building up of the most valuable cryptogamic herbarium and library in America. Some account of the former was published in Rhodora (**3**: 242. 1901). The large collections which are of special interest to New England botanists are Dr. Farlow's own collection of algae and fungi, the Edward Tuckerman herbarium of lichens, the Faxon Sphagna, and the moss-herbaria of T. P. James and of the late Dr. George G. Kennedy. Dr. Farlow's familiarity with the lower plants was only equalled by his knowledge of the literature of the subject. His letters from Europe in 1872–74 express his desire to collect a library in his special field, and mention books that he was seizing the opportunity to buy. Of the richness of his library in recent years, only those can judge who have had the privilege of access to it. All botanists will rejoice that both herbarium and library have been left to Harvard University and that they are to bear the appropriate name of "The Farlow Herbarium and Reference Library of Cryptogamic Botany."

The recognition of Dr. Farlow's eminence in his profession was wide-spread both in America and in Europe. The honorary degree of LL. D. was conferred on him by Harvard in 1896, by the University of Glasgow in 1901, and by the University of Wisconsin in 1904. In May, 1907, he attended the celebration at Upsala, Sweden, of the 200th anniversary of the birth of Linnaeus, and received the honorary degree of Ph. D. He was a member of a large number of learned societies and academies, in several of which he held the office of president. In 1876, J. Agardh, of the University of Lund, named in his honor, Farlowia, a genus of Red Algae found on our northwest coast. In 1883, Saccardo proposed the same name for a genus of hysteriaceous fungi, and upon the discovery that the name was already in use, substituted for it, in 1891, the name Farlowiella. No attempt has been made to list the considerable number of species of algae, fungi, and lichens, named in his honor.

If one were asked to mention Dr. Farlow's distinctive characteristics one would certainly speak of his memory, his wit, his versatility, and his kindness.

I may be permitted to give a personal illustration of his memory. In February, 1915, I was working one day at the herbarium on some lichens collected in Switzerland. One minute, black lichen on a rock, I was entirely unable to place. Dr. Farlow looked at it with his lens and handed it back to me without a word, but with a characteristic "h'm." The next morning, however, I received a note from him with the name of the plant which he had collected in California in 1883! His collection was one of the two known records for America, so one can judge of the rarity of the species.

In this account of Dr. Farlow, his botanical activities have naturally been emphasized, but he was much more than a botanist. His wit, which showed itself constantly to those intimate with him, brought him a well-deserved reputation as a speaker at public dinners and at the meetings of the many societies of which he was a member. His address as retiring president of the Botanical Society of America given at Cleveland, January 1, 1913, and published in *Science* (**37**: 79–86) illustrates this characteristic. But the repetition of his stories and "asides" in cold print is inadequate to represent him since it lacks the touch of his personality.

His humor and his wide range of interests made him always welcome in social life. And this life he thoroughly enjoyed both in Cambridge and during his trips to Europe. He was noted for his hospitality even in his bachelor days, and his marriage in 1900 to Miss Lilian Horsford brought into his home a gracious hostess whose presence made the home more enjoyable than ever to their many friends.

Dr. Farlow's kindness and generosity were so unostentatious that no detailed record can ever be made. But both here and in Europe there are many persons who cherish the memory of what they owe to him. His knowledge and his collections were always at the service of all who were qualified to benefit from them. Soon after his death one of his old students, who has made important contributions to American mycology, wrote to me, saying: "I can hardly realize that his inspiring and sympathetic correspondence is at an end." Nothing can speak more forcibly of his relations to those around him than the fact that the "youngest" member of the staff of the Cryptogamic Herbarium had been with Dr. Farlow for seventeen years.

We who today work in the laboratories where he taught and in the herbarium which he created still feel keenly the consciousness of his personality, and still we look up at intervals expecting to hear his quick steps and his rapid speech, with some enlivening bit of humor or some penetrating and fruitful comment on the specimens which we are studying.

Cambridge, Massachusetts.

VARIATIONS IN LACTUCA CANADENSIS.

K. M. Wiegand.

The treatment of *Lactuca canadensis* L. and its forms in our various manuals seems not to accord exactly with what is found in the field. The writer has attempted a different classification of these variations, and the result is presented in the accompanying key. In floral and fruit characters *L. canadensis* is remarkably constant. It is only in the leaves that great fluctuation is found. Here variation is marked, as it often is in the ligulate *Compositae*.

The var. *typica* and its three following varieties are not equally related. The last three varieties are phases of one polymorphic subdivision of the species. This subdivision is to be set off against var. *typica*. These two primary divisions intergrade but little, and have slightly different, though overlapping ranges, the typical form not extending so far south. In the second group the varieties and forms show abundant intergradations. In the entire-leaved varieties, the lobed leaves have been wholly replaced, while in the obovate toothed-leaved variety the oblanceolate or obovate toothed basal leaves, frequently found in var. *integrifolia*, have spread over the whole plant. It is as though in one case the leaves were pushed toward the base of the stem through the multiplication of the upper entire leaves, while in the opposite case the lower leaves have entirely replaced the upper. The lobed leaves immediately below the entire ones in var. *latifolia* have broadly falcate divisions, while the lowermost on the same plant usually have the divisions obovate, subtruncate and toothed. When these lowest leaves are entirely eliminared through the multiplication of the entire leaves, the only divided leaves remaining are those with broadly falcate divisions. Unless this relation is understood the grouping together under one varietal head of plants apparently so dissimilar may be a trifle confusing.

The description of *L. canadensis* given by Linnaeus leaves the impression that he had in hand a form with unlobed leaves, since a character so striking would naturally have been mentioned. The species was based on a specimen of Kalm's. This Dr. Gray saw, and at that time made the note that it was the *L. elongata* of authors. Since Dr. Gray recognized a species *integrifolia*, it is to be presumed that the Kalm specimen had divided leaves. On this basis the writer is using the name *L. canadensis* L. as synonymous with and antedating *L. elongata* Muhl.

L. Steelei Britton, like *L. Morssii* Robinson, combines characters of *L. canadensis* and *L. spicata.* These are probably hybrids of the two species last mentioned. The achene in both is 3–5-ribbed and tapers to a short stout beak as in *L. spicata,* but the pappus in both is pure white. However, the leaves in the various specimens fluctuate in form between the two species.

a Leaves with linear-falcate, usually entire lobes; upper unlobed leaves (if any) linear or linear-lanceolate *b*
 b Leaf-base sagittate or auriculate.......................... var. *typica.*
 b Leaf-base tapering, not sagittate......................... f. *angustipes.*
a Leaves with broadly falcate, or obovate and obliquely truncate, entire or toothed lobes; upper leaves similar or unlobed and lanceolate or ovate-lanceolate, rarely oblanceolate or obovate, entire or rarely toothed *c*
 c Leaf-base sagittate, clasping........................... var. *latifolia.*
 c Leaf-base tapering, not sagittate...................... f. *exauriculata.*
a Leaves all unlobed, lanceolate, oblong, oblanceolate or obovate, entire or denticulate, the lowest sometimes shallowly lobed *d*
 d Cauline leaves lanceolate to ovate-lanceolate, entire or rarely toothed *e*
  e Leaf-base sagittate, clasping....................... var. *integrifolia.*
  e Leaf-base tapering, not sagittate...................... f. *angustata.*
 d Cauline leaves oblanceolate or obovate, usually toothed *f*
  f Leaf-base sagittately clasping........................ var. *obovata.*
  f Leaf-base tapering, not sagittate...................... f. *stenopoda.*

L. CANADENSIS var. **typica** var. nov. *L. canadensis* L. Sp. Pl. ed. 1, ii. 796 (1753). *L. elongata* Muhl. in Willd. Sp. Pl. iii. 1525 (1804). *L. elongata* α *longifolia* T. & G. Fl. N. A. ii. 496 (1843). *Sonchus pallidus* Willd. Sp. Pl. iii. 1521 (1804). *L. canadensis* Robinson & Fernald in Gray's Man. ed. 7. 866 (1908) in part.—Foliorum segmentis lineari-falcatis plerumque integris, basi sagittatis amplexicaulibus; foliis superioribus rariter elobatis et linearibus vel anguste lanceolatis.—Quebec and Prince Edward Island to Saskatchewan, south to Massachusetts, New York, Illinois and Missouri; also occasionally on the Pacific Coast where probably introduced.

Var. TYPICA forma **angustipes** f. nov., foliis basi angustatis nec sagittatis nec auriculatis.—A sporadic form seen from Central New York, but probably occurring elsewhere. TYPE SPECIMEN: Sheldrake, Cayuga Co., New York, 1919, *Eames & Wiegand,* in Herb. New York State College of Agriculture.

Var. LATIFOLIA O. Kuntze Rev. Gen. i. 349 (1891). *L. elongata* Ell. Bot. S. C. & Ga. ii. 252 (1822). *L. canadensis* Robinson & Fernald in Gray's Man. ed. 7. 866 (1908) in part.—Prince Edward Island to Wisconsin, south to Florida and Oklahoma. A common form in the Middle Eastern States.

Var. LATIFOLIA forma **exauriculata** f. nov., foliis basi angustatis nec sagittatis nec auriculatis.—Seen from Massachusetts, Connecticut, Central New York and Florida. TYPE: Wenham, Mass., *C. E. Faxon*, in Gray Herb.

Var. INTEGRIFOLIA (Bigelow) Gray Man. ed. 5. 281 (1869). *L. integrifolia* Bigelow Fl. Bost. ed. 2. 287 (1824). *L. sagittifolia* Elliott Bot. S. C. & Ga. ii. 253 (1822), and Gray's Man. ed. 7. 867 (1908). *L. elongata* β *integrifolia* T. & G. Fl. N. A. ii. 496 (1843). *L. canadensis* var. *montana* Britton in Britton & Brown Ill. Flora N. U. S. & Can. iii. 274 (1898).—Prince Edward Island to Wisconsin, south to South Carolina, Illinois, Oklahoma and Nebraska.

Var. INTEGRIFOLIA forma **angustata** f. nov., foliis basi angustatis nec sagittatis nec auriculatis.—A sporadic form seen from Pemberton, Massachusetts, Southington, Connecticut, Delaware, central New York, and a doubtful specimen from Illinois. TYPE: Southington, Connecticut, 1892, *C. H. Bissell*, no. 333, in Gray Herb.

Var. **obovata** var. nov. *L. integrifolia* Robinson & Fernald in Gray's Man. ed. 7. 266 (1908). Foliis omnibus oblanceolatis vel obovatis elobatis vel infimis paullo lobatis; margine integris vel plerumque plus minusve denticulatis; basi sagittatis.—Maine to Indiana and Nebraska, south to New Jersey and Oklahoma. TYPE: Maugus Hill, Wellesley, Mass. 1897, *E. F. Williams*, in Gray Herb.

Var. OBOVATA forma **stenopoda** f. nov., foliis basi angustatis nec sagittatis nec auriculatis.—Specimens seen from Connecticut and Oklahoma. TYPE: valley of Stink Creek near Tonkana, Kay County, Oklahoma, 1913, *G. W. Stevens*, no. 1812, in Gray Herb.

CORNELL UNIVERSITY, Ithaca, New York.

SOME VARIATIONS OF CARDAMINE PRATENSIS IN AMERICA.

M. L. FERNALD.

To one who is familiar with the pink-petaled Cuckoo Flower which is frequently naturalized on lawns and in meadows from Newfoundland to New England an excursion, such as the recent field-trip of the New England Botanical Club, to Berkshire County, brings a great surprise. The familiar pink-flowered plant about Boston grows, as stated, in lawns or grassy meadows and is obviously a recent introduction. This plant is also found in lawns in Berkshire County; but in the deepest woodland swamps, in the quaking and almost inaccessible margins of marl- or mud-ponds or in cold bogs occurs an unquestionably indigenous plant with milk-white petals. This is the plant which throughout most of British America and the northern States is passing as *Cardamine pratensis.* This indigenous plant with white petals occurs in the habitats above described or on cold springy spots from Ungava to the mouth of the Mackenzie, south, chiefly in calcareous regions, to Newfoundland, Anticosti Island, the Gaspé Peninsula, Berkshire Co., Massachusetts, perhaps northwestern Connecticut, northern New Jersey, central and western New York, northern Ohio, northern Indiana, Minnesota and northern British Columbia; and it is noteworthy that the keen observer, Professor John Macoun, should have appended to the list of stations in his *Catalogue of Canadian Plants* the comment: "The Canadian form is usually more slender than the European, and always white flowered."[1]

Color of petals alone is usually a very unsafe character, but in this case it is certainly significant that our indigenous plant should so generally have white, while the true *Cardamine pratensis* of Eurasia, the plant recently introduced into the Northeast and selecting drier habitats than the native, has pink petals. Typical *C. pratensis* as generally defined by European authors has the leaflets of the basal rosette, or at least the terminal leaflets, distinctly crenate or dentate with several teeth, while the middle and upper cauline leaves have the linear to oblong leaflets not abruptly contracted at base. In our white-flowered indigenous plant, on the other hand, the leaflets of the rosette-leaves are most commonly entire, although they may occasionally be shallowly toothed, while the lateral leaflets of the middle and often of the upper cauline are usually oblanceolate to elliptic and distinctly contracted to petiolules. In these characters our plant entirely agrees with *C. pratensis,* var. *palustris* Wimmer & Grabowski,[2] at least as identified by O. E. Schulz in his *Monographie der Gattung Cardamine.* Several European specimens thus identified by Schulz are inseparable from our plant and the essential characters of the variety as given by Schulz are satisfactory: "folia caulina . . . foliola elliptica vel oblonga, ± integra, lateralia manifesto . . . petiolulata . . . Petala plerumque alba."[3] The plant

[1] Macoun, Cat. Can. Pl. i. 41 (1883).
[2] Wimm. & Grab. Fl. Siles. ii. pt. 1, 266 (1829).
[3] O. E. Schulz, Engler's Bot. Jahrb. xxxii, Heft 4, 533 (1903).

has had various names indicative of its habitat: *C. palustris* Peterm., *C. paludosa* Knaf, *C. fontinalis* Schur and *C. pratensis*, var. *fossicola* Godet. In contrast with the usually inundated habitats of this white-flowered variety we have the meadow- and turf-habitats of true *C. pratensis*, habitats well indicated by its name; and in Bailey's *Standard Cyclopedia of Horticulture* the latter plant is said to be "also useful in drier places, as in rockeries." A few sheets in the Gray Herbarium of the indigenous plant have been referred by Schulz to var. *dentata* (Schultes) Neilreich, but whether or not the latter variety is distinguishable in Europe it is certain that our American white-flowered bog plant cannot be satisfactorily regarded as two varieties. Schulz further maintains, in his discussion of var. *palustris*, that Kerner had been in error in considering that var. *palustris* had a distinct range from that of typical *C. pratensis*, saying "Eine besondere geographische Verbreitung besitzt demnach die Pflanze nicht, wie Kerner in Schedae ad Fl. Exs. Austro-Hung. III. 74 (1884) annahm." As an indigenous plant in America, true *C. pratensis* seems to occur only in Alaska. It is therefore clear that on this continent at least the two plants have decidedly different ranges.

In the Arctic regions, extending south with us to the Aleutian Islands and to northeastern Labrador is a low extreme with usually pink petals and with the leaflets of the basal leaves linear to elliptic. This is var. *angustifolia* Hook.

One other variation of *Cardamine pratensis* demands a special comment. This is the pink-flowered plant with "double" flowers, an old-fashioned garden plant which in eastern Massachusetts has become abundantly naturalized along Stony Brook in Middlesex County. This is forma *plena* Beck von Mannagetta. Although considered merely a form of true *C. pratensis* with numerous petals it is noteworthy that the plant now naturalized along Stony Brook, as well as such European specimens as the writer has seen, has the leaflets unusually broad and more inclined to be petiolulate.

Briefly summarized, these variations may be distinguished as follows:

Lateral leaflets of the basal leaves with ovate to reniform blades: the terminal obovate to reniform, 0.35–3 cm. long: stem 1.5–5 dm. high.
  Terminal leaflet of basal leaves distinctly crenate or dentate, with 3–9 teeth: petals pink.
    Petals in a single series: lateral leaflets of the middle and upper cauline leaves linear to oblong, sessile or nearly so. . . . *C. pratensis* (typical).

Petals very numerous: lateral leaflets of the middle and upper cauline leaves oblanceolate to oblong-obovate, petiolulate
C. pratensis, forma *plena*.
Terminal leaflet of the basal leaves entire or obscurely toothed; lateral leaflets of the middle and upper cauline leaves usually with a distinct petiolule: petals white.................*C. pratensis*, var. *palustris*.
Lateral leaflets of the basal leaves with linear to oblong blades: the terminal oblong to ovate, 1–6 mm. long: stem 0.7–2.5 dm. high.
C. pratensis, var. *angustifolia*.

C. PRATENSIS L. Sp. Pl. ii. 656 (1753); for detailed synonymy see O. E. Schulz, Engler's Bot. Jahrb. xxxii. Heft 4, 524 (1903).—Eurasia, Alaska; and as an introduced plant in lawns and meadows, Newfoundland to New England.

Forma PLENA Beck von Mann. Fl. Nied. Oesterr. i. 454 (1890).—Thoroughly naturalized in wet meadows along Stony Brook, Middlesex Co., Massachusetts, first collected in 1886 (*W. W. Nolen*).

Var. PALUSTRIS Wimm. & Grab. Fl. Siles. ii. pt. 1, 266 (1829). *C. pratensis*, var. *oblongifolia* Peterm. Fl. Lips. 483 (1838). *C. palustris* Peterm. in Rabenh. Bot. Centralbl. i. 47 (1846). *C. paludosa* Knaf, Flora, xxix. 293 (1846). *C. pratensis*, var. *fodinarum pendula* Schur, Verh. Mitt. Siebenb. Ver. Nat. iv. 61 (1853). *C. grandiflora* Hallier. Bot. Zeit. xxiv. 209 (1866). *C. fontinalis* Schur, Enum. Pl. Transsilv. 48 (1866) acc. to Schulz. *C. pratensis*, var. *fossicola* Godet, Suppl. Fl. Jura, 13 (1869). *C. pratensis*, var. *dentata* O. E. Schulz, l. c. as to American plant, probably not var. *dentata* (Schultes) Neilr. Fl. Nied. Oest. ii. 718 (1859).—Eurasia; Ungava to Mackenzie, south in shallow water, bogs, springs and swampy woods to Newfoundland, Anticosti Island and Gaspé and Bonaventure Cos., Quebec, Berkshire Co., Massachusetts, ? Litchfield Co., Connecticut, Morris Co., New Jersey, central and western New York, northern Ohio, northern Indiana, Minnesota and northern British Columbia.

Var. ANGUSTIFOLIA Hook. Fl. Bor.-Am. i. 45 (1829). *C. polemonioides* Rouy & Fouc. Fl. France, i. 234 (1893).—Arctic regions, south to northeastern Labrador (Rama) and the Aleutian Islands.

Schulz cites a specimen from Niles, Michigan, collected by *Wm. Boott* as belonging here. The plant, however, has the basal leaves and the white petals of var. *palustris* and is apparently an unusually small-leaved extreme of that. Var. *angustifolia* has either white or purplish petals, Professor John Macoun making the statement that "All the arctic specimens have purple flowers" (Cat. Can. Pl. i. 486).

GRAY HERBARIUM.

A NEW SPECIES OF SPERGULARIA.

K. M. Wiegand.

In the central portion of New York State, on the plain lying between Lake Ontario and the plateau region farther south, are found numerous salt springs which render the soil in the vicinity decidedly brackish. In a lesser degree the influence of the salt extends through the swamps and waters of that whole region. To this factor is largely due the very interesting assembly of coastal plants found in Central New York. Some are distinctly maritime, as *Ruppia maritima, Najas marina, Chenopodium rubrum, Leptochloa fascicularis* and *Ranunculus Cymbalaria,* while others are coastal in nature but less distinctly maritime, as *Hibiscus Moscheutos, Phragmites communis, Listera australis, Potamogeton filiformis* and *Carex alata.* In desiccated places on the salt flats and bordering the salty pools Spergularias occur often in considerable abundance. Plants of this genus are found also around the salt works at Syracuse, N. Y., about thirty miles distant toward the east. In a paper on the Spergularias of northeastern North America, Fernald and Wiegand (Rhodora xii. 157, 1910) noted that the species at Syracuse was *S. marginata* (DC.) Kit. not known elsewhere from North America. Since that time the writer has collected both *S. marginata* and *S. salina* at Syracuse. He was therefore greatly surprised to find that the Spergularia at the stations farther west was not the same. A study of the material in the Gray Herbarium has shown that these plants are unlike any species in that collection from America, and a diligent search failed to show any similar foreign species. It is possible that they represent a local endemic species in this region, though this is not usual in a glaciated country like New York State. It has seemed desirable to call the attention of botanists to this plant in the hope that it may be found elsewhere. The species may be described as follows:

S. **alata** sp. nov. magnitudine habituque *S. leiospermae* (Kindb.) Schmidt et *S. salinae* J. & C. Presl simillima, verisimiliter annua vel biennis glabra vel in pedunculis et rarissime etiam in internodiis superioribus sparse glandulari-pubescens; stipulis late deltoideo-ovatis acutis; bracteis foliaceis; petalis quam sepala brevioribus roseis; staminibus 4–6; sepalis ovatis vel oblongo-ovatis plerumque obtusis quam capsula magna (5–7 mm. longa) dimidio vel saltim quarta parte brevioribus; pedicellis infimis maturitate 7–14 mm. longis; seminibus 0.7–0.8 mm. longis irregulariter ovalibus saepissime omnibus alatis, alis tenuibus erosis.—Brackish soil about salt springs and salt ponds in Central New York. Cayuga County; salt pond west of Howland Island, 1917, *Metcalf & Wiegand*, no. 8064, and 1919, *Eames, Randolph & Wiegand*, no. 12005; salt flats east of Montezuma Village, 1916, *Metcalf & Wiegand*, no. 6406 (TYPE in Gray Herb.), and 1919, *Eames, Randolph & Wiegand*, no. 12004.

This plant differs from *S. marginata* (DC.) Kit. in the thinner erose wing of the seeds, in the more glabrous stems, more foliaceous bracts, and probably also in the annual root. From *S. salina* J. & C. Presl it differs in the more glabrous stems, more foliaceous bracts, longer pedicels, larger capsules, and non-papillose, winged seeds. From *S. leiosperma* (Kindb.) Schmidt it may be distinguished by the longer pedicels, larger capsules, and winged seeds. The seeds of the last two species are rarely winged. In appearance the plant most resembles *S. marginata*, probably because of the large capsules and long pedicels.

Cornell University, Ithaca, New York.

A Correction.—Through an error, *Littorella uniflora* was reported in the October issue of Rhodora (xxi. 191) as collected at "The Gut," South Hero, Vermont. The plant in question was *Myriophyllum tenellum*, which is occasional in the state according to the Flora of Vermont.—Mrs. Nellie F. Flynn, Burlington, Vermont.

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THE GENUS ELODEA IN NEW ENGLAND.

Harold St. John.

Many New England botanists have recently realized that *Elodea*, as represented in their region, was not one uniform species, *E. canadensis* Michx, as it had so long been considered. The credit for this renewal of interest in the genus should, in large part, go to Dr. P. A. Rydberg, who perceived the fundamental importance of the floral differences, correlated them with the leaf characters, and gave us our first comprehensive treatment[1] that even approximated the true taxonomic relationships.

Adherents of the International Rules, however, cannot follow Rydberg in adopting Rafinesque's name *Philotria*,[2] since *Elodea* of Michaux is the first published name for the genus. The earlier name *Elodes* of Adanson[3] for what is now considered a section of *Hypericum*, would not under the International Rules invalidate *Elodea* of Michaux, even if the former were still maintained as of generic rank.

The reason for the imperfect understanding of this genus is, of course, the fact that the best characters are to be found in the flowers, which are so evanescent that they may be found on only a few days out of the year. Sterile material can be identified with reasonable surety, but only after one has determined the specific limits by the study of flowering material.

Michaux when founding the genus described[4] his *Elodea canadensis* as with perfect flowers, having the floral tube prolonged into a long

[1] Rydberg, P. A., Notes on Philotria Raf. Bull. Torr. Bot. Cl. xxxv. 457–65 (1908).

[2] Rafinesque, C. S., Review of Pursh's Flora of North America. Am. Monthly Mag. ii. 175 (1818).

[3] Adanson, M., Fam. des Pl. ii. 444 (1763).

[4] Michaux, A., Fl. Bor.-Am. i. 20 (1803).

thread, sheathed at base with a long spathe, the ovary sessile, the style elongate, the 3 stigmas two-parted, the 3 stamens cordate, borne on thick filaments opposite the outer of the 6 perianth lobes, and the leaves in whorls of 3, oblong and obtusish. According to Caspary it appears from the data with the specimens that they were found near Montreal, while the published statement is brooks of Canada ("in rivulis Canadae"). There are six specimens, two of them with flowers.

By some unknown agency this species was introduced into Europe where it was found at Warringstown, Ireland,[1] in 1836 by a gardener, John New. In 1842 it appeared in the lake of Dunse Castle, Berwickshire, Scotland, and near Dublin, Ireland; in 1847 in the Foxton Locks near Market Harborough, Leicestershire, and at Chichester, Hampshire, England. This strange exotic was cultivated in the botanical gardens on the continent, and it soon spread to the adjacent rivers and canals and now is one of the commonest hydrophytes of western Europe. It is now commonly known in England as American duckweed, riverweed, waterweed, Babington's curse, water thyme, choke pondweed; in Ireland as cat's tails; in France as élodée du Canada; in Germany as Wasserpest, kanadische Wasserpest; in Holland as waterpest, engelsch ruigt, professerskruid, studentenroet; in Denmark as Vandpest; in Sweden as Vattenpest; and in Italy as peste d'acqua. Most of these names have an uncomplimentary connotation, the plant being either a weed or a pest. It is difficult for a botanist who has searched for this water plant in New England, and perhaps succeeded a few times in finding it in the western parts of Vermont, Massachusetts, or Connecticut, to think of it as a serious water pest. It is uncommon or local, and certainly not a troublesome weed, but when introduced into Europe it spread like wild fire and became a serious menace to drainage and navigation through choking up the rivers and canals. Two well authenticated cases are quoted to illustrate this. "In 1847 a specimen[2] from the Foxton Locks was planted in a tub, in the Cambridge Botanical Garden; and in 1848 the late Mr. Murray, the Curator, placed a piece of it in the conduit stream that passes by the new garden. In the follow-

[1] Horn, P., Ueber die sogenannte "Wasserpest" (Elodea canadensis Casp.). Archiv der Pharmacie (or Deutscher Apotheker-Verein) 3rd ser. i. 51–68 (1872); Zur Entwicklungsgeschichte der Blüthe von Elodea canadensis 426–433 (1872).

[2] Marshall, W., Excessive and noxious Increase of Udora Canadensis (Anacharis Alsinastrum). Phytologist iv. 714 (1851).

ing year, on Mr. Babington asking what had become of the stick which marked the site of the plant, he was informed that it had spread all over the ditch. From this point it doubtless escaped, by the waste pipe, across the Trumpington Road into the 'Vicar's Brook,' and thence into the river above the mills, where it is now found in the greatest profusion. In the case of the Cam, then, we see it proved to demonstration, that the short space of four years has been sufficient for one small piece of the Anacharis to multiply so as to impede both navigation and drainage. When Professor Gray, of Boston, U. S., was at Cambridge, Mr. Babington mentioned the circumstances to him, at which he expressed surprise, as the Anacharis is not found to spread in this active manner in America. Perhaps our sluggish streams, the decomposing vegetable and animal matters in our Cambridge waters, and especially the excess of lime present (fifteen to seventeen grains in the gallon), furnishing an inexhaustible supply of inorganic food, may account for its more rapid increase here than in America."

It is noteworthy that with the exception of two stations in eastern Massachusetts, Lake Quannapowitt, Wakefield, Andover, and a third near Providence, Rhode Island, we know the true *Elodea canadensis* in New England only from western Vermont, Berkshire County, Massachusetts, and western Connecticut, regions abounding in limestone strata. Marshall's suggestion that the limy nature of the waters in England may be the factor so favorable for its rapid growth and dispersal, receives interesting confirmation from the rarity of *Elodea canadensis* in America in regions that are not decidedly limy.

"The American weed[1] (*Anacharis Alsinastrum*) is causing a great amount of anxiety here on account of its amazing growth, and the tenacity with which it clings to those spots where it once takes possession. There is a beautiful sheet of water, of about eighty acres, through which the river Trent passed previous to the year 1853, when its channel was diverted, but there are still places where the connection is maintained, although but slightly so. About three years ago the *Anacharis* first made its appearance in the river, a short distance above the lake; it had previously taken possession of the Trent and Mersey Canal, with which there are means of communication, and a month afterwards it was visible in the lake. Both

[1] Marshall, W., The American Water-Weed. Phytologist n. s. ii. 195 (1857–8).

last year and the previous one it had increased so rapidly as to require removal by manual labour: *but the more it was disturbed the faster it grew.* This year it covers the entire surface, and *in so dense and wonderful a manner that no amount of labour seems capable of removing it, or even keeping it under. It actually grows faster than it can be cleared off*, the mode of which is, first by cutting, and then by drawing it together by means of long rafts, collecting it on the shore, and either carting it away or placing it in heaps for decomposition."

In 1848, after this strange new waterweed had been found several times and sent to him twice, Babington[1] described it as *Anacharis Alsinastrum.* It has been stated repeatedly that this plant produces in Europe only pistillate flowers. In America it is said to produce perfect flowers. Babington, however, states that the female flowers have three subulate filaments, lacking anthers. Marshall[2] says, "it flowers in our still waters in the greatest profusion, covering the surface with its tiny blush-colored flowers and silky threads, but I have never found any but females. From the peculiar character of the female flower (by which I mean the fact that although there are no *perfect* stamens present, yet *the filaments* are always there, wanting only anthers to surmount them to make the flowers perfectly hermaphrodite), * * *." These flowers have been figured in European works, and their plan is 3 sepals, 3 petals, 3 bipartite stigmas, and 3 filaments or staminodia. See, for instance, the beautiful plate in the English Botany.[3] The American literature is full of references to the staminate flowers of *Elodea canadensis,* but it seems clear now, that in every case this was due to a confusion with some one of the other species of *Elodea,* all of which do have distinct staminate flowers. It is true that Caspary identified with Michaux's material of *Elodea canadensis* some specimens from Bethlehem, Pennsylvania, *C. J. Moser,* 1832, which he says have 7 stamens and no stigmata. The writer feels confident that these specimens of Moser's belong to another species. To summarize, as *Elodea canadensis* Michx. occurs in Europe it produces pistillate flowers with 3 filaments or staminodia. All flowering material from America examined by the writer has exactly the same sort of flowers, pistillate flowers with 3 staminodia.

[1] Ann. & Mag. Nat. Hist. II. i. 83 (1848); translated in Ann. Sci. Nat. Bot. 3rd ser. xi. 69 (1849).

[2] Phytologist n. s. ii. 196 (1857–8).

[3] Smith, J. E. & Sowerby, English Bot. Supplement pl. 2993 (1865).

Through the careful observations of several workers we now know that the other North American species have one type of flowers identical in structure with the only type produced by *E. canadensis* Michx., that is pistillate flowers bearing 3 staminodia. This was demonstrated for the species *occidentalis* by R. W. Woodward,[1] for *Nuttallii* by Nuttall,[2] and for *Planchonii* by Wylie.[3] Thus in the structure of its floral parts *E. canadensis* stands apart from these other species only in its total lack of any distinct staminate flowers. We have only Michaux's statement that his plant had three terminal cordate anthers borne on thick filaments ("TRIANDRIA * * * filamenta crassa: antherae terminales, cordatae"). This leaves us with a question that can only be settled by field work in the streams and ponds of the limy regions from Quebec to the mountains of Virginia, westward to Minnesota and southern Saskatchewan. Does *Elodea canadensis* ever produce perfect flowers, or are they always pistillate flowers with 3 filaments or staminodia?

In 1814, Pursh described[4] a *Serpicula occidentalis*. He bases this in part on *Elodea canadensis* Michx., quoting Michaux's name as a synonym and giving the reference to Michaux's Flora. In the description there is an element that tallies exactly with *Elodea canadensis* as described by Michaux from the rivers of Canada: the flowers being perfect, with three stamens, with strap-shaped reflexed biparted stigmas. But, to this Pursh adds, "foliis ternatis linearibus acutis. * * * In stagnant waters, frequent; from Canada to Virginia. ♃. July. *v.v.* * * *. Michaux describes the leaves to be oblong and obtuse, which is only the case in the early part of the season: at flowering time they certainly are long, linear, and acute." It will be apparent that Pursh had himself seen a species of this genus, probably in Virginia, one which even at flowering time had long linear acute leaves. There is such a species, and it is easily distinguished from *Elodea canadensis* Michx. on these vegetative characters, as well as floral characters which Pursh does not mention, drawing his description of the floral parts from Michaux and his *E. canadensis*. This linear-leaved species has a more southerly range, not being known from Canada. It occurs in southern Maine,

[1] Rhodora xxi. 219 (1919).
[2] Nuttall, Thomas, Gen. N. Am. Pl. ii. 242 (1818).
[3] Iowa State Univ. Nat. Hist. Bull. vi. 49 (1913).
[4] Pursh, Frederick, Fl. Am. Sept. i. 33 (1814).

eastern Vermont, eastern Massachusetts including Essex, Middlesex, Suffolk, Norfolk and Barnstable Counties, Rhode Island, eastern and central Connecticut, Long Island, New York City, regions of the lower Delaware River, lower Susquehanna River, Chesapeake Bay, and westward to Wisconsin, Missouri, Nebraska, and in Oregon. In most of these regions the soil is derived from granitic or sandy sources, and the element of lime is conspicuous by its absence. To this species Pursh's name *occidentalis,* excluding the synonym *Elodea canadensis* Michx. and the part of the description drawn from it, is applicable, and as it is the first name for it within the specific category, the new combination is made here. The more northern *E. canadensis* is known to the writer from a station in the mountains of Virginia, and another in Kentucky, but these are the only stations south of southwestern Connecticut.

For this plant, in the eastern part of its range, Rydberg takes the name *Serpicula verticillata, B. angustifolia* Muhl.[1] and makes the specific combination. This varietal name *angustifolia* Muhl., although a nomen subnudum, seems to be properly applied to this plant, but if it is considered a species, as by Dr. Rydberg and the writer, the varietal name must be replaced by the first specific name, *occidentalis* Pursh, which was the first name in the proper category.

From this species Rydberg[2] distinguishes *Philotria minor* (Engelm.) Small which has similar staminate and pistillate flowers, but differs in having the "Leaves 5–8 mm. long; sepals and petals 1–1.5 mm. long" instead of "Leaves 1 cm. long or more; sepals and petals 1.5–2 mm. long" and growing in the central valley of the United States instead of in the northern Atlantic states. There is a good specimen of Engelmann's *Udora verticillata ? minor* from St. Louis, 1845, in the Gray Herbarium. This was first published[3] in synonomy under *Anacharis Nuttallii* Planchon. It was the basis of *Philotria minor* (Engelm.) Small.[4] There is no wide gap between the ranges of *occidentalis* and *minor* nor can the writer distinguish any differences in the flowers or leaves. Consequently *minor* is placed in the synonomy of *occidentalis.*

In an article on the "Morphology of Elodea canadensis," Robert B. Wylie[5] gives some important details of the phenomena of pollination.

[1] Muhlenberg, Henry, Cat. Pl. N. Am. 84 (1813).
[2] Bull. Torr. Bot. Cl. xxxv. 463–5 (1908).
[3] Pringsheim's Jahrb. wissen. Bot. i. 465 (1858).
[4] Small, J. K., Fl. S. E. U. S. 47 (1903).
[5] Wylie, Robert B., Bot. Gaz. xxxvii. 11 (1904).

It is clear from the context that his observations were made on the species here treated as *occidentalis*. "The staminate flowers are borne entirely beneath the surface of the water, and these, as is well known, break off and rise to the surface, there shedding the pollen. It is probable that with the ripening of the sporangia, in the still submerged flower, gases given off by the plant fill the spaces about the spores as well as any other cavities developed in the flower. At maturity a bubble of oxygen forms at the tip of the flower, and with its enlargement the sepals open slightly. At this time, looking down into the flower one can see that the sporangia have opened, and that many of the spores have been shed into the central space. The oxygen bubble may finally become nearly as large as the flower, and, when conditions are proper, the buoyancy of the enclosed gas, aided by the low specific gravity of the flower itself, overcomes the weakened attachment, and the flower darts to the surface. Upon reaching the surface the bubble disappears, the sepals snap back quickly, and in their recurved position form three boat-like floats which support the sporangia above the water; these catch the breeze and the flower sails away. While such float devices for the staminate flower are thought to be of great importance in the pollination of Vallisneria, it is doubtful if any significance can be attached to them in Elodea. The pollen was nearly all discharged at the moment the flower came to the surface, and any remaining portion would have no better opportunity for reaching the stigma of the pistillate flower. The snow-white tetrads are quite conspicuous floating on the water, or scudding along the surface with the wind.

The floating of the pollen grains is due to the nature of the outer spore coat. In a previous paragraph it was mentioned that the exine was covered with spines, each bearing at its tip a slight enlargement; these spines tend to hold back the surface film from contact with the body of the spore, and thus imprison enough air to keep it afloat. The microspore has a greater specific gravity than water, and will sink at once if wetted. * * *

While the gas bubbles may not be necessary for pollination, they are certainly very helpful. Their buoyancy aids in detaching the flowers, raises them quickly to the surface, and the sudden recurving of the sepals may be related in some way to the escape of the bubbles on reaching the air. The accumulation of gas about the spores of the submerged flower is also of significance in that it prevents the moistening of the ripe spores while yet submerged; for this, as we have seen, would lead to their sinking or release. * * * *

The pistillate flower, as has been noted above, reaches the surface of the water by the lengthening of the fused parts above the ovary. * * * The floral parts * * * * are repellent to water and so resist wetting for many hours. With the opening of the flower the three prominent stigmas quickly recurve, arching well out over the floral envelopes. Lying thus, commonly on its side at first, the weight of the flowers rests chiefly on the stigmas. Since the stigmas are not readily wetted by water, they form a depression in the surface film. Pollen grains floating near the flower therefore approach and quickly slide down into contact with the stigma. There is thus established about each flower 'a circle of influence,' which in quiet waters is about 2 cm. in diameter, and spores floating into this area are immediately brought into contact with the stigma. * * * *

It will be seen that the whole process of pollination is dependent in one way or another upon the *surface film* of water."

Later this species was observed during two successive seasons by R. W. Woodward, and he gives a detailed, accurate description[1] of the gross morphology of the staminate and pistillate flowers, and comments on the mechanism of cross fertilization of this dioecious species. As he points out, the pistillate flowers are borne from spathes in the upper axils that sheathe the base of the long floral tube which elongates and pushes the flower bud to the surface of the water. In the fresh material Woodward observed staminodia, thus demonstrating that *E. canadensis* differs in the morphology of its flowers only in the absence of staminate flowers. The staminate flowers of *E. occidentalis* are tiny globose affairs about 2 mm. long sessile in the middle or lower axils. The staminate spathe encloses the flower tightly, and may be prolonged into a short apiculate tip.

Rydberg distinguished *Philotria Nuttallii* (Planchon) Rydb.,[2] another species which has its floral structure similar to the preceding. It was launched by Planchon as a doubtful species based on *Udora canadensis* Nutt.,[3] excluding the synonym *Elodea canadensis* Michx. Rydberg takes it up for "plants referred to *Elodea canadensis* Michx.,

[1] Rhodora xxi. 218 (1919).
[2] Bull. Torr. Bot. Cl. xxxv. 461 (1908).
[3] Nuttall, Thomas, Gen. N. Am. Pl. ii. 242 (1818).

but with more narrowly oblong, often somewhat acutish leaves. * * * The spathe is like that of *P. angustifolia*, but larger, 5–6 mm. long, the anthers in the unopened flower 2–2.5 mm. long." He had one sheet from New Jersey with staminate and pistillate flowers and other pistillate and sterile plants from New York and Virginia. The writer has seen one sheet, with sessile staminate spathes 5 mm. long, the anthers 2 mm. long, immature pistillate flowers, the leaves narrowly oblong, acutish, much stiffer than those of *occidentalis* and not crowded at the summit of the stem as those of *canadensis*. This tallies exactly with *Nuttallii*, and there are several sheets from a broad range that on their vegetative characters would be put into *Nuttallii*. There are, however, two sheets from southern New England which throw a shadow of doubt on the specific value of the characters of *Nuttallii*. They are *S. N. F. Sanford*, no. 454, in slow stream, Fall River, Massachusetts, August 14, 1913; and *C. A. Weatherby*, no. 3,596, coll. *E. B. Harger & C. A. Weatherby*, shallow water of Housatonic River, Huntington, Connecticut, September 17, 1914. They combine the vegetative characters of *Nuttallii* and the floral characters of *occidentalis*. These will be considered as intermediate specimens and consequently *Nuttallii* as a doubtful species needing further study.

The only other species occurring in New England is *Elodea Planchonii* Caspary. As a matter of fact these four species, all occurring in New England, are, after a study of the specimens in the Gray Herbarium, the Herbarium of the New England Botanical Club, the Herbarium of Brown University, and the private herbaria of Mr. Walter Deane and Mr. C. A. Weatherby, all the species that the writer has been able to recognize in the United States and Canada. He has seen no material to represent *Philotria linearis* Rydb. *Anacharis canadensis* Planchon[1] based on material from Canada: Saskatchewan, *Drummond;* and Canada: *Cleghorn* was reclassified as *Elodea Planchonii* Caspary.[2] There is a good duplicate of the *Drummond* specimen in the Gray Herbarium. The flowers are dioecious, like those of *occidentalis* and *Nuttallii*, but the staminate flowers are remarkably distinct. When young they are sheathed in a spathe which is narrowed to a pedicel-like base. The swollen terminal portion has its upper end open like a wide gaping mouth.

[1] Ann. Sci. Nat. Bot. 3rd ser. xi. 75 (1849).

[2] Pringsheim's Jahrb. wissen. Bot. i. 468 (1858).

In maturing the staminate flower is pushed up to the surface of the water on a long slender thread-like stalk, in the same manner as is the pistillate flower. They have sepals 5 mm. long, and anthers 2.5–4 mm. long. This very distinct plant has recently been re-described as *Elodea Iowensis* Wylie (*Philotria Iowensis* Wylie),[1] as *Philotria Iowensis* Wylie (*Elodea Iowensis* Wylie),[2] and as *Elodea ioensis* Wylie.[3] Wylie contrasts his species with *E. Planchonii* Caspary, laying emphasis on his new species having the staminate spathe "sessile, contracted at base" instead of as in *Planchonii* having the staminate "Spathe peduncled." This difference exists only in the terminology employed by Wylie and by Rydberg. *E. Planchonii* Caspary was described as having no petals in the staminate flowers. Wylie described and figures[4] *E. ioensis* Wylie as having, in the staminate flowers, linear lanceolate petals, ¼ mm. wide. Examination of a staminate flower from the duplicate type of *E. Planchonii* showed no petals. None of the other material at hand, including Wylie's distribution of *E. ioensis*, showed any petals. It is probable that the petals in the staminate flowers are evanescent, and only to be seen when flowering material is kept under constant observation, as did Wylie with his plant at East Okoboji Lake, Iowa. Comparison of duplicate type material of *Elodea Planchonii* Caspary with authentic and beautifully prepared material of *E. ioensis* Wylie distributed by Wylie himself, proves the two to be identical.

Key to the New England Species of Elodea.

A. Staminate flowers wanting; leaves firm, oblong or ovate-oblong, usually obtuse, crowded and strongly imbricated at the summit of the stem.
1. *E. canadensis* Michx.

A′. Staminate flowers present; leaves linear, lance-linear, lanceolate, or lance-oblong, usually acute, the internodes marked, the leaves divergent, scarcely imbricated even at the summit of the stem.

B. Staminate spathes sessile, the tips not widely divergent; peduncles of staminate flowers not exceeding the spathes, at anthesis breaking and setting free the flowers which float to the surface of the water, sepals not exceeding 2.5 mm. in length, anthers less than 2.5 mm. long.

C. Staminate spathe globose apiculate, the body about 2 mm. long, anthers 0.8–1.1 mm. long; leaves linear, flaccid.
2. *E. occidentalis* (Pursh) St. John.

C′. Staminate spathe lanceolate-ovate, 5–6 mm. long, the anthers 2 mm. long; leaves lance-oblong, firm.
3. *E. Nuttallii* (Planchon) St. John.

[1] Proc. Iowa Acad. Sci. xvii. 82 (1910).
[2] Science n. s. xxxiii. 263 (1911).
[3] Iowa State Univ. Nat. Hist. Bull. vi. 48 (1913).
[4] Iowa State Univ. Nat. Hist. Bull. vi. pl. 2, f. 7 (1913).

B′. Staminate spathe narrowed into a peduncle-like base as long as the expanded body, which ends in a gaping mouth, formed by the deeply cleft tip and the widely divergent points; staminate flowers pushed to the surface of the water by an elongating thread-like pedicel, sepals 4–5 mm. long, anthers 2.5–4 mm. long; leaves lance-oblong.
4. *E. Planchonii* Caspary.

1. Elodea canadensis Michx. Fl. Bor.-Am. i. 20 (1803). *Anacharis Alsinastrum* Bab. Ann. & Mag. Nat. Hist. II. i. 83 (1848), and Ann. Sci. Nat. Bot. 3rd ser. xi. 74 (1849). *Elodea latifolia* Caspary, Pringsheim's Jahrb. wissen. Bot. i. 467 (1858).

Illustrations: Ann. Sci. Nat. Bot. 3rd ser. xi. pl. i. (1849); Bot. Zeit. xvi. pl. ix (1885); Smith, J. E. & Sowerby: English Bot. Supplement pl. 2,993 (1865); Coste, H.: Fl. de France iii. 290 (1906); Britton & Brown: Ill. Fl. ed. 2, i. fig. 248 (1913).

Distribution: Ponds and streams, especially in calcareous areas from Montmorency County, Quebec, south to the mountains of Virginia and Kentucky, and westward to southern Saskatchewan. Quebec: Sainte Anne de Beaupré, Aug. 30, 1905, *J. Macoun,* no. 68,806; Sargent's Bay, Lake Memphremagog, Aug. 3, 1903, *Churchill;* Fitch Bay, Lake Memphremagog, Aug. 18, 1906, *Churchill;* Pickanock River, Aug. 16, 1894, *J. Macoun.* Vermont: Little Otter Creek, Ferrisburg, Aug. 16, 1896, *Eggleston & Grout;* Lake Bomoseen, West Hubbardton, Oct. 3, 1897, *Eggleston;* shore of Winooski River, Essex Junction, July 25, 1911, *S. F. Blake,* no. 2,210. Massachusetts: Andover, Sept., 1883, *Joseph Blake,* no. 963 (508); Lake Quannapowitt, Wakefield, *W. S. Ripley, Jr.,* no. 17,494; shallow water, Lake Garfield, Monterey, July 12, 1912, *R. Hoffmann;* Sheffield, Sept. 25, 1899, *R. Hoffmann.* Rhode Island: Providence, *S. T. Olney.* Connecticut: shallow water about Lake Congamond, Aug. 1–5, 1910, *Eames & Godfrey, Eames,* no. 8,457; Lake Saltonstall, Branford, Sept. 12, 1914, *Blewitt,* no. 1,981; shallow water of Housatonic River, North Canaan, Sept. 6, 1909, *Weatherby,* no. 2,700; shallow water of brook, Huntington, Sept. 17, 1914, *Harger & Weatherby, Weatherby,* no. 3,604; shallow water of Housatonic River, Huntington, Sept. 17, 1914, *Harger & Weatherby, Weatherby,* no. 3,595. New York: still water, Dead Creek, Grass River, Canton, July 18, 1914, *Phelps,* no. 279; western New York, *Gray.* Ontario: Detroit River, Oct. 16, 1861, Herb. *Boott.* Michigan: Manistee, Aug. 17, 1882, *Morong.* Kentucky: [Lexington, cf. Rhodora xv. 120, 1913], *Short.* Illinois: in water 6 dm. deep, Grass Lake, July 28, 1907, *F. C. Gates;* shallow water in a peat-bog lake, Lake Villa, Aug. 8, 1906, *Gleason & Shobe,* no. 182. Minnesota: ponds, Hennepin County, Aug., 1890, *Sandberg;* Garden Island, Lake of the Woods, June 26, 1894, *MacMillan & Sheldon,* no. 572. Saskatchewan: Souris River, July 29, 1883, *J. M. Macoun.*

2. E. **occidentalis** (Pursh) comb. nov. *Serpicula occidentalis* Pursh, excl. syn. *E. canadensis* Michx., Fl. Am. Sept. i. 33 (1814). *Serpicula*

verticillata, B. angustifolia Muhl., Cat. Pl. Am. Sept. 84 (1813). *Udora verticillata ? minor* Engelm., publ. in syn., Pringsheim's Jahrb. wissen. Bot. i. 465 (1885). *Philotria minor* (Engelm.) Small, Fl. S. E. U. S. 47 (1903). *Elodea minor* (Engelm.) Farwell, Rep. Mich. Acad. Sci. xvii. 181 (1916).

Illustrations: Britton & Brown: Ill. Fl. ed. 2, i. figs. 249, 251 (1913).

Distribution: In fresh ponds and streams occasionally in brackish waters, avoiding calcareous regions from southern Maine to the District of Columbia, westward to Missouri, northern Wisconsin, Nebraska, and Oregon. Maine: Haley Pond, Rangeley, 1894, *Furbish;* quiet pools in Messalonskee River, Waterville, Sept. 2, 1898, *Chamberlain & Fernald, Chamberlain,* no. 774, *Fernald,* no. 2,750; Cobossee Contee Lake, Aug., 1898, *T. J. Battey;* South Poland, 1893, *Furbish;* East Livermore, 1894, *Furbish;* Androscoggin Lake, North Leeds, Sept. 1894, *Furbish;* Lake Auburn, Aug. 1898, *Merrill,* no. 508; tidal pools and rills in mud flats of the river, Bowdoinham, Sept. 19, 1916, *Fernald & Long,* no. 12,448. Vermont: Windsor, July 27–31, 1900, *Eggleston,* no. 2,085. Massachusetts: Lake Cochichewick, North Andover, Sept. 24, 1903, *Pease,* no. 2,638; Somerville, *Warner Bailey;* in shallow water, Spot Pond, Stoneham, Sept. 6, 1912, *C. C. Kingman;* Alewife Brook, Medford, Aug. 21, 1870, *W. Boott;* Fresh Pond, Cambridge, Sept. 21, 1879, *H. A. Young,* Sept. 12, 1886, *Deane,* Sept. 14, 1886, *Deane,* Oct. 1886, *Deane, E. & C. E. Faxon,* May 27, 1903, *Pease,* no. 2,063; Muddy River, off Brookline Ave., Brookline, July 1909, *Forbes;* waste lands, Back Bay Fens, Boston, Sept. 17, 1916, *F. S. Collins,* no. 3,639 and Aug. 22, 1917, *F. S. Collins;* sandy bottom, northern end of Mill Pond, Brewster, Aug. 4, 1918, *Fernald,* no. 16,001; Harwich, June 23, 1914, *F. S. Collins,* no. 2,445. Rhode Island: Mill Pond, Lonsdale, Sept. 15, 1888, *A. Greene.* Connecticut: in shallow pools along bank of Connecticut River, Hartford, Sept. 25, 1909, *Blewitt,* no. 609; shallow water of Farmington River, New Hartford, Aug. 17, 1910, *Blewitt,* no. 586; in a slowly flowing stream, Middletown, July 26, 1914, *Ware,* no. 3,472; shallow water of Pistapaug Pond, Durham, Sept. 9, 1913, *Blewitt,* no. 1,680; in shallow pond, Waterbury, Aug. 23, 1911, *Blewitt,* no. 573; in Stony Brook, East Haven, Sept. 12, 1914, *Blewitt,* no. 1,980; fresher waters of Beaver Creek, Milford, July 16, 1897, *E. H. Eames;* stagnant water of a slough, Putnam, Aug. 31, 1915, *Weatherby,* no. 3,777; Boardman's Pond, East Hartford, July 15, 1903, *Weatherby,* no. 367; slow-flowing water of brooks, East Haven, Sept. 12, 1914, *Weatherby,* no. 3,591; shallow water of Pistapaug Pond, Wallingford, Sept. 9, 1913, *Weatherby,* no. 3,373; brackish estuary, Old Lyme, July 8, 1918, *Woodward;* Connecticut River, Hartford, July 18, 1885, *Wright;* Simsbury, Sept. 3, 1904, *I. Holcomb;* Wethersfield, *Wright;* in lacu Bantam prope Litchfield, *D. C. Eaton.* New Jersey: Sussex Co., July 1879, *Rusby.* Pennsylvania: near

Philadelphia, 1848, *James*. DELAWARE: Wilmington, Herb. *Canby*. MARYLAND: in open bog, s. 30° w. of Havre de Grace Light, Aug. 1, 1902, *Shull*, no. 147. DISTRICT OF COLUMBIA: in vicinis Washington, June 11, 1882, *Ward*. WISCONSIN: Lake Superior, Oronto, July 26, 1868, *Gillman;* Milwaukee, *Lapham*. ILLINOIS: Athens, 1861, *E. Hall*, no. 1,079. IOWA: in water, Fayette, July 1894, *Fink*. MISSOURI: sloughs, Forest Mill, June 16, 1912, *Palmer*, no. 3,766; St. Louis, May 1845, *Engelmann*. NEBRASKA: Sweetwater Lakes, Sept. 6, 1915, *Ray Thomson*, no. 177. KANSAS: ponds, Linn County, Aug. 9, 1897, *G. L. Clothier;* Fort Leavenworth, 1849, *Fendler*. OREGON: 1871, *E. Hall*, no. 503; Sauvies Islands, Williamette River, 1877, *Howell*.

3. E. **Nuttallii** (Planchon) comb. nov. *Anacharis Nuttallii* Planchon, Pringsheim's Jahrb. wissen. Bot. i. 465 (1858). *Udora canadensis* Nutt. excl. syn. *E. canadensis* Michx. Gen. N. Am. Pl. ii. 242 (1818). *Philotria Nuttallii* (Planchon) Rydb. Bull. Torr. Bot. Cl. xxxv. 461 (1908).

The writer has seen only one flowering specimen that is surely of this species, CONNECTICUT: shallow water of Housatonic River, Oxford, Aug. 13, 1918, *Weatherby*, no. 4,348.

4. E. PLANCHONII Caspary, Pringsheim's Jahrb. wissen. Bot. i. 468 (1858). *Anacharis canadensis* Planchon, not Michx., Ann. Sci. Nat. Bot. 3rd ser. xi. 75 (1849). *Philotria angustifolia* (Muhl.) Britton, not Britton in Rydb. Fl. Col., Col. Agric. Exp. Sta. Bull. c. 15 (1906). *Philotria Planchonii* (Caspary) Rydb., Bull. Torr. Bot. Cl. xxxv. 462 (1908). *Elodea Iowensis* (*Philotria Iowensis*) Wylie, Proc. Iowa Acad. Sci. xvii. 82 (1910). *Philotria Iowensis* (*Elodea Iowensis*) Wylie, Science. n. s. xxxiii. 263 (1911). *Elodea ioensis* Wylie, Iowa State Univ. Nat. Hist. Bull. vi. 48 (1913).

DISTRIBUTION: Local in ponds and streams from Massachusetts to Saskatchewan and Colorado. MASSACHUSETTS: Great Pond, North Andover, *Sears;* Lake Quannapowitt, July 2 and 14, 1916, *W. S. Ripley, Jr.*, nos. 16,125 and 16,138. NEW YORK: western part, *Gray*. INDIANA: in the Deshee River about 6 miles west of Decker, Aug. 18, 1919, *Deam*, no. 29,224. MICHIGAN: Fort Gratiot, July 18, 1870, *H. Gillman;* Sault Ste. Marie, July 27, 1873, *H. Gillman*. WISCONSIN: Madison, Aug. 14, 1890, *Lapham*. IOWA: East Okoboji Lake, 1911, *Wylie*. NORTH DAKOTA: in stagnant water, Minot, Aug. 20, 1905, *Lunell*. SASKATCHEWAN: *Drummond*. WYOMING: Fish Hatchery, Sept. 28, 1898, *A. Nelson*, no. 5,374; running water, Seven Mile Lakes, Albany County, Sept. 7, 1901, *Goodding*, no. 597. COLORADO: Lee's Lake, Aug. 5, 1897, *Crandall*, no. 2,423.

GRAY HERBARIUM.

THE NORTHERN VARIETY OF RANUNCULUS HISPIDUS.

M. L. Fernald.

Michaux, describing his *Ranunculus hispidus* from "sylvis Carolinae inferioribus," began his description "R. erectus, hirsutissimus."[1] This phrase well characterizes the plant at the southern border of its range, but northward the hirsute plant becomes rare and gradually gives way to a commoner variation with the pubescence appressed or even almost or quite wanting. Thus, of the 38 collections before the writer from New England and New York State 35 have appressed pubescence and only 3 (all from southern Connecticut) have the spreading pubescence of the more southern typical *R. hispidus*. In fact, Dr. K. C. Davis, in his treatment of the genus,[2] apparently wrote from his familiarity with the northern variation, for ignoring the Michaux phrase, "R. erectus, hirsutissimus," Davis described *R. hispidus* as "Appressed-pubescent." From New England and New York the plant with appressed pubescence or subglabrous petioles and stems extends westward to Iowa and south to the mountains of North Carolina, West Virginia, Missouri and Kansas; while typical *R. hispidus* extends well into Georgia and Arkansas. The more northern extreme is worthy varietal separation as

Ranunculus hispidus Michx., var. **falsus**, n. var., petiolis caulibusque sericeo-strigosis vel subglabris.—Vermont and Massachusetts to Ontario and Iowa, south to Virginia, North Carolina, Missouri and Kansas. The following specimens are characteristic. Vermont: rich hillside, Pownal, July 23, 1898, May 30, 1900, *Eggleston*, nos. 108, 1927. Massachusetts: Worcester, May 18, 1912, *Woodward;* moist field, Sturbridge, May 20, 1916, *Knowlton;* damp rocky thicket, Charlton, May 20, 1916, *Bean & Schweinfurth;* Amherst, *Blanchard et al.;* dry woods, Springfield, May 5, 1915, *Andrews;* rich open woods, Stockbridge, May 30, 1902, *Hoffmann;* in humus overlying limestone, Sheffield, May 16, 1907, *Cushman*, no. 517; dry wooded calcareous bank, Sheffield, May 30, 1919, *Bean & Fernald* (type in Gray Herb.). Connecticut: open woods, Franklin, June 6, 1907, *Woodward;* Middlebury, May 5, 1896, *Shepardson;* cold rocky woods, Southington, May 22, 1898, *Bissell;* dry hillside, Waterbury, May 30, 1911, *Blewitt*, no. 684; dry open woods, Salisbury, June 1, 1902, *Fernald.* New York: Westbury, *Tubby;* Harrison, April 25, 1905, *Coe;* open gravelly woods, Lick Brook, Ithaca, May 6, 1915, *Eames*, no. 4064;

[1] Michx. Fl. Bor.-Am. i. 321 (1803).
[2] K. C. Davis, Minn. Bot. Stud. ii. 472 (1900).

gravelly soil, dry open woods, Beebe Lake, Ithaca, August 16, 1915, *Eames & Thomas*, no. 4067; rocky crests above Shurger's Glen, Lansing, May 15, 1916, *MacDaniels & Wiegand*, no. 6447; Lake Chautauqua, June 4, 1893, *Churchill*. NEW JERSEY: Summit, May 23, 1891, *Churchill;* river banks, Camden, June, 1876 (glabrous extreme), *Martindale*. PENNSYLVANIA: West Branch of Octoraro Creek, Lancaster Co., May 6, 1891, *Heller;* near Haines Station, Lancaster Co., May 20, 1901, *Heller*. MARYLAND: Baltimore Co., May 5, 1881, *Smith;* Watersville, May 13, 1881, *Smith*. VIRGINIA: Goshen, Rockbridge Co., May 4, 1915, *Churchill*. WEST VIRGINIA: dry woods, White Sulphur Springs, May 14–17, 1914, *Hunnewell*. NORTH CAROLINA: moist places near Salisbury, Rowan Co., April 22, 1897, *Biltmore Herb.*, no. 1229*b*. ONTARIO: Whirlpool Rapids, Niagara, May, 1901, *J. Macoun*, no. 33,581. OHIO: Toledo, May, 1884, *Young*. INDIANA: without statement of locality or collector. ILLINOIS: rich woods near Cottonwood Station, Urbana, April 17, 1909, *Pease*, no. 11,807; low woods near Crystal Lake, Urbana, April 27, 1909, *Pease*, no. 11,825 (smoother form); Ottawa, *Huett;* moist cleared timberland, Macon Co., May 9, 1915, *Clokey*, no. 2384. WISCONSIN: Preble, Brown Co., May 21, 1892, *Schuette*. IOWA: Marshalltown, May 15, 1897, *Ball*, no. 471; Ames, May 22, 1897, *Ball & Preston*, no. 465. MISSOURI: St. Louis, 1877, *Eggert*. KANSAS: woods, Wyandotte Co., May 3, 1897, *Hitchcock*, no. 1105.

Many of the specimens above cited have been distributed as *R. septentrionalis*, a northern species of swamps and meadows with much coarser stems and leaves and with stout and very long repent stolons developing soon after the expansion of the first flowers.

GRAY HERBARIUM.

HABENARIA PSYCODES, VAR. ECALCARATA IN VERMONT.—Last August there was sent me a peculiar orchid which had been collected by Dr. Anne E. Perkins in a meadow at Berkshire, Vt. Prof. Ames later determined it as the peloric form of *Habenaria psycodes* described, figured and named var. *ecalcarata* by Miss M. M. Bryan.[1]

In this form (for it seems to be a teratological development rather than a true variety) the usual three-parted, spurred and fringed lip is replaced by an oblong-ovate, spurless petal, entire and wholly similar to the other petals, except that it occasionally bears small irregular and jagged marginal projections which remotely suggest its relationship to the normal type of lip. The result is a nearly

[1] Ann. Mo. Bot. Gard. iv. 38 (1917).

regular flower, superficially resembling that of a *Goodyera* much more than that of a *Habenaria* and reminiscent of *H. psycodes* only in color.

Miss Bryan makes no mention of the column in her description of var. *ecalcarata;* in Dr. Perkins's material, however, this organ shares the peloric tendencies of the perianth. Instead of the usual two nearly erect anther-sacs, it develops four, set at various angles in a rough half-circle about its upper part. Presumably the four sacs represent the two anthers of the simpler orchids, such as *Cypripedium*, and their arrangement, like the almost regular perianth, indicates a reversion toward a more primitive and more regular type of flower. All the sacs examined produced pollinia, but these were without distinguishable glands. The whole anterior surface of the column was strongly viscid; but I was unable to determine whether or not the stigma was fully formed and capable of performing its function.

In both Miss Bryan's and Dr. Perkins's material, all the flowers were alike, the peloria not being, as sometimes, confined to a portion of the inflorescence. Miss Bryan's specimens came from Bay View, Mich., where several plants were observed to persist for years: Dr. Perkins noted only one plant at her station. A precisely analogous form of *Habenaria fimbriata* was collected years ago by H. G. Jesup at Lynn, N. H., and described and illustrated by him, but not given a name.[2]—C. A. Weatherby, East Hartford, Conn.

Polygala paucifolia Willd., forma **vestita,** n. f., foliis dense pilosis, pilis canescentibus.

Leaves densely pilose with canescent hairs.—New Hampshire: rich deciduous woods, northwest base of Fall Mountain, Walpole, May 26, 1917, *L. A. Wheeler & M. L. Fernald* (type in Herb. N. E. Bot. Club).

The common form of *Polygala paucifolia* has the leaves green and quite glabrous except for a slight ciliation and sometimes a little pilosity on the midrib. Forma *vestita* is conspicuous when growing on account of its pale foliage and at Walpole forms an extensive carpet.—M. L. Fernald, Gray Herbarium.

Vol. 22, no. 253, including pages 1 to 16 and portrait plate, was issued 28 February 1920.

[2] Bot. Gaz. xviii. 189–190 (1893).

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SOIL TESTS OF ERICACEAE AND OTHER REACTION-SENSITIVE FAMILIES IN NORTHERN VERMONT AND NEW HAMPSHIRE

Edgar T. Wherry

The relative importance of physical and chemical features of soils in determining the distribution of vegetation is the subject of considerable difference of opinion. Some have reached the conclusion that physical factors, such as porosity and water content, are more significant than chemical factors, such as the presence of abundant lime or of excessive acidic substances; others consider the chemical nature of the soil, and accordingly the nature of the rock from which it is derived, to be of fundamental importance. An illustration of the application of these two viewpoints in explaining the distribution of two northern coniferous trees has recently been published by Fernald.[1] The physical features proved in these cases entirely inadequate to account for the observed relationships, whereas the geology, and the resultant chemical properties of the soil, show so close a correlation with the areas occupied by the species in question, that no one approaching the subject with open mind could fail to recognize therein the dominant factor in their distribution.

The writer became interested in this subject several years ago, while engaged in geological field work in Pennsylvania, through observing that relationships existed between the native plants and the underlying rock formations; but at that time there was no simple method available to determine whether the effect was chiefly physi-

[1] Fernald, M. L. Lithological factors limiting the ranges of *Pinus Banksiana* and *Thuja occidentalis*. Rhodora xxi. 41 (1919).

cal or chiefly chemical. The subsequent demonstration by Gillespie[1] that the reaction (acidity or alkalinity) of a soil can be directly measured by the use of indicators—that is, dyes which change their colors with variations in reaction furnished a means for obtaining definite information upon the matter. The method was first tried out in the laboratory, on soil samples representing various geological formations as well as different species of plants which were supposed to be sensitive to soil reaction; and the preliminary results on one group, the *Orchidaceae*, have already been published.[2] The method was later modified for use in the field, as recently described.[3] On learning of this method, Mr. Frederick V. Coville of the Bureau of Plant Industry, U. S. Department of Agriculture, suggested to the writer that since the *Ericaceae* are apparently especially sensitive to soil reaction—for the most part requiring definite acidity—it would be desirable that tests be made on a number of members of this family. Accordingly, with the aid of funds from the Bureau of Plant Industry, several trips were taken for this purpose; and in the present paper are recorded the results obtained on one of these trips in June, 1919, at certain points in northern New England. While the *Ericaceae* were studied primarily, data were obtained on other plants growing in the same regions; although only plants which for one reason or another are inferred to be decidedly sensitive to soil reaction are considered, and no attempt is made to list all the species growing in the places visited. The nomenclature of Gray's Manual, 7th edition, 1908, is followed throughout, synonyms being introduced in certain cases. Pressed specimens of the plants studied have been deposited in the U. S. National Herbarium.

The acidity and alkalinity of the soils studied are described in terms recommended for the purpose elsewhere.[4] To summarize the plan here, omitting technical physical-chemical terms,—pure water, which is neutral in that equivalent amounts of acid and alkaline constituents (ions) are present in it, is taken as the unit of both "specific acidity" and "specific alkalinity." A solution containing up to 10

[1] Gillespie, L. J. The reaction of soil and measurements of hydrogen-ion concentration. Journ. Wash. Acad. Sci. vi. 7 (1916).

[2] Wherry, Edgar T. The reactions of the soils supporting the growth of certain native orchids. Journ. Wash. Acad. Sci., viii. 589 (1918).

[3] Wherry, Edgar T. Determining soil acidity and alkalinity by indicators in the field. Jorn. Wash. Acad. Sci., x. (April, 1920).

[4] Wherry, Edgar T. The statement of acidity and alkalinity, with special reference to soils. Journ. Wash. Acad. Sci., ix. 305 (1919).

times as much acid as is contained by water is called "minimacid;" one containing from 10 to 100 times, "subacid;" from 100 to 1000 times, "mediacid;" and more than 1000 times, "superacid." Corresponding terms are used on the alkaline side, although medialkaline and superalkaline soils are not known to exist in the eastern United States, to which these studies are confined. It is sometimes convenient to group together minimacid, neutral and minimalkaline soils under the term, "circumneutral."

As to the correspondence between these and previously used terms, —"oxylophytes," as defined by Warming and others, seem to be characteristic of soils possessing only the higher degrees of acidity as here classified. "Calciphiles" or "calcicoles" may grow in soils of widely varying reaction, for calcium often exists in soils in the form of neutral salts, such as the sulphate and the chloride. However, since a very abundant compound of calcium, the bicarbonate, yields an alkaline reaction, calcicoles are particularly frequent in alkaline soils. These relations are brought out in the following table:

TABLE I. COMPARISON OF COMMON SOIL REACTIONS AND PLANT TYPES.

REACTION	Mediacid	Subacid	Minimacid	Neutral	Minimalkaline
			Circumneutral		
CALCIUM SALTS	Insoluble	Sulphate, chloride, etc.			Bicarbonate
OXYLOPHYTES	Common	Occasional	Rare	Absent	Absent
CALCICOLES	Absent	Rare	Occasional	Common	Common

For practical purposes, then, oxylophytes may be regarded as plants characteristic of mediacid soils, and calcicoles of circumneutral soils.

The tests are made by stirring up a soil with neutral water, pouring off the more or less clear liquid, and adding a drop or two of appropriate indicator solution. From the color then assumed the specific acidity or alkalinity of the soil in question can be determined. Sets of indicator solutions arranged for use in the field, with directions for their application, can now be purchased. (See advertising columns of this journal).

Every species of plant has of course an acid and an alkaline limit to its growth; and if these are sufficiently wide apart the plant may be regarded as indifferent to soil reaction. In the *Ericaceae* and other families here studied, however, it has been found that not only do these limits lie fairly close together, but also that for different species the limits have characteristically different positions in the scale. When these points are considered, in connection with the fact that in many cases a given species grows under the most widely varying physical conditions, from the wettest bogs to the driest sandy uplands, the conclusion can hardly be avoided that the chemical features of the soil are of greater significance than the physical ones in determining the distribution of these plants.

It has been found that in certain nurseries ericaceous plants can be grown in soils with an initial acidity distinctly below the lowest limits observed for the same species in nature. This is no doubt due partly to the exclusion of competition and partly to the fact that vigorous plants develop increased acidity immediately around their roots. However this may be, the limiting reactions shown by the soils supporting each species in its natural habitats are well worth determining. It is not claimed that the soil reaction is the only factor controlling the distribution of these plants; nor is the manner in which the reaction affects the plant considered. The aim of this paper is essentially to record observational data as to the reactions shown by the soils in typical natural occurrences of *Ericaceae*. It is hoped that these data can be supplemented by future work in other regions.

The regions in which the studies have been made, the general features of the soils there, etc., are presented in Table II. Detailed descriptions of the distribution of plants and soils follow.

Table II. Features of Regions Studied.

Region	State	Surface Formation	Soil	Dominant Reaction	Ericaceae
Summits of White Mountains	N. H.	Gneiss, granite	Black alpine peat	Mediacid	Abundant
Mountains along Willoughby Lake	Vt.	Calcareous drift	Upland peat	Circumneutral	Rare
Swamps, etc., south of Willoughby Lake	Vt.	Calcareous drift	Peat and muck	Subacid	Common
Bog south of West Burke	Vt.	Siliceous drift	Peat	Mediacid	Abundant
Swamps, etc., St. Johnsbury and Fairlee	Vt.	Varied drift	Peat and muck	Subacid	Common

Grateful acknowledgment is herewith made to Miss Inez A. Howe, of the Fairbanks Museum, St. Johnsbury, and to Rev. Dr. H.

M. Denslow, at the time residing at Fairlee, who acted as guides to the Vermont localities; to Messrs. Edward and Kenneth Gillett, who demonstrated how they grow native plants in their nursery at Southwick, Massachusetts; and to Harry W. Trudell and Louis H. Koch, who took part in the expedition as voluntary associates, and aided materially in collecting the data.

Summits of the White Mountains, New Hampshire.

The flora of the White Mountains has been described by Flint,[1] by Grout[2] and by Fernald.[3] The underlying rock is dominantly mica gneiss, with considerable granitic intrusions and quartz veins.

The first few hundred feet of ascent of the Presidential Range is through the spruce-fir forest, where the upland peat is mostly subacid in reaction, and ericaeous plants are rare, only *Chiogenes hispidula* and *Vaccinium canadense* being noted. At about 1200 meters elevation the conifers become smaller in stature, the soils blacker and more acid, and *Ericaceae* more abundant, *Rhododendron* (*Rhodora*) *canadense* and *Vaccinium pennsylvanicum* var. *angustifolium* appearing at the upper limit of trees. Above the tree line the ground is carpeted by vast numbers of ericaceous plants, growing in autogenous, black, damp or even wet humus, which may be designated for convenience as "alpine peat." Here were found, in addition to those already listed: *Ledum groenlandicum, Kalmia angustifolia, Kalmia polifolia, Arctostaphylos alpina, Vaccinium uliginosum, V. Vitis-Idaea* var. *minus,* and the heath-like *Empetrum nigrum.* In occasional colonies of sphagnum *Vaccinium Oxycoccos* was also found. On the rocky ledges, in similar but somewhat drier soil, besides many of the above list, were observed: *Loiseleuria* (*Chamaecistus*) *procumbens, Phyllodoce coerulea, Cassiope* (*Harrimanella*) *hypnoides, Vaccinium caespitosum,* and the pubescent *Empetrum atropurpureum* (*E. nigrum* var. *andinum* of the Manual). The alpine peat supporting all of these species showed uniformly mediacid reaction. Only exceptionally were lower values, down to subacid, observed, where occasional colonies of the same species had spread down into the upland peat of the forest floor. One species reported from the region, *Andromeda*

[1] Flint, W. F. The distribution of plants in New Hampshire. In: Geology of New Hampshire, by C. H. Hitchcock, i. 381 (1874).

[2] Grout, A. J. A botanist's day on Mt. Washington. Plant World ii. 116 (1899).

[3] Fernald, M. L. The soil preferences of certain alpine and subalpine plants, Rhodora ix, 149 (1907).

glaucophylla, could not be found, but its soils are no doubt similar in reaction.

In the most exposed places of all, near the summits of the mountains, the soil consists chiefly of frost-broken rock fragments, and even these *Ericaceae* are unable to gain much foothold. *Rhododendron lapponicum* and *Diapensia lapponica* are typically developed in this sort of situation, along with scattered colonies of the other species. The crumbling rock itself, where as free as possible from organic matter, ranges in reaction from subacid to neutral, the acidity being apparently due to the presence of minute lichens, etc.; but on testing the material at the roots of the plants mentioned, a mediacid reaction was almost invariably obtained, because of the presence of humus mixed with the rock fragments. Seedlings of these plants were occasionally found in material of lower acidity, but the reaction around them is never less than subacid.

The distribution of plants of other groups with reference to the soil acidity is also a matter of interest. Among ferns, the absence of the usual rock-growing species, such as the Woodsias and true Aspleniums, is a striking feature, the soils apparently being too acid for these. Three specimens of ferns were noted above the tree-line, in mediacid alpine peat on rocky ledges: *Phegopteris polypodioides* (*Phegopteris*), *Aspidium* (*Dryopteris*) *spinulosum*, *Asplenium Filix-femina* (*Athyrium angustum*). These ascend to very high elevations, the last reaching practically to the summit of Mt. Washington itself (1917 meters), although all are considerably dwarfed. *Lycopodium Selago* var. *appressum* and *L. annotinum* var. *pungens* appear in the most exposed situations, the soils being likewise mediacid or rarely subacid.

Of flowering plants other than *Ericaceae*, the following are noteworthy. In damp soils of mediacid reactions grow *Streptopus roseus*, *Coptis trifolia*, *Trientalis americana*, and *Lonicera caerulea* var. *villosa*. In drier, though not the most exposed places, grow also *Maianthemum canadense*, *Clintonia borealis*, and *Cornus canadensis*. In the bare rocky ground, where *Diapensia* flourishes, occur *Salix Uva-ursi*, *Arenaria groenlandica*, *Stellaria borealis*, *Potentilla tridentata* and *Geum* (*Sieversia*) *Peckii;* the *Stellaria* and a grass, *Poa laxa*, being the only plants observed at the actual summit of Mt. Washington. The soils of all these species proved to be normally mediacid in reaction.

Soils of minimacid reaction were found to occur on the White Mountains only in springy places. Ericaceous plants were in no case observed in such material, but a few species elsewhere found in soils of low acidity were noted, such as *Habenaria* (*Limnorchis*) *dilatata*, *Habenaria* (*Lysiella*) *obtusata* and *Castilleja pallida* var. *septentrionalis.*

Willoughby Lake, Vermont

The Willoughby Lake region is well known to botanists, especially from the excellent Flora published by Kennedy[1] in which previous work is summarized. Fernald[2] has discussed contrasts shown by the plants of this region and those of certain other localities in New England and adjacent Canada. The rock of Mts. Willoughby and Hor, Ordovician in age, is dominantly gneissic in character, with many calcareous strata, as well as granitic intrusions. The spring water seeping out from the faces of the cliffs has in practically every case traversed more or less limy material, and proved to be slightly alkaline in reaction; in rare instances it is neutral. The talus slope contains abundant calcareous rock fragments and its soils are mostly circumneutral in reaction. On the mountain slopes the soils vary in reaction, being circumneutral where the calcareous strata outcrop, although there are also minor areas of acid soils over granite ledges, as well as in places where thick upland peat has developed.

Few plants usually regarded as characteristic of acid soils are present in the Willoughby region. Colonies of *Cornus canadensis* occur on some of the acidic areas, and two acid-soil orchids, *Habenaria* (*Coeloglossum*) *bracteata* and *Habenaria fimbriata* (*grandiflora*) were noted in upland peat on the north slope of Mt. Willoughby. The only ericaceous plants seen on the whole mountain were a few members of the *Pyrola* group: *Chimaphila umbellata, Pyrola asarifolia, P. chlorantha, P. elliptica,* and *P. secunda.* All these grow in upland peat ranging from subacid to neutral in reaction.

Of plants usually found in limestone regions, and presumably partial to alkaline soils, the following are noteworthy: *Asplenium Ruta-muraria, Cryptogramma Stelleri, Woodsia glabella; Parnassia caroliniana, Saxifraga oppositifolia, S. Aizoon, S. aizoides,* and *Primula mistassinica.* Their soils were found to range from circumneutral to subalkaline.

South of Willoughby Lake conditions are entirely different. During the Glacial Period the ice advanced southward between Mts.

[1] Kennedy, G. G. The Flora of Willoughby, Vermont. Rhodora, vi. 93 (1904).
[2] Rhodora, ix, 149 (1907).

Willoughby and Hor, removing vast quantities of the rocks of which they are composed, and spreading this material over lowlands to the south for a distance of many miles. The rocks are, as previously noted, distinctly calcareous, and accordingly the springs which emerge from the hummocks of glacial drift are for the most part more or less alkaline in reaction. Acid soils have developed here and there whereever the decomposing vegetable matter has formed layers of sufficient thickness to prevent neutralization by the alkaline rock constituents.

The water in depressions in the cool dark arbor vitae (*Thuja occidentalis*) swamps is throughout slightly alkaline. No ericaceous plants were observed to grow in this water, although several orchids do so, notably *Cypripedium hirsutum* (*reginae*), *Listera convallarioides*, *L. cordata*, *Habenaria* (*Limnorchis*) *hyperborea*, *H. dilatata* (in open places), and *Corallorrhiza trifida*. On the hummocks of peaty material, however, several *Ericaceae* were noted, including *Pyrola secunda* var. *obtusata*, *P. asarifolia* var. *incarnata*, *Moneses uniflora*, *Vaccinium canadense*, and *Chiogenes hispidula*, in subacid or more often mediacid soil. Orchids which stick to the more acid soil situations are *Habenaria* (*Lysias*) *orbiculata*, *Epipactis repens* var. *ophioides*, *E. tesselata*, and *Corallorrhiza maculata*. The bunchberry, *Cornus canadensis*, is also limited to the acid locations.

The streams which rise on the south side of the col below the head (south end) of Willoughby Lake have minimalkaline to subalkaline water, and the relations shown by the plant associations surrounding them are noteworthy. *Myrica Gale* grows directly in the alkaline water, but although some ericaceous shrubs appear to accompany it closely, actual tests of the soil around their roots showed distinct to marked acidity in every case. The boldest of these, *Chamaedaphne calyculata*, occasionally reaches out as far as material of minimacid reaction; but *Kalmia angustifolia*, *K. polifolia*, and *Ledum groenlandicum* are always in subacid to mediacid peat. Upland peat with subacid reaction on the slopes of the hummocks of drift supports *Epigaea repens*, *Pyrola americana*, and *Vaccinium canadense;* also the orchid, *Habenaria* (*Coeloglossum*) *bracteata*, and such plants as *Linnaea borealis* var. *americana*, and *Cornus canadensis*.

West Burke, Vermont.

A small bog about three miles south of West Burke furnished an instructive contrast to those to the north, which have just been described. Here the drift is non-calcareous, and the open water mediacid. The *Ericaceae* grow far out into the water, forming with the sphagnum a floating mat which quivers under one's steps. *Andromeda glaucophylla, Kalmia angustifolia, K. polifolia,* and *Ledum groenlandicum* (all but the first also observed in the Willoughby region), are abundant here. In the sphagnum grow also *Vaccinium Oxycoccos* and its variety *intermedium* and *Chiogenes hispidula;* and on the drier banks *Pyrola elliptica, Epigaea repens, Gaultheria procumbens,* and *Vaccinium canadense.* In addition to *Ericaceae, Smilacina trifolia, Pogonia ophioglossoides,* and *Sarracenia purpurea* were noted. The soils are practically all mediacid.

It seemed worth while, having indicators on the spot, to test out the correctness of Fernald's[1] remarks as to the habitat of *Thuja occidentalis:*

"It is therefore premature to say that in the region of its almost continuous occurrence . . . *Thuja* confines itself to calcareous soils, for, like many other plants in the area where they are dominant, *Thuja* may prove to be ubiquitous or somewhat indifferent to moderate differences of soil."

As above noted, the water of the *Thuja* swamps is usually found on testing to be somewhat alkaline, the alkaline constituent being of course chiefly calcium bicarbonate, so that the term calcareous is correctly applied. Search was made for occurrences of *Thuja* elsewhere than in swamps, in the same general region. Along the railroad north of West Burke station this tree was found to be growing well, and to be producing some seedlings, in dry sandy drift which has in places a subacid reaction, although it varies from this through minimacid down to neutral. In other parts of Vermont similar observations were made, so that Fernald's statement, based chiefly upon inferences from geological maps, is abundantly confirmed when actual chemical tests are applied.

St. Johnsbury, Vermont.

In the course of the trip there were several opportunities to make tests of the soils in the vicinity of St. Johnsbury, and to obtain data on species of *Ericaceae* and other groups not well represented in the previously described regions. In a *Thuja* swamp about 3 km. east of the town the water was found to be minimalkaline, but hummocks of peaty material are present in which the acidity locally becomes

[1] Rhodora, xxi, 57 (1919).

as high as mediacid. The orchids, *Habenaria* (*Limnorchis*) *hyperborea* and *Cypripedium hirsutum* (*reginae*), and also the typical calcareous soil plant, *Parnassia caroliniana*, grow in the alkaline water. *Pyrola secunda* was noted on a hummock with minimacid reaction; while on the more acid ones were found *Aspidium spinulosum, A. Boottii, Clintonia borealis, Cypripedium acaule*, and *Cornus canadensis*, all plants which normally seem to favor highly acid conditions.

In the Knapp swamp, 5 km. west of St. Johnsbury, the conditions proved to be similar to the above. The water ranges from minimacid to neutral, and down in moss saturated with this water and sharing its reaction grow sparingly the rare orchids, *Cypripedium arietinum* and *Calypso bulbosa*, which can thus be classed, on the basis of actual test, as species of circumneutral soil. Three ericaceous plants, *Pyrola secunda* var. *obtusata, Moneses uniflora* and *Ledum groenlandicum* grow here, in hummocks with minimacid reaction, and the orchid, *Cypripedium parviflorum*, is abundant in muck with the same acidity. At one point a colony of *Cornus canadensis* was noted within 10 centimeters of the *Calypso*-bearing moss, which suggested that it might at times withstand minimacid conditions; but actual test showed it to have around its roots subacid material: thus the acidity may vary 10-fold or more within a few centimeters, and the vegetation develop accordingly. In pine woods around this swamp the orchids, *Cypripedium arietinum, Epipactis tesselata*, and *Habenaria* (*Lysias*) *Hookeri* are abundantly developed, and their soils, representing acid upland peat partially neutralized by underlying calcareous glacial drift, show subacid to minimacid reactions.

In a swamp in the town of Peacham, further west, the conditions are not unlike those just described, but the flora is even richer. Here the water was found to be neutral to minimalkaline, and in it grows *Caltha palustris*, which usually seeks circumneutral waters. In muck with minimacid reaction was noted *Smilacina stellata*, and the tall *Habenarias*. Hummocks of sphagnum are here prominent and, as they possess the usual mediacid reaction, a number of *Ericaceae* grow upon them. The beautiful pink *Pyrola asarifolia* var. *incarnata* (*P. uliginosa* of some authors) is abundant in this situation, the acidity of its soil thus contrasting sharply with that of the typical form of the species, which, as noted in the description of Lake Willoughby, grows there in neutral soil. Others noted are *Pyrola secunda* var. *obtusata, Moneses uniflora, Ledum groenlandicum, Chamaedaphne calyculata, Chiogenes hispidula,* and *Vaccinium Oxycoccos.* In addition to *Ericaceae,* there occur on the sphagnum *Arethusa bulbosa, Listera cordata, Microstylis unifolia, Dalibarda repens, Cornus canadensis, Menyanthes trifoliata,* and *Linnaea borealis* var. *americana,* a typical acid-soil list. By way of contrast, on the same trip, the other species of the orchid genus *Microstylis, M. monophyllos,* was found, near Harvey's Pond, growing in spring water with minimalkaline reaction.

Fairlee, Vermont.

The hills to the west of Lake Morey, near Fairlee station, yielded further interesting results. No arbor-vitae swamps occur here, but there are several swampy spots in the deciduous woods, where the water, emerging from shale strata, is neutral to minimacid in reaction. In this water were found the orchids, *Cypripedium hirsutum* (*reginae*), *Habenaria psycodes, Habenaria* (*Limnorchis*) *hyperborea, H. dilatata, H. dilatata* var. *media, Habenaria* (*Lysiella*) *obtusata, Microstylis monophyllos, Liparis Loeselii,* and *Corallorrhiza trifida.* In drier places, where the acidity is mostly subacid, were observed also *Cypripedium parviflorum* var. *pubescens, Habenaria* (*Lysias*) *Hookeri, H. orbiculata, H. macrophylla,* and *Habenaria* (*Coeloglossum*) *bracteata.* Several ericaceous plants accompany these orchids in the dry or damp woods, their soil being an upland peat more or less neutralized by the underlying glacial drift, so that the acidities are unusually low for several species; those noted comprise: *Pyrola americana, P. chlorantha, P. elliptica, P. secunda, Chimaphila umbellata, Epigaea repens, Gaultheria procumbens, Vaccinium pennsylvanicum* var. *angustifolium* and *V. canadense.* These gave tests of subacid to minimacid reaction.

Data on Individual Species.

In order to summarize the data for each species above noted, and to bring out their acid and alkaline limits of growth, some mode of graphic representation is desirable. For this purpose the specific acidities are best ranged horizontally, and the acidities at which the plant has been observed to grow, being marked by x, and the "optimum," at which the species appears to thrive best, distinguished by a capital X. The letter o refers to data obtained by the writer elsewhere in natural habitats, and n is used to indicate observations made in nurseries. When the reactions of a series of species are tabulated in this manner, the relations between them are brought out clearly, as shown in the following table.

Table III. Soil Acidities of Ericaceae and Related Plants.

	Specific Acidities					
	300 Medi-acid	100	30 Sub-acid	10	3 Minim-acid	1 Neu-tral
Pyroloideae						
Chimaphila umbellata (L.) Nutt.	–	x	X	x	–	–
Moneses uniflora (L.) Gray	x	x	X	x	x	–
Pyrola secunda L.	–	x	X	x	–	–
" " var. obtusata Turcz.	x	x	X	x	x	–
" americana Sweet	–	x	X	x	–	–
" chlorantha Swartz	–	–	x	X	x	–
" elliptica Nutt.	–	x	x	X	x	–
" asarifolia Michx.	–	–	–	–	–	X
" " var. incarnata (Fisch.) Fern.	X	–	–	–	–	–
Ericoideae						
Ledum groenlandicum Oeder	X	x	x	n	–	–
Rhododendron canadense (L.) B. S. P. (Rhodora L.)	x	X	x	n	–	–
Rhododendron lapponicum (L.) Wahl.	X	x	–	–	–	o
Loiseleuria procumbens (L.) Desv.	X	x	–	–	–	–
Kalmia polifolia Wang.	X	x	–	n	–	–
" angustifolia L.	X	x	x	n	–	–
Phyllodoce coerulea (L.) Babington	X	x	–	–	–	–
Cassiope hypnoides (L.) D. Don (Harrimanella Coville)	X	x	–	–	–	–
Andromeda glaucophylla Link	X	x	–	n	–	–
Chamaedaphne calyculata (L.) Moench	X	x	x	x	–	–
Epigaea repens L.	x	X	x	n	–	–
Gaultheria procumbens L.	X	x	x	x	–	–
Arctostaphylos alpina (L.) Spreng	X	x	–	–	–	o
Vaccinoideae						
Chiogenes hispidula (L.) T. & G.	X	x	x	–	–	–
Vaccinium pennsylvanicum Lam. var. angustifolium (Ait.) Gray	X	x	x	n	–	–
Vaccinium canadense Kalm	x	x	X	x	–	–
" uliginosum L.	X	x	–	–	–	–
" caespitosum Michx.	x	X	x	–	–	o
" Vitis-Idaea L. var. minus Lodd.	X	x	–	n	–	–
" Oxycoccos L.	X	–	–	–	–	–
" " var. intermedium Gray	X	–	–	–	–	–
Diapensiaceae						
Diapensia lapponica L.	X	x	–	–	–	–
Empetraceae						
Empetrum nigrum L.	X	x				
" atropurpureum Fern. & Wieg. (E. nigrum var. andinum of Gray's Man.)	X	x	–	–	–	

A number of interesting relationships are brought out by Table III. First of all it is noteworthy that the plants studied fall into two main groups with respect to their optimum reactions, one in which the optimum value is specific acidity 30 or less, the other in which it is 100 or greater. The former corresponds essentially to the *Pyroloideae*, the latter to the *Ericoideae* and *Vaccinoideae*, in the Gray classification.

The range of reaction shown by the members of the *Pyroloideae* is inclined to be rather wide, being from 300 to 3 in a few cases. That they are not by any means indifferent to soil reaction, however, is shown by the fact that the optimum lies in all but the last two cases within the narrow range of specific acidity 10 to 30.

The last two Pyrolas show such a striking contrast in their soil acidity as to warrant special discussion of them. Typical *Pyrola asarifolia* was found growing along Willoughby Lake, in rather dry soil containing calcareous rock fragments, and being throughout practically neutral in reaction. It is also present in certain woods near St. Johnsbury, in damp material of similar reaction. It is, indeed, often classed definitely as a calcicole.[1] On the other hand the variety *incarnata* is abundant in the Peacham swamp, west of St. Johnsbury, growing well up in the hummocks of sphagnum, where the specific acidity is 300; and it was also found in a similar situation in swamps south of Willoughby Lake. Additional observations on both of these plants, and especially on the intermediate forms reported by Fernald,[2] would be desirable to ascertain whether there is any constant and definite correlation between soil acidity and plant characters. Cultivation of these plants in soils of different reactions should also be tried.

In the *Ericoideae* and the *Vaccinoideae*, at least in the series of species here studied, the range of reaction tends to be rather restricted, sometimes being only from 300 to 100, and the optimum reactions all lie within a narrow range. Several of the individual species, however, deserve brief comment. It is curious to note that while *Rhododendron lapponicum* is here found to be a mediacid soil species, and has been recorded by Fernald[3] from several alpine granitic regions, in all of which the reactions are no doubt similar, in northern Sweden

[1] Cf. Blake, S. F. The Flora of New Brunswick. Rhodora, xx. 101 (1918).

[2] Fernald, M. L. Pyrola asarifolia Michx. var. incarnata, n. comb. Rhodora, vi. 178 (1904).

[3] Rhodora, ix, 162 (1907).

it is reported to be "kalkstet" or limited to limestone, and thus presumably to circumneutral soils,[1] as indicated by o in the last column of the table opposite this species. Perhaps different varieties are passing as *Rhododendron lapponicum*, corresponding to the two Pyrolas above discussed, and to *Andromeda glaucophylla* and its circumneutral soil variety *iodandra*.[2]

Loiseleuria (*Chamaecistus*) *procumbens* is stated by Schroeter[3] to grow in the Alps on both crystalline rocks and limestone, but to be surrounded by autogenous humus, so that the soil acidity may be fairly high, even on the latter rock. *Arctostaphylos alpina*, although included by Warming[4] among acid soil plants, is described by Schroeter[5] and by Thompson[6] as growing on limestone. It is possible that it is surrounded by autogenous humus, and that the reaction is acid, or else that another variety is represented. A North American red-fruited form growing on limestone is regarded by Fernald as a distinct species, *Arctostaphylos rubra*.[7] Further study of this group appears to be needed.

Vaccinium caespitosum, though most frequent in acid soil localities, is noted by Fernald[8] to grow in one limestone region, the St. John Valley in Maine and New Brunswick. However, in this, as indeed in the other cases, it would be better to wait for actual soil tests to be made before making deductions as to the soil requirements of these plants. Even in species showing apparently well-defined reactions, it is possible that further work may in some cases lead to the extension of the ranges of reaction as well as the position of the optimum values. The writer expects to continue such work and hopes that others will take it up also, for the more data there are available the more certain will be any conclusions that may be drawn.

In the Acidity 10 column of Table III, the letter n is placed opposite a number of members of the *Ericoideae* and *Vaccinoideae* to indicate

[1] Fries, T. C. E. Botanische Untersuchungen in Nördlichsten Schweden. Upsala 1913, page 230.

[2] Fernald, M. L. A calciphile Variety of Andromeda glaucophylla. Rhodora, xviii. 100 (1916).

[3] Schroeter, C. Das Pflanzenleben der Alpen. Zurich, 1908, page 135.

[4] Warming, E., and Vahl, M. Oecology of Plants (English translation). Oxford, 1909, pp. 211, 213.

[5] Op. cit. p. 158.

[6] Thompson, Harold S. Alpine plants of Europe. London, 1911, p. 183.

[7] Fernald, M. L. The alpine Bearberries and the generic Status of Arctous. Rhodora, xvi. 21 (1914).

[8] Rhodora, ix. 163 (1907).

that they are being temporarily grown in soil of that acidity in Gillett's nursery at Southwick, Massachusetts, although in nature they seem unable to thrive permanently in soils of like reaction.

The results of tests made on soils supporting other groups of reaction-sensitive plants may well be tabulated like the *Ericaceae;* this is done in Tables IV, V, and VI.

TABLE IV. SOIL REACTIONS OF ORCHIDACEAE.

(Observed in northern Vermont and New Hampshire, 1919.)

	Specific Acidities						Spec. Alk,	
	300 Medi-acid	100	30 Sub-acid	10	3 Minim-acid	1 N.	3 Minim-alk.	10
Cypripedium arietinum R. Br.	–	–	x	X	x	x	–	–
" parviflorum Salisb.	–	o	x	X	x	o	o	–
" " var. pubescens (Willd.) Knight	–	o	o	X	x	x	o	o
" hirsutum Mill. (reginae)	–	–	–	x	x	X	x	o
" acaule Ait.	X	o	o	o	–	–	–	–
Habenaria hyperborea (L.) R. Br.	–	–	–	x	x	X	x	x
" dilatata (Pursh) Gray	–	–	–	x	x	X	x	x
" " var. media (Rydb.) Ames	–	–	–	–	x	X	x	–
" obtusata (Pursh) Richards	–	x	x	X	x	x	–	–
" Hookeri Torr.	–	x	X	x	–	–	–	–
" orbiculata (Pursh) Torr.	–	x	X	x	–	–	–	–
" macrophylla Goldie	–	x	X	x	–	–	–	–
" bracteata (Willd.) R. Br.	–	x	X	x	x	–	–	–
" psycodes (L.) Swartz	o	o	o	o	X	x	–	–
" fimbriata (Ait.) R. Br.	–	o	o	X	–	–	–	–
Pogonia ophioglossoides (L.) Ker.	X	o	o	–	–	–	–	–
Arethusa bulbosa L.	X	–	–	–	–	–	–	–
Epipactis repens var. ophioides (Fern.) A. A. Eat.	–	x	X	x	–	–	–	–
" tesselata (Lodd.) A. A. Eat.	–	x	X	x	–	–	–	–
Listera cordata (L.) R. Br.	x	x	X	x	x	–	–	–
" convallarioides (Swartz) Torr.	–	–	–	x	X	x	–	–
Corallorrhiza trifida Chatelain	–	–	–	x	X	x	–	–
" maculata Raf.	–	x	X	–	–	–	–	–
Microstylis monophyllos (L.) Lindl.	–	–	–	–	x	X	x	–
" unifolia (Michx.) B. S. P.	X	x	o	o	–	–	–	–
Liparis Loeselii (L.) Richard	o	o	o	o	X	x	–	–
Calypso bulbosa (L.) Oakes	–	–	–	x	X	x	–	–

The above list supplements the one previously published by the writer,[1] in which species of more southern distribution were treated, although a few appear in both lists. It is noteworthy that there are among the northern orchids many with greatest development in circumneutral soils, whereas most of the southern species prefer

[1] Journ. Wash. Acad. Sci., viii. 589 (1918).

more acid soils. Divergent measurements obtained on some of the above species elsewhere than in New England are indicated by the letter o in the appropriate column. The range of some species is rather wide, yet even in these cases the optimum usually has characteristic position. It is striking that in certain cases two species of the same genus may diverge widely in optimum soil reaction.

Finally, reaction-sensitive plants, belonging to other than the above two families, which were studied will be listed for completeness. In Table V are given the oxylophytes; the optimum reaction of all these has been found by actual test to be mediacid, although a few of them have been observed occasionally in subacid soils as well.

Table V. Mediacid Soil Plants (Oxylophytes).

(Observed in northern Vermont and New Hampshire, 1919.)

Aspidium Boottii Tuckerman (Dryopteris Boottii Underwood).
" spinulosum (O. F. Müll.) Swartz (Dryopteris spinulosa Kuntze).
" " var. intermedium (Muhl.) D. C. Eat. (Dryopteris intermedia (Willd.) A. Gray).
Lycopodium Selago L. var. appressum Desv.
" annotinum L.
" " var. pungens Desv.
Smilacina trifolia (L.) Desf. (Vagnera trifolia Morong.)
Clintonia borealis (Ait.) Raf.
Streptopus amplexifolius (L.) DC.
" roseus Michx.
Salix Uva-ursi Pursh.
Arenaria groenlandica (Retz.) Spreng.
Stellaria borealis Bigel.
Sarracenia purpurea L.
Coptis trifolia (L.) Salisb.
Rubus Chamaemorus L.
Potentilla tridentata Ait.
Geum Peckii Pursh (Sieversia Peckii R. Br.).
Pyrus melanocarpa (Michx.) Willd. (Aronia Britton).
Cornus canadensis L. (Chamaepericlymenum canadense Aschers. & Graebn.).
Trientalis americana (Pers.) Pursh.
Linnaea borealis L. var. americana (Forbes) Rehder.

In Table VI plants of circumneutral soils as shown by actual tests, are treated similarly; probably all of these are to be classed as calcicoles.

TABLE VI. CIRCUMNEUTRAL SOIL PLANTS (CALCICOLES).

(Observed in northern Vermont and New Hampshire, 1919.)

Cryptogramma Stelleri (Gmel.) Prantl (Pellaea gracilis Hook.).
Cystopteris bulbifera (L.) Bernhardi (Filix bulbifera Underwood).
Woodsia glabella R. Br.
" alpina (Bolton) S. F. Gray (W. hyperborea R. Br.).
Asplenium Ruta-muraria L.
Thuja occidentalis L. (Also in subacid soils high in calcium salts.)
Smilacina stellata Desf. (Vagnera Morong).
Anemone riparia Fernald.
Caltha palustris L.
Braya humilis (C. A. Mey.) Robinson.
Saxifraga Aizoon Jacq.
" aizoides L.
" oppositifolia L.
Parnassia caroliniana Michx.
Astragalus Blakei Eggleston.
Primula mistassinica Michx.
Campanula rotundifolia. (Also in subacid soils high in calcium salts.)

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THE AMERICAN VARIETIES OF PYROLA CHLORANTHA.

M. L. FERNALD.

To one who has been familiar with the large-flowered *Pyrola chlorantha* which occurs in scattered colonies through dry woods of southern New England, southern New York and Pennsylvania, it often seems strange that the smaller-flowered plant of northern New England and adjacent regions is conspecific with it. The common plant of eastern Massachusetts, for example, has numerous rounded leaves which make a conspicuous rosette, the blades often 3–4.5 cm. broad and nearly as long, and the greenish-white petals 6.5–9 mm. long and comparatively broad (3.5–6 mm.). This is the plant described by Barton in 1815 as *P. convoluta*.[1] In the White Mountains and across the northern half of Maine, on the other hand, *P. chlorantha* is often quite leafless or has only a few leaves, these inclined

[1] Barton, Fl. Phil. Prodr. 50 (1815).

to have somewhat wedge-shaped small blades (0.7–2.5 cm. long and broad), and the petals of this mountain plant are only 4–6 mm. long and 2.5–4 mm. broad. These are the superficial differences between the two plants, but close study reveals others. The large-leaved, large-flowered, more southern plant has a broader calyx, 4.8–6 mm. broad with lobes 1.2–2 mm. long, the plant of northern New England having a calyx 3–4 mm. broad, with lobes 0.5–1 mm. long. The anthers of the more southern plant are 3–4, of the more northern 1.6–2.6 mm. long, and the mature style (in fruiting specimens) of the southern is 8–10, of the northern 5–7 mm. long.

If these two were the only representatives we had of *Pyrola chlorantha,* they would seem abundantly distinct. But north of the range of either, though slightly overlapping into the range of each, there is a third trend which combines their characteristics. This plant with numerous rounded leaves forming a conspicuous rosette superficially resembles Barton's *P. convoluta,* but the leaf-blades are commonly smaller, while the calyx, petals, anthers and style more nearly approach in their measurements the few-leaved plant with usually cuneate small blades. This more northern intermediate plant, ranging from Newfoundland and "Labrador" to Mackenzie and south very locally to New England, the Great Lake Region, the Black Hills, Arizona and Oregon, is typical *P. chlorantha,* inseparable apparently from the plant of northern Eurasia.

In the Rocky Mountain region occurs a somewhat characteristic extreme with elliptic or oblong-ovate leaf-blades but seeming to differ in no other character from typical *P. chlorantha.* This plant was considered by Dr. Gray identical with *P. occidentalis* R. Br. from the Behring Sea region and treated as *P. chlorantha,* var. *occidentalis* (R. Br.) Gray.[1] It is highly improbable, however, that the two are identical, Andres, who has devoted years to a study of *Pyrola,* stating[2] that the sepals of *P. occidentalis* are larger than in *P. chlorantha* and publishing a silhouette of an Alaskan specimen which shows a rounder blade than in the elliptic-leaved Rocky Mountain plant.

In the West, too, certain plants commonly referred to *P. chlorantha* are equally close to *P. picta* Sm. These perplexing plants are all from the area in which the latter species occurs and may represent

[1] Gray, Syn. Fl. N. A. ii. pt. 1, 47 (1878).
[2] Andres, Allgem. Bot. Zeitschr. xix. 82 (1914).

a hybrid with that polymorphous species. The writer attempts no solution of their status.

The American varieties of *Pyrola chlorantha* may be distinguished by the following key:

Calyx 3–4 (rarely 5) mm. broad: petals 4–6.5 mm. long, 2.5–4 mm. broad: anthers 1.6–3 (rarely 3.3) mm. long: mature style 5–7 mm. long.
  Leaves rounded to base and apex, rather numerous (4–11) in a rosette: calyx-lobes deltoid-ovate to ovate-oblong, usually longer than or as long as broad, 0.8–1.7 mm. long: anthers 2.3–3.3 mm. long.
    Leaf-blades mostly orbicular, suborbicular, reniform or ovate; the larger 1.5–3.3 cm. broad........................*P. chlorantha* (typical).
    Leaf-blades mostly elliptic or oblong-ovate; the larger 0.9–1.7 cm. broad. var. *saximontana*.
  Leaves mostly cuneate at base and truncate or subtruncate at summit, somewhat flabelliform-obovate, few (1–7 or even wanting) in a rosette; the larger 0.7–2.5 cm. broad and long: calyx-lobes broadly deltoid, mostly broader than long, 0.5–1 mm. long: anthers 1.6–2.6 mm. long. var. *paucifolia*.
Calyx 4.8–6 mm. broad; its lobes 1.2–2 mm. long: petals 6.5–9 mm. long, 3.5–6 mm. broad: anthers 3–4 mm. long: mature style 8–10 mm. long: leaf-blades rounded at base; the larger ones 2–4.5 cm. broad. var. *convoluta*.

P. CLORANTHA Sw. Sv. Vet.-Akad. Nya Handl. xxxi. 190 (1810).—Dry or dryish woods, southeastern and central Newfoundland and "Labrador" to Mackenzie, south to Nova Scotia, and locally to s. Maine, e. Cape Cod and w. Massachusetts, (?) Hartford Co., Connecticut, w. Ontario, Wisconsin, Black Hills, South Dakota, and among the mts. to Arizona and Oregon. Europe and northern Asia.

Var. **saximontana**, n. var., foliis plerumque ellipticis vel oblong-ovatis, majoribus 0.9–1.7 cm. latis.—Montana to New Mexico. MONTANA: descent to Ross' Hole, 1880, *S. Watson*, no. 260; Yellow Bay, Flathead L., 1908, *Mrs. J. Clemens* (TYPE in Gray Herb.). WYOMING: Cache Creek, Yellowstone Park, 1885, *Tweedy*, no. 918; Leigh's Lake, 1901, *Merrill & Wilcox*, no. 1120. COLORADO: Minnehaha, alt. 2600 m., 1901, *Clements*, no. 238. NEW MEXICO: Winsor Creek, Pecos Nat. Forest, 1908, *Standley*, no. 4227, in part.

Var. **paucifolia**, n. var., foliis nullis vel paucis (1–7) plerumque flabellato-obovatis truncatis vel subtruncatis basi cuneatis, rare ovatis vel subreniformibus, majoribus 0.7–2.5 cm. longis latisque; calycibus 3–4 mm. latis, lobis late deltoideis 0.5–1 mm. longis; petalis 4–6 mm. longis, 2.5–3.5 mm. latis; antheris 1.6–2.6 mm. longis; stylo maturo 5–7 mm. longo.—Cape Breton to w. Ontario, s. to n. and w. New England, n. New York and locally to mts. of Pennsylvania. PRINCE EDWARD ISLAND: Alberton, 1912, *Fernald & St. John*, no. 7886. NEW BRUNSWICK: gorge of Aroostook R., 1902, *Williams, Collins & Fernald*. NOVA SCOTIA: Smoky Mt., Cape Breton, 1914, *Nichols*, no. 868; Lake Warren, Ingonish, Cape Breton, 1904, *Churchill;* Truemanville, 1884, *Trueman;* Pictou, 1907, *C. B. Robinson*, no. 592.

Maine: St. Francis, 1881, *Furbish;* Orono, 1892, *Fernald;* near Mt. Katahdin, 1900, *Churchill;* Rum Mt., 1895, *Fernald;* Russell Mt., Blanchard, 1897, *Fernald;* Dover, 1895, *Fernald;* Mt. Bige'ow, 1915, *Knowlton;* Farmington, 1915, *Knowlton;* Rangeley, 1894, *Furbish;* Buckfield, 1878, *Allen;* Hartford, 1892, *Parlin;* Dedham, 1916, *Fernald & Long,* no. 14,281; Orland, *Atkins;* Mt. Megunticook, Camden, 1913, *Fernald,* no. 10,120; South Poland, 1893, 1894, *Furbish.* New Hampshire: near summit of Mt. Clinton, 1894, *T. O. Fuller;* Mt. Resolution, Sargent's Purchase, 1912, *Pease,* no. 14,044; n. peak of Mt. Hope, Hadley Grant, 1915, *Pease,* no. 16,495; Shelburne, *C. E. Faxon;* Randolph, 1893, *Williams,* 1908, *Pease,* no. 11,417; Dalton Mt., Dalton, 1914, *Pease,* no. 16,094; Mt. Prospect, Lancaster, 1913, *Pease,* no. 14,214; Woodstock, 1915, *Fernald,* no. 11,833; Atwell Hill, Piermont, July 26, 1910, *E. F. Williams* (type in Gray Herb.); Breezy Point, Warren, 1907, *Williams;* Gilmanton, 1907, *Cushman & Sanford,* no. 1271. Vermont: Willoughby, 1896, *Kennedy;* Townshend, 1914, *Wheeler;* mountain slope, Manchester, 1898, *Day,* no. 114. Massachusetts: Buckland, 1904, *Forbes;* Great Barrington, 1901, *Hoffmann.* Connecticut: Bolton, *Weatherby.* New York: Stony Creek Ponds, Adirondack Mts., 1899, *Rowlee, Wiegand & Hastings.* Pennsylvania: Ponoco Plateau, 1904, *Harshberger.* Ontario: Nipigon L., 1912, *Pulling.* Michigan: Black R., 1868, *Gillman;* Keweenaw Co., 1890, "rare," *Farwell,* no. 304.

Var. *paucifolia,* it will be seen from the above stations, is particularly characteristic of the upland regions of northern New England, often ascending nearly to timber-line. In most of this area it is the only variant known, but eastward, in the Maritime Provinces, it meets typical *P. chlorantha* and is sometimes associated with it and southward its boundaries approach the northern limits of var. *convoluta.* In the Northwest, in British Columbia and Washington, occurs a form of *P. chlorantha* strongly suggesting var. *paucifolia* but with more rounded leaf-blades. The scanty material at hand is too inadequate and this form is for the present left with true *P. chlorantha.*

Var. **convoluta** (Barton), n. comb. *P. convoluta* Barton, Fl. Philad. Prodr. 50 (1815). ? *P. cordata* Andres, Allgem. Bot. Zeitschr. xix. 82 (1913).—Southeastern and centr. Maine to Maryland and Nebraska.

In its comparatively large petals and leaves var. *convuluta* somewhat suggests small plants of *P. americana* Sweet, but it has all the technical points of *P. chlorantha.* In his original publication Barton described *P. convoluta* merely by contrasting it with *P. americana*

(*P. rotundifolia* of Barton). Similarly, in describing his *P. cordata*, Andres compares his plant with *P. americana*, but says that it has the "Blüten . . . *chlorantha*-ähnlich . . . vielleicht nur eine geographische Rasse derselben." While typical *P. chlorantha* in America belongs chiefly in the Canadian region, and var. *paucifolia* primarily to the mountain-slopes of northern New England and adjacent regions, var. *convoluta* is a more southern extreme which does not ascend to noteworthy altitudes.

Gray Herbarium.

NOTES ON POGONIA TRIANTHOPHORA.

Albert E. Lownes.

Of all the *Orchidaceae* found in the region about Asquam Lake, New Hampshire, *Pogonia trianthophora* (Sw.) BSP. is without doubt the most interesting. It was first reported in 1898 when a single station was found. Now there are six known stations, scattered over a comparatively small area, and containing between five and ten thousand plants. An intensive study of the plant began in 1917, and after three years of observation it is possible to note the following facts.

An unusual feature is the close colonial manner of growth, twenty to forty plants occurring within a square foot. These colonies are found in pockets or hollows in beech woods, which are filled with the decaying leaf-mold without soil. Late in July or early August the little pointed tip of the lowest leaf makes its appearance. Under favorable weather conditions the stem lengthens rapidly, and in a week the flowers are borne. The flowers are *erect*, white (rarely pink), the anther deep magenta.

Fertilization, which is rare, is effected by a species of small bee (*Halictus quadrimaculatus*). The bee forces his way into the blossom, hitting the anther as he goes, and loosening but not detaching it. As he backs out, the pollinia adhere to his thorax. The flower then nods and becomes a pale buff color. The seed rarely ripens at Squam Lake.

The plant seems to spread rather by means of the tuberous root system. These tubers are one of the peculiar growths in plant life. They are waxy white in color, translucent, and vary in size from that of a pinhead to three-quarters on an inch in length. They send out slender shoots of variable length. These form new tubers at the end, which in turn send out small shoots of their own. These secondary tubers become separated from the old ones by the decay of the connecting tube and thus a colony is formed. The old tuber dies and the new ones begin to store up nourishment and moisture. A bud appears at the top and eventually a new plant is formed. All this takes time, and a colony found in one place does not reappear for seven or eight years.

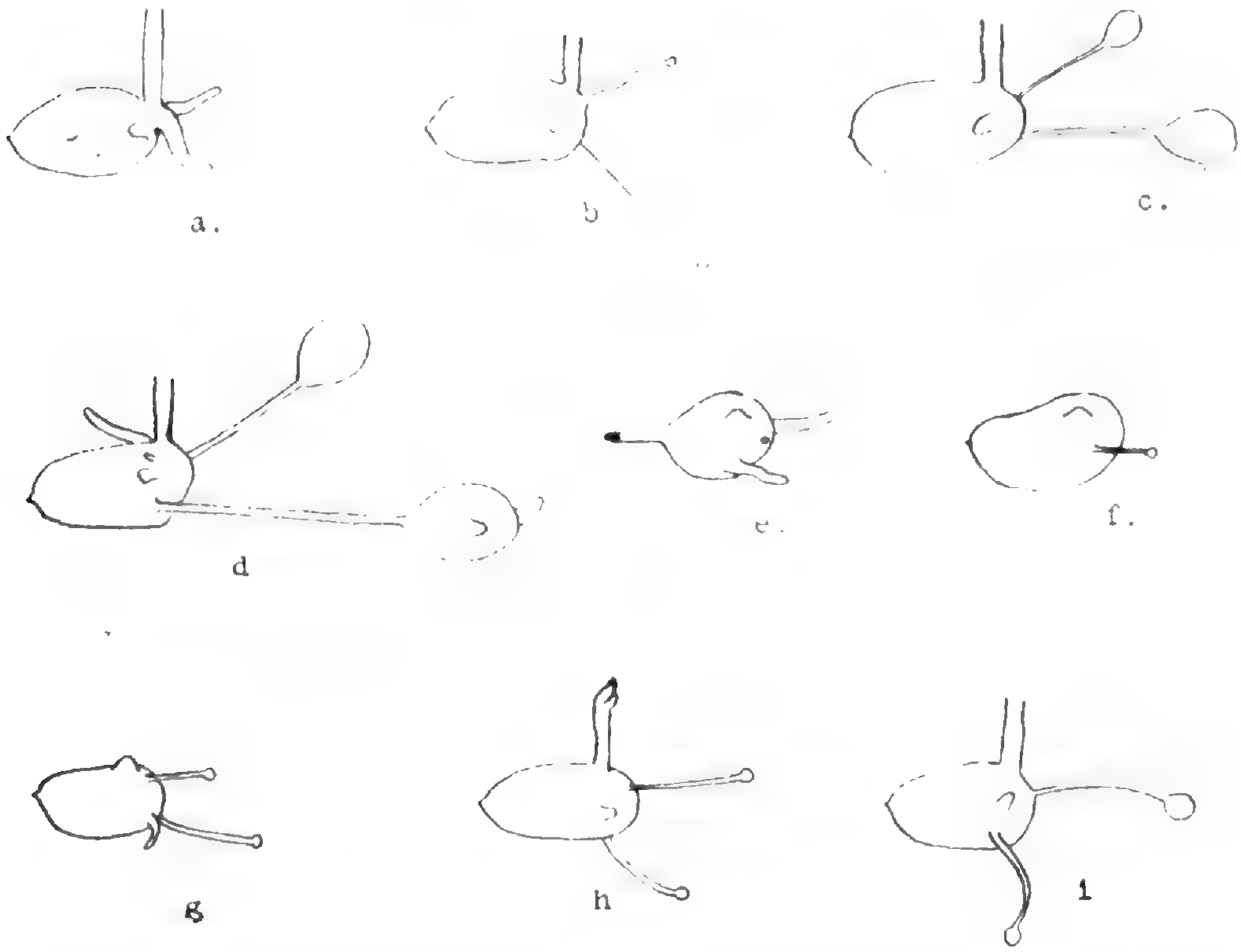

Fig. 1. *a*. Tuber with off-shoots. *b, c*. Off-shoots develop small tubers. *d*. Young tubers send out off-shoots. *e*. Young tuber cut off from old one by decay of connecting shoot; bud forms. *f–g*. Small tubers form. *h*. Bud begins to grow. *i*. New plant full grown begins to form secondary tubers. Compare with *b*.

An interesting experiment proved that the plant is able to withdraw the moisture from the tubers in time of drought. A colony of the plants was dug up on August 21, 1918, in order to photograph the tubers. It was placed on a table inside a building and left without water and with the tubers exposed. Two weeks later (September 5) the plants were as fresh as ever, but the tubers had shrunk and shriveled to a fraction of their original size.

The blossoms, which last for three or four days, if not fertilized, open only in clear weather. On cloudy days and to a certain extent at night the flowers close. So far as I know, this is the only one of our native orchids to have this trait. The whole plant, except when it first appears in the bud and the capsule, is erect, and it little merits its common name of Nodding Pogonia.

PROVIDENCE, RHODE ISLAND.

SCIRPUS ACUTUS Muhl.—In 1904, Mrs. Chase[1] differentiated in our flora four species which had been passing under the aggregate name *Scirpus lacustris* L., at the same time showing that the Old World plant is unknown from North America. The four species recognized by Mrs. Chase are *S. validus* Vahl., *S. occidentalis* (Wats.) Chase, *S. heterochaetus* Chase and *S. californicus* (C. A. Meyer) Britton. It would seem, however, that in proposing *S. occidentalis* as a new species she overlooked, as her followers have done, the clear description given in Bigelow's *Florula Bostoniensis* of *S. acutus*,[2] a new species ascribed by Bigelow to Muhlenberg. Bigelow's description was based on the plant of Fresh Pond, Cambridge, which was distinguished from *S. validus* (the *S. lacustris* of American authors of his time) by "Spikes . . . oblong and closely imbricate . . . In deep water at Fresh Pond and elsewhere."

Somewhat later, Muhlenberg himself published *S. acutus*,[3] splendidly contrasting it with his *S. lacustris* (*S. validus* of Mrs. Chase's treatment): *S. lacustris* culmo . . . supra attenuato, *S. acutus* culmo . . . supra aequali nec attenuato, pleno maculato, maculis fuscis oblongis; *S. lacustris* spicis . . . ovatis, *S. acutus* spicis . . . oblongis; *S. lacustris* cal. gluma . . . obtusa . . . fusca, *S. acuta* cal. gluma fusca carinata mucronata pubens;

[1] Chase, RHODORA, vi, 65–71, tt. 52, 53 (1904).
[2] Muhl. ex Bigelow, Fl. Bost. 15 (1814).
[3] Muhl. Descr. Gram. 33 (1817).

S. lacustris setis 4 hispidis semine sublongioribus, *S. acutus* setis hispidis 3 vel 4 [by implication semine nec longioribus].

Both Bigelow's description and Muhlenberg's unquestionably define *S. occidentalis* and the type station, "deep water at Fresh Pond," is likewise conclusive, for *S. occidentalis* was often collected in Fresh Pond in the days prior to its conversion into a reservoir, but the old collections show no material of *S. validus* from the pond, merely from the shallow Glacialis and other small pools of the region. There is no question then that we should revive the name.

Scirpus acutus Muhl. ex Bigelow, Fl. Bost. 15. (1814); Descr. Gram. 33 (1817). *S. lacustris*, var. *occidentalis* Wats. Bot. Cal. ii. 218 (1880). *S. occidentalis* (Wats.) Chase, Rhodora, vi. 68, t. 53, fig. c (1904).

M. L. Fernald, Gray Herbarium.

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EUPATORIUM PURPUREUM AND ITS ALLIES.

K. M. Wiegand.

The verticillate-leaved Eupatoriums have long given trouble to American botanists. In connection with work on the flora of Central New York, the writer has found it necessary to make some disposition of the material ordinarily recognized as *Eupatorium purpureum*. That more than one form is to be found under this name in New York State has been apparent for some time, but the limits and characters of these forms did not seem to agree with those recognized by various authors as delimiting the numerous subdivisions of this species. The problem was taken, with others, to the Gray Herbarium, where Dr. Robinson kindly placed at the writer's disposal the very complete collection of *E. purpureum* in that institution, and also photographs made by him of Linnean and Willdenovian specimens in European herbaria. This material was supplemented by the rich collection of New England Eupatoriums in the herbarium of the New England Botanical Club, and of New York State plants of this group in the herbarium of the New York State College of Agriculture. As a result of this study, a treatment has been worked out which it is hoped will aid in clearing up the difficulties that have so long surrounded this section of Eupatorium.

Briefly stated, four species have been confused under the general name *E. purpureum* L. For clearness, these may be numbered, and their most striking characters listed, as follows:

1. Florets 6–9, rarely 5–12: stem speckled: leaves usually in 3's or 4's, ovate, abruptly contracted at the base, more or less plainly

3-nerved. Along the Coastal Plain from eastern Massachusetts and southern New Hampshire to South Carolina. A plant of wet soil.

2. Florets 9–15, rarely 8–20: stem speckled: leaves in 4's or 5's, rarely in 3's or 6's, gradually tapering at the base, and pinnately-veined. Newfoundland through northern New England to western Connecticut and central Pennsylvania, westward to Illinois, and Colorado, New Mexico and British Columbia. A plant of wet soil.
3. Florets 6–7, rarely 5 or 8: stem rarely speckled, evenly purple, glaucous, hollow: leaves in 4's–6's, rather bluntly and finely toothed: corolla less than 5 mm. long. Southern Maine and Rhode Island to Florida, Texas, and Oklahoma; also in western Pennsylvania and Ohio. A plant of damp woods and pastures, on the Atlantic Coast and Uplands.
4. Florets 5–6, rarely 3–7: stem rarely speckled, purple only at the nodes, scarcely glaucous, solid: leaves in 3's or 4's, rarely in 2's or 5's, sharply toothed: corolla 5–7 mm. long: heads paler than in the other species. Eastern Massachusetts and southern New Hampshire westward to Wisconsin, and southward to Pennsylvania, Kentucky, Oklahoma and Nebraska; also in the mountains from Virginia to Georgia. A plant of rich upland woods, rarely found near the coast.

The selection of names for these species has been found difficult. In the following discussion of the Linnean types the principle is observed that if there exists a specimen which Linnaeus had in hand when the description was written, this is to be considered the type, and is to be given the greatest weight in deciding upon the application of the name. If no such specimen exists, or if specimens and characters of two or more species are confused in the description, thus rendering definition by this means impossible, then the cited synonomy is to be employed in determining the type so far as it is of value.

In the first edition of the Species Plantarum (p. 838. 1753), Linnaeus gave the name *E. purpureum* to an American species of Eupatorium with verticillate leaves, and at the same time noted a var. β. In the Amoenitates Academicae, *E. maculatum* was described by Linnaeus; and in the second edition of the Species Plantarum both species were treated at length. The citations under β in the first edition all refer to our No. 1 above. Hermann's plate, and also that of Morrison, are plainly this plant; so also is the Hortus Cliffortianus plant in the British Museum as shown by a photograph. Moreover, the description accompanying the Ray citation represents this species, as shown by the number of leaves cited, as well as by a reference to the spotted stem and leaves like a nettle. Also, the original portion of the description of *E. purpureum* was drawn, either from the β references, or from the Hortus Cliffortianus plant, or both, and therefore refers to No. 1: "folia * * * lato-lanceolata * * * lanceolato-ovata * * * petiolata * * * Calyces florum incarnati. Flosculi octo."

In the Amoenitates, where *E. maculatum* was first proposed, all the citations under the original β are transferred to that species, and they are the only citations given. However, Linnaeus's description of *E. maculatum* applies much better to our No. 2: "foliis quinis tomentosis lanceolatis. * * * Folia quinque vel sex," since this northern plant usually has more lanceolate leaves, which are commonly more hairy underneath, and more frequently borne in 5's or 6's than is the case in plant No. 1. Plant No. 1 never has the leaves in 6's, and very rarely, if ever, in 5's. The situation is still further complicated by Linnaeus in the closing statement of the description where he says that *E. maculatum* is his variety of *E. purpureum* as to both synonomy and description. In the Linnean herbarium is a specimen from Kalm which Linnaeus must have had at the time the Species Plantarum was written, and which is undoubtedly plant No. 2. Moreover, plant No. 2, rather than No. 1, is much more likely to have been found by Kalm in the regions visited by him; since No. 1 is coastal, and not northern. A photograph of the specimen shows six leaves in the whorls (though unusual even for this species), and in every way answers the description of *E. maculatum* given by Linnaeus. There is every reason to suppose, therefore, that Linnaeus had this in hand when the description was drawn, and it is therefore to be considered the type-specimen. The name *E. maculatum* must, therefore, be applied to our No. 2, notwithstanding the fact that the synonomy applies to No. 1.

It remains to determine the application of the name *E. purpureum*. The statement has already been made that the original description seems to have been drawn from the β portion of the species. In the second edition of the Species Plantarum, where he first defines together both *E. purpureum* and *E. maculatum,* Linnaeus recasts the description of *E. purpureum,* omitting the statement that the stem was spotted, and stating that it was, "viridis, ad exortum petiolarum purpurascens." This new description excludes both spotted-stemmed species, and narrows the application of the name to species Nos. 3 and 4. However, a still further study of the description shows that Linnaeus was confusing both of these, since the statement quoted above applies best to No. 4; while the statement "folio quina lanceolata-ovata. Calyces florum incarnati. Flosculi octo" applies to No. 3. A photograph of material now in the Linnaean herbarium seems to show, though an accurate identification of it is impossible, that Linnaeus at some time had specimens of both species. It is necessary, therefore, because of this confusion, to ignore the Linnaean description, and to attempt the definition of the name through the synonomy. The writer has not had access to the Colden citation. The plant on which the Gronovian reference was based was most probably our No. 3, as judged by the statement of Gronovius: "foliis ovato-lanceolatis obtuse serratis * * * foliis longis," and Gronovius's reference to Cornut which will later be shown to be No. 3. Moreover, though not much material has been seen from Virginia, it seems likely that No. 4 is largely confined to the mountains in that state, while No. 3 extends to the coast, and would be more likely to have been found by Clayton.

The next citation of Linnaeus was to Cornut where a plate and extended discussion is given. The plate is not convincing, as it might represent either species. In the text, however, is the statement: "Caules * * * rubescentes (cinereo tamen colore suffusi) [i. e., glaucous] * * * inanes intus," which can refer only to No. 3. The source of Cornut's plant, however, is in doubt, as our No. 3 is not known from Canada where the title of his work would lead one to infer that it was obtained.

The other citation of Linnaeus was to Morrison, but the figure there given seems to have been copied from Cornut, and the description is a verbatim transcription of Cornut's. The citations of Linnaeus, therefore, so far as they can be identified, unanimously refer to plant No. 3. Moreover, the key heading, "*Calycibus octofloris," under which *E. purpureum* is found in the Species Plantarum, is appropriate to this plant and not to No. 4, which has from 3 to 6 florets. The name *E. purpureum* must therefore be used for our species No. 3.

In the Species Plantarum, on the page preceding that on which *E. purpureum* was described, Linnaeus proposed another species under the name *E. trifoliatum.* The original description consists solely of the statement "foliis ternis," which plainly is insufficient to define the species; and it is therefore necessary to depend upon the citations given, which are to Gronovius and Ray. The description given by Gronovius is inconclusive, having been drawn apparently from a slender shade plant with whitish heads without stating such characters as are of value here. The Clayton plant cited by Gronovius is his No. 620. A photograph of a specimen now in the British Museum labelled Clayton No. 620 shows it to be probably our No. 3. The leaves are lanceolate, bluntly and finely toothed; and, so far as can be made out from the print, the stem is purple and glaucous and not darker at the nodes. The stem is also cracked in one place in a manner more likely to occur if it were hollow. Also, as has already been stated, No. 3 is more likely to have been found by Clayton than No. 4. However, no species normally has leaves of this form in 3's. The specimen seems abnormal, but is more reasonably placed in No. 3. *E. trifoliatum* L. and *E. purpureum* L. are therefore to be considered one and the same species. Most of the early writers retained *E. trifoliatum* in addition to the various names employed by them for the other species. So far as the writer is aware, Torrey and Gray (Fl. N. A. ii. p. 82, 1841) were the first to unite *E. trifoliatum* and *E. purpureum.* This was done under the latter name; which, therefore, is the one to be retained under the Vienna Code (Chapter III, Sect. 5, Art. 46) which says: "When two or more groups of the same nature are united, the name of the oldest is retained. If the names are of the same date, the author chooses, and his choice cannot be modified by subsequent authors."

The oldest name that may be legitimately applied to our species No. 1 is the *E. verticillatum* of Lamarck (Encyc. ii, 405, 1786). This was divided by the author into two parts, α and β. Lamarck's citations and descriptions do not entirely agree. The Cornut and Morrison citations under α are the ones listed by Linnaeus under *E. purpureum* α, and have been shown above to refer to our No. 3. The Hermann reference under β, as has already been pointed out, refers to No. 1. However, the description given by Lamarck shows that both α and β are to be referred to species No. 1. In this description reference is made to a dull-green dotted stem and purple heads with six or seven florets, a combination of characters appropriate to no other species than No. 1; and under β the statement that the stem is obscurely purple and spotted, leaves parallel-ribbed and not cottony, flowers about 8, must also refer to No. 1. It is true the statement under β of leaves in 5's is not appropriate to No. 1, which very rarely has 5 leaves in the whorl, and yet it could not refer to No. 2, for the number of florets is stated as only 8. Lamarck's description was drawn from a garden plant, and No. 1 might possibly have produced 5 leaves under cultivation. If greatest weight in determining the application of Lamarck's name is given to his description, then the name *E. verticillatum* must be applied to our species No. 1.

The oldest available name for the fourth species is apparently Michaux's *E. falcatum*. In his description the statement leaves 4-verticillate, oval-lanceolate, acuminate at each end and subfalcate, calyx 5-flowered, is most appropriate to No. 4. The panicle is stated as multicorymbose, and the flowers white. This species often has a very large panicle, and pale heads which are frequently nearly white in dense shade.

The following is a key to the species and varieties discussed:

a. Leaves ovate to ovate-lanceolate, abruptly contracted into the petiole, more or less 3-nerved: plant somewhat viscid, scabrous-puberulent, with a strong odor when fresh: stem finely purple-specked, not glaucous: inflorescence convex (leaves in 3's or 4's, very rarely in 2's or 5's: florets 6–9, rarely 5–12) . . . . 1. *E. verticillatum*.

a. Leaves lanceolate to oval, tapering at the base, pinnately veined (except sometimes in the variety of No. 2): plant not viscid and not odorous. *b*

  b. Florets 9–15 (rarely 8–20): inflorescence or its divisions flat-topped: stem speckled if not obscured by too deep purple, not glaucous (leaves puberulent to glabrate beneath, in 4's or 5's, rarely in 3's or 6's: florets scarcely exserted). *c*.

    c. Leaves below the inflorescence, and bracts, inconspicuous. 2. *E. maculatum*.

    c. Leaves surrounding the inflorescence, and bracts, large and conspicuous, much exceeding the inflorescence, often more or less 3-nerved. var. *foliosum*.

  b. Florets 5–7 (rarely 3–8): inflorescence convex: stems rarely speckled, more or less glaucous. *d*.

    d. Stems fistulose, purple, plainly glaucous: leaves in 4's to 6's, bluntly toothed, scabrous-puberulent beneath or glabrate: florets scarcely exserted: corolla 3.5–4.8 mm. long, very rarely longer. 3. *E. purpureum*.

    d. Stems solid, green with purple nodes, faintly glaucous: leaves in 3's or 4's, very rarely in 2's or 5's, sharply toothed, villous-pubescent beneath or glabrate: florets much exserted: corollas 5.5–7.5 mm. long: heads paler than in the other species. . . . . . . 4. *E. falcatum*.

1. E. verticillatum Lamarck, Encyc. ii. 405 (1786) α and β. *E. purpureum* L. Sp. Pl. Ed. 1, ii. 838 (1753) as to synonomy under β, and as to description, but not as to synonomy under α, and not as

to his later treatment. *E. maculatum* L. Amoen. Acad. iv. 288 (1759) as to synonomy only. *E. fusco-rubrum* Walter, Fl. Car. 199 (1788) probably. *E. punctatum* Willd. Enum. Pl. Berol. 853 (1809) (photo. seen). *E. dubium* Willd. in Lam. Encyc. Sup. 2. 606 (1811). *E. ternifolium* Elliott, Bot. So. Car. and Ga. ii. 306 (1824) probably. *E. purpureum* var. *maculatum* Darlington, Fl. Cestrica 453 (1837).—Stem finely speckled with purple, green or more often suffused with purple, not glaucous, scarcely darker at the nodes, usually solid but frequently hollow, scabrous-puberulent above and apparently somewhat glandular: leaves generally in 3's or 4's occasionally in 2's or 5's, from broadly to narrowly ovate, sub-acuminate, abruptly narrowed to a conspicuous petiole which is 10–15 mm. long, coarsely serrate with somewhat rounded and mucronate or sharper teeth, veiny and often rugose, more or less plainly 3-nerved, above usually scabrous, beneath atomiferous and glabrous except on the veins which are more or less scabrous-puberulent: inflorescence rather small and dense, convex, when well developed hemispherical or short-oblong: heads narrowly oblong, 6–9 (rarely 5 or 12)-flowered, usually deep-purple: involucral bracts slightly narrower than in the next species; the inner often sub-acute: corolla 4.5–5.5 mm. long, slightly exserted: achenes 3.5–4.5 mm. long.—Borders of swamps and in marshes, in sandy or gravelly acid soils: on the Coastal Plain from eastern Massachusetts and southern New Hampshire to South Carolina. New Hampshire: Rochester, 1888, *Mrs. E. Bartow;* Derry, 1916, *C. F. Batchelder;* Mason, 1916, *C. F. Batchelder;* Jaffrey, 1896, *W. Deane,* 1897, *B. L. Robinson,* no. 379; Rindge, 1916, *C. F. Batchelder;* Gilsum, 1899, *M. L. Fernald,* no. 209. Massachusetts: eastern Massachusetts, 1854, *W. Boott;* North Andover, 1885, *C. H. Morss;* Wakefield, 1886, *F. S. Collins;* Sherborn, 1911, *Martha L. Loomis,* no. 430; South Royalston, 1907, *J. A. Bates;* Maugus Hill, Wellesley, 1897, *E. F. Williams;* Brookline, 1900, *G. E. Morris* (white flowers); Blue Hills, 1894, *W. H. Manning;* Cohasset, 1901, *E. F. Williams;* Loon Pond, Lakeville, 1913, *Fernald & Long,* no. 10490; Mashpee, 1916, *Knowlton, Bean & Bird;* East Sandwich, 1919, *Fernald & Long,* no. 19163; Allen's Harbor Creek Harwich, 1919, *Fernald & Long,* no. 19166; Brewster, 1912, *F. S. Collins,* no. 1649; Chilmark, 1911, *J. A. Cushman,* no. 7571; New Bedford, 1872, *G. Mackie.* Rhode Island: Rumford, 1903, *E. F. Williams;* Providence, 1844, *G. Thurber;* Crescent Beach, Block Island, 1913, *Fernald, Long & Torrey,* no. 10491. Connecticut: Waterford, 1899, *C. B. Graves;* Saybrook Junction, 1914, *R. W. Woodward* (flowers white); Southington, 1898, *L. Andrews,* no. 42, 1898, *C. H. Bissell,* no. 311; Tranquillity Farm, Middlebury, 1896, *W. M. Shepardson.* New York: Port Chester, 1886, *Louise M. Stabler.* New Jersey: May's Landing, 1916, *I. Tidestrom,* no. 8042; Hammonton, 1917, *A. Gershoy,* no. 660; Dividing Creek, 1910, *B. Long,* no. 4843; Atsion, 1917, *A. Gershoy*, no. 661; Bennett, 1917, *A. Gershoy*, no. 659. Delaware: near Delaware City, 1916, *I. Tidestrom*, no. 7903. District of Columbia: Washington and vicinity, 1898, *E. S. Steele*. South Carolina: Santee Canal, *Ravenel*.

This is the commonest species in low ground along the Coastal Plain. Albino forms are occasionally found. The glandular pubescence apparently gives the plant a characteristic strong odor not present in the other species, but this observation needs verification. The stem is occasionally hollow. The variation in number of florets among the specimens studied was as follows: 4 with 5 florets, 17 with 6 florets, 13 with 7 florets, 10 with 8 florets, 11 with 9 florets, 5 with 10 florets, 2 with 11 florets, and 1 with 12 florets. The number of leaves in the whorl fluctuated in the following proportion: 4 with 2 leaves (small plants), 27 with 3 leaves, 28 with 4 leaves, and 1 with 5 leaves.

2. E. maculatum L. Amoen. Acad. iv. 288 (1759) as to original description and specimen in the Linnaean Herbarium, but not as to citations. *E. Bruneri* A. Gray, Synopt. Fl. i. pt. 2, 96 (1884). *E. atromontanum* A. Nelson, Bot. Gaz. xxxi. 400 (1901). *E. Rydbergii* Britton, Manual 921 (1901). *E. purpureum* var. *Bruneri* Robinson, Proc. Amer. Acad. xlii. 44 (1906) for the more hairy western plants.—Stem green and finely purple-speckled, more often the spots obscured by a deep purple suffusion, not glaucous, puberulent above, not darker at the nodes, very exceptionally hollow: leaves most commonly in 4's or 5's, rarely in 3's or 6's, elliptic-ovate or elliptic-lanceolate, tapering at base and apex, short petioled or nearly sessile, sharply and often irregularly incurved-serrate varying to more finely crenate-serrate, pinnately veined, rugose, above glabrous or slightly scabrous, beneath atomiferous and from nearly glabrous to canescent with minute crisp scabrous hairs on the veins or more commonly on both veins and parenchyma: inflorescence or its parts flat-topped, dense: heads broadly oblong, 9–15 (rarely 8 or 20)-flowered, usually deep purple: bracts of the involucre broad, obtuse: corollas 5 mm. long, their tips usually but slightly or not at all exserted beyond the involucre: achenes 3.4–4.2 mm. long.—Open grounds and the borders of thickets, along streams and in wet sedgy meadows, in rich often mucky scarcely sandy soils, generally in calcareous regions: Newfoundland and Quebec to northern New England, western Massachusetts, western Connecticut, and Lancaster County, Pennsylvania; westward through Michigan, Illinois, Colorado, Utah, and Saskatchewan to New Mexico and British Columbia. Newfoundland: Salmonier River, 1894, *Robinson & Schrenk*, no. 40. Quebec: Grindstone Island, Magdalen Islands, 1912, *Fernald, Long & St. John*, no. 8093; vicinity of Cap a L'Aigle, 1905, *John Macoun*, no.

68338. PRINCE EDWARD ISLAND: Hillsborough River, Mt. Stewart, 1912, *Fernald, Bartram, Long & St. John*, no. 8092; Brackley Point, 1912, *Fernald, Long & St. John*, no. 8094. MAINE: Lake Hadley, East Machias, 1898, *M. A. Barber;* Orono, 1887, *M. L. Fernald*, 1896, *E. D. Merrill*, no. 437; Dover, 1895, *M. L. Fernald*, no. 307; Abbott, 1916, *Fernald & Long*, no. 14647; Fairfield, 1916, *Fernald & Long*, no. 14646; Greenvale, 1894, *K. Furbish;* South Deer Isle, 1914, *A. F. Hill*, no. 1834; Cow Island, Topsham, 1910, *K. Furbish;* South Poland, 1895, *K. Furbish;* Wells, 1898, *K. Furbish.* NEW HAMPSHIRE: Shelburne, 1915, *W. Deane;* Dartmouth College Grant, 1914, *A. S. Pease*, no. 16194; Gate of Crawford's Notch, 1884, *C. E. Faxon* (albino form); Walpole, 1916, *C. F. Batchelder.* VERMONT: Willoughby, 1898, *G. G. Kennedy;* Ripton, 1908, *E. F. Williams;* Manchester, 1898, *M. A. Day*, no. 91. MASSACHUSETTS: Greenfield, 1913, *J. Murdoch, Jr.*, no. 5208; Worthington, 1912, *B. L. Robinson*, no. 596; Cheshire and vicinity, 1912, *E. J. Winslow;* Lenox, 1911, *R. Hoffmann* (shade form); Stockbridge, 1902, *R. Hoffmann;* New Marlboro, 1912, *R. Hoffmann;* Mount Washington, 1915, *F. G. Floyd.* NEW YORK: Canton, 1914, *Orra P. Phelps;* Ithaca, 1913, *E. L. Palmer*, nos. 1190 & 1191; 1915, *C. C. Thomas*, no. 5099; 1919, *A. J. Eames*, nos. 12973, 12975, 12978, 12979; 1919, *Eames & Wiegand*, no. 12974; 1919, *Wiegand*, no. 12976; 1919, *L. F. Randolph*, no. 12972; Big Gully Ravine, Springport, 1919, *Eames, Randolph & Wiegand*, no. 12980; North Spencer, 1915, *Eames & MacDaniels*, no. 5088; Spencer Lake, 1919, *Eames & Wiegand*, no. 12981. PENNSYLVANIA: Dillerville Swamp, in limestone, 1901, *A. A. Heller.* ONTARIO: Plevna, 1902, *J. Fowler;* Island Lake, Algonquin Park, 1900, *Macoun*, no. 21813. OHIO: Birmingham, 1914, *L. H. MacDaniels*, no. 151. MICHIGAN: Keweenaw County, 1890, *O. A. Farwell*, no. 777; Turin, 1901, *B. Barlow;* Flint, 1909, *E. E. Sherff;* South Haven, 1911, *O. E. Lansing, Jr.*, no. 3316. INDIANA: East Chicago, 1910, *O. E. Lansing, Jr.*, no. 2804. ILLINOIS: Ravinia, 1911, *E. E. Sherff;* Cedar Lake, Lake County, 1906, *Gleason & Shobe*, no. 142; South Chicago, 1913, *H. H. Smith*, no. 5752; near Wady Petra, 1900, *V. H. Chase*, no. 764. WISCONSIN: Fort Howard Marsh, Brown County, 1890, *J. H. Schuette;* Osceola, 1900, *C. F. Baker.* IOWA: Ames, 1896, *Pammel & Ball*, no. 34. MINNESOTA: Cass Lake, Cass County, 1914, *L. H. & H. E. Pammel*, no. 553; Muskoda, Red River Valley, 1901, *C. A. Ballard*, no. 3083. NORTH DAKOTA: near Bottineau, 1902, *J. Lunell.* SOUTH DAKOTA: Black Hills, 1910, *J. Murdoch, Jr.*, no. 4296. NEBRASKA: sand hills of central Nebraska, 1893, *P. A. Rydberg*, no. 1682; Fort Niobrara, Knox County, 1908, *J. M. Bates*, no. 4686; Paddock, 1893, *F. Clements*, no. 2797. COLORADO: Fort Collins, 1881, *Bruner* (type of *E. Bruneri* Gray). WYOMING: Beaver Creek, Black Hills, 1896, *A. Nelson*, no. 2553 (type number of *E. atromontanum* Nelson). UTAH: Wasatch Mountains, 1872, *Wheeler.* New Mexico: Fort Wingate, *Dr. Matthews.* Saskatchewan: 1857–58, *E. Bourgeau.* British Columbia: Fraser River, 1858, *Lyall;* Chilliwack Valley, 1901, *J. M. Macoun,* no. 26486.

Var. **foliosum** (Fernald) comb. nov. *E. purpureum* var. *foliosum* Fernald, Rhodora x. 86 (1908).—Leaves large, ovate-oval, with a tendency toward a 3-ribbed base, thin, nearly or quite glabrous: inflorescence small, surrounded and usually much surpassed by the large lance-ovate upper leaves and bracts.—Newfoundland and Saguenay County, Quebec to northern New England and possibly Lake Superior. Newfoundland: Manuel's River, 1894, *Robinson & Schrenk;* Brigus Junction, 1911, *Fernald & Wiegand,* no. 6275; Grand Falls, 1911, *Fernald & Wiegand,* no. 6276; Bluff Head, Bay of Islands, 1898, *A. C. Waghorne,* no. 18; Harry's River, 1910, *Fernald & Wiegand,* no. 4133. Quebec: Dartmouth River, 1904, *Collins, Fernald & Pease;* Mingan, 1915, *H. St. John,* no. 90749. Prince Edward Island: Bloomfield, 1912, *Fernald, Long & St. John,* no. 8095. New Brunswick: Kent County, 1870, *J. Fowler.* Maine: Van Buren, "the common form," 1900, *M. L. Fernald;* Hamlin, 1901, *Fernald;* Fort Fairfield, 1901, *E. F. Williams;* Boundary Lake, 1902, *Eggleston & Fernald;* Fairfield, 1916, *Fernald & Long,* no. 14648; Bridgton, 1912, *L. R. Martin.* New Hampshire: Ice Gulch, Randolph, 1908, *A. S. Pease,* no. 11498; Pittsburgh, *Fernald & Pease,* no. 17068; Jefferson, 1916, *Pease,* no. 16837. Michigan: moist thickets, Keweenaw County, 1887, *O. A. Farwell,* no. 441 (doubtful).

E. maculatum is a northern plant of the richer, more calcareous soils, and is therefore nearly or quite absent from the sandy coastal plain from New England southward. In Central New York it is the characteristic joe-pye weed, occurring in great abundance everywhere in low grounds except perhaps in acid bogs. Locally it is somewhat variable as affected by shade and moisture, but geographically it is much more so. In the northeast the var. *foliosum* seems distinct enough to warrant separate treatment, but the other variations pass one into the other so gradually that no practical dividing lines can be drawn. Thus the leaves of the northeastern specimens are only slightly hairy beneath, but as one travels westward they gradually become more hairy until some plants on the Great Plains have the leaves distinctly whitened on the under surface. Locally, too, the degree of pubescence may fluctuate with the exposure. The more canescent western plants have been separated by Robinson as *E. purpureum* var. *Bruneri* (Gray) Robins. (l. c.). Several sheets of var. *foliosum* from Gaspé have the upper portion of the stem, and to a certain extent the under surface of the leaves, villous instead of crisp-puberulent. Scattered specimens of the typical form have narrow leaves with fine crenate serrations resembling those of *E. purpureum*, a variation the significance of which is not understood but which is probably ecological. The florets vary considerably in number, due apparently in some cases at least to local conditions. Among the specimens examined the number of florets ran as follows: 1 with 7 florets, 2 with 8 florets, 10 with 9 florets, 12 with 10 florets, 12 with 11 florets, 30 with 12 florets, 17 with 13 florets, 10 with 14 florets, 7 with 15 florets, 1 with 16 florets, 3 with 17 florets, 1 with 18 florets, 1 with 19 florets, 0 with 20 florets, and 1 with 21 florets. The leaves in the whorls fluctuate within narrow limits. The number counted ran as follows: 1 with 2 leaves (starved specimen), 7 with 3 leaves, 55 with 4 leaves, 54 with 5 leaves, and 2 with 6 leaves.

3. E. PURPUREUM L. Sp. Pl. ed. 1, ii. 838 (1753) as to synonomy under α, which in this case determines the type. *E. trifoliatum* L. Sp. Pl. ed. 1, ii. 837 (1753), placed under *E. purpureum* by T. & G. in 1841. *E. americanum* Hill, Brit. Herb. 453 (1756). ? *E. purpureum* γ *angustifolium* T. & G. Fl. N. Amer. ii. 82 (1841). *E. fistulosum* Barrett, Eupat. verticillate (1841), see also Wood's Class Book, ed. 2, 314 (1847).—Stems normally unspeckled, occasionally mottled, uniformly suffused with purple and not darker at the nodes, plainly glaucous, glabrous, hollow: leaves in 4's–6's, very rarely in 7's, elliptic-lanceolate, acuminate, tapering gradually to the nearly sessile base, regularly and finely crenate-serrate, scarcely rugose, above glabrous, beneath atomiferous and sparingly fine-puberulent on the veins only, or commonly almost glabrous; the veins numerous, spreading, regularly decreasing toward base and apex of the leaf; inflorescence crisp-pubescent, convex, often hemispherical, when well developed large and loose with the lower branches divaricate or horizontal: heads purple, narrowly cylindrical, 6–7 (rarely 5 or 8)-flowered: bracts of the involucre mostly obtuse: corolla 3.5–4.8 mm. long, slightly or not at all exserted: achenes 3.2–4.5 mm. long.—Low fields and the borders of thickets, if not too wet, in rich sandy and gravelly scarcely calcareous soils: southern Maine to Rhode Island, Florida, Texas and Oklahoma, and from eastern Kentucky, and West Virginia through western Pennsylvania to Ohio. MAINE: Cape Elizabeth, 1911, *M. L. Fernald;* Biddeford Pool, 1900, *G. G. Kennedy.* MASSACHUSETTS: Concord, *E. S. Hoar;* Milton, 1899, *G. G. Kennedy;* East Sandwich, 1919, *Fernald & Long*, no. 19168; Deerfield, 1908, *M. A. Day*, no. 62. RHODE ISLAND: Providence, *G. Thurber.* CONNECTICUT: Pomfret, 1910, *Sarah R. Armington;* Gully Brook, Hartford, 1907, *A. W. Driggs;* Ledyard, 1901, *C. B. Graves*, no. 234. MARYLAND: Ellicott City, 1916, *G.*

Arsène. District of Columbia: 1901, *E. S. Steele;* Brookland, 1908, *T. Holm;* near Fort Totten, 1915, *T. Holm.* Virginia: Rappahannock River, 1915, *I. Tidestrom,* no. 7607; Bedford County, 1871 & 1872, *A. H. Curtiss.* West Virginia: Harman, 1904, *A. H. Moore,* no. 2167; Dry Fork River near Harman, 1904, *J. M. Greenman,* no. 236. Kentucky: near Poor Fork Post Office, 1893, *T. H. Kearney, Jr.,* no. 214. South Carolina: Santee Canal, *H. W. Ravenel.* Alabama: *Buckley.* Florida: Eustis, 1895, *G. V. Nash,* no. 2118. Texas: Pope, *ex herb. G. Thurber.* Oklahoma: Page, 1914, *O. W. Blakley,* no. 3417. Arkansas: southwestern Arkansas, *F. L. Harvey,* no. 4. Pennsylvania: Pittsburgh, 1831, *Holz.* Ohio: Little Mountain, 1897, *J. M. Greenman,* no. 310.

In general this plant is very constant in its characters. One specimen from Pittsburgh, Pa. (Holz) has corollas longer than 5 mm.; otherwise this character of the corolla is good. The variation in florets was: 6 with 5 florets, 14 with 6 florets, 5 with 7 florets, and 1 with 8 florets. The variation in number of leaves in the whorl was: 7 with 4 leaves, 5 with 5 leaves, 6 with 7 leaves, and 1 with 8 leaves.

4. E. falcatum Michx. Flor. Bor. Am. ii. 99 (1803). *E. purpureum* L. Sp. Pl. ed. 2, 1173 (1763) as to description in part, not as to synonomy. *E. amoenum* Pursh, Fl. Am. Sept. ii, 514 (1814). *E. purpureum* var. *amoenum* A. Gray, Synopt. Fl. N. A. i. pt. 2, 96 (1884). *E. purpureum* var. *falcatum* Britton, Mem. Torr. Bot. Club v. 312 (1894).—Stems normally unspeckled, rarely mottled, green, purple at the nodes, rarely more purplish, scarcely glaucous, glabrous or nearly so, solid: leaves mostly in 4's, less commonly in 3's, rarely in 2's or 5's, lanceolate to ovate-oval or rarely ovate, acuminate, tapering gradually to the petioled or nearly sessile base or rarely more abruptly tapering, sharply serrate, slightly rugose; veins numerous, less spreading and less regular than in the last, decreasing gradually toward base and apex; blade glabrous and nearly smooth above, atomiferous and from glabrous to densely crisp-villous beneath, the hairs longer and softer than in the other species: inflorescence crisp-downy, convex, when well developed hemispherical or short-oblong and loose, often very large and open (up to 5 dm. long and 4 dm. wide): heads narrowly cylindrical, pale purple or whitish, 3–6 (7)-flowered: involucral bracts narrowly oblong, the inner acutish: corollas (5–) 5.5–7.5 mm. long, much exserted beyond the involucre: achenes 3–5 mm. long.—Open woods and wood borders in damp or rather dry rich light soil, but not in the coastal sands: eastern Massachusetts, southern New Hampshire, and southern Vermont, to Connecticut, and in the uplands to Georgia; westward through Ontario, New York, and Pennsylvania to Wisconsin, Nebraska and Oklahoma.

New Hampshire: Asquam Lake, 1914, *A. L. Gundersen;* Walpole, 1899, *M. L. Fernald,* no. 214. Vermont: Pownal, 1898, *J. R. Churchill,* also *W. W. Eggleston,* no. 258; 1899, *Eggleston,* no. 1. Massachusetts: Revere, 1879 & 1882, *H. A. Young;* Middlesex Fells, 1894, *W. H. Manning;* Blue Hills, 1894, *C. G. French;* Readville, *C. E. Faxon;* Stockbridge, 1902, *R. Hoffmann.* Connecticut: Waterbury, 1910, *A. E. Blewitt,* no. 1135; Hammond's Woods, Waterford, 1902, *C. B. Graves,* no. 302; New Haven, *D. C. Eaton.* New York: Oneida Lake, *old Torrey & Gray specimen;* various places in the Cayuga Lake Basin, 1919, *Eames, Randolph & Wiegand,* nos. 12983, 12984, 12985, 12986, also *Eames & Wiegand,* nos. 12982, 12989, and *A. J. Eames,* no. 12987; Junius, 1915, *Eames & MacDaniels,* no. 5090. Virginia: Stony Man Mountain near Luray, 1901, *E. S. & Mrs. Steele,* no. 9; Bedford County, 1871 & 1872, *A. H. Curtiss.* West Virginia: Parsons, 1904, *A. H. Moore,* no. 1994; East Fork of the Greenbrier River, Pocohontas County, 1904, *A. H. Moore,* no. 2380, and *J. M. Greenman,* no. 235; Gap Mountain, 1903, *E. S. & Mrs. Steele,* no. 186. Kentucky: on Big Black Mountain, Harlan County, 1893, *T. H. Kearney, Jr.,* no. 166. North Carolina: Swain County, 1891, *Beardslee & Kofoid.* Georgia: north Georgia, 1875, *C. Wright;* Whitfield County, 1900, *P. Wilson,* no. 70; west of Cuthbert, 1903, *R. M. Harper,* no. 1877. Ontario: Queenston, 1911, *J. White,* no. 2. Michigan: near Port Huron, 1892, *C. K. Dodge;* Flint, 1909, *E. E. Sherff.* Indiana: Wabash River east of Bluffton, 1908, *C. C. Deam,* no. 5194. Wisconsin: Brown County, 1901, *J. H. Schuette* (albino form); Kankauna, 1890, *Schuette.* Illinois: Bloomington, 1886, *B. L. Robinson;* near Princeville, 1900, *V. H. Chase,* no. 716; Peoria, 1904, *F. E. MacDonald;* Havana, 1903, *H. A. Gleason;* St. Clair County, 1886, *H. Eggert;* Grand Tower, 1902, *H. A. Gleason;* Belknap, 1902, *Gleason.* Iowa: Ames, 1897, *Ball & Pammel;* Dakota City, 1896, *Pammel,* no. 33. Nebraska: Nemaha, 1910, *J. M. Bates,* no. 5211. Oklahoma: Grand River, Cherokee Nation, 1895, *J. W. Blankinship;* near Ottawa, 1913, *G. W. Stevens,* no. 2371.

E. falcatum is much more variable than *E. purpureum.* In the southern mountains it is often very slender (*E. amoenum* Pursh) but ordinarily it is large and frequently very tall with an expanded inflorescence as noted in the description. The nodes occasionally lose the purple coloration. The leaves vary widely in shape, and the pubescence is extremely variable in density, but it is always of the same loose type. The heads are usually pale, but may vary to white or to deeper purple. The transitions in all cases are so gradual, and the combinations so complex, that no subdivision of the species has seemed practical. The variation in florets was as follows: 4

with 3 florets, 7 with 4 florets, 25 with 5 florets, 24 with 6 florets, and 2 with 7 florets. The variation in number of leaves in a whorl was: 2 with 2 leaves (poor specimens), 20 with 3 leaves, 36 with 4 leaves, and 2 with 5 leaves.

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THE AMERICAN AMMOPHILA.

M. L. Fernald.

The common Sand Reed, Psamma, Marram or Beach Grass, which covers the coastal sand dunes from the Straits of Belle Isle to North Carolina and occurs on sandy shores of the St. Lawrence system inland quite to Lake Superior, has been universally identified with *Ammophila arenaria* (L.) Link, the species occurring on the western and southern coasts of Europe. Superficially the two are very similar, although it needs only a glance at good material of typical *A. arenaria,* which occurs from southern Scandinavia to Portugal and Morocco, to see that the spike-like panicle is much shorter than in most of the American plant, *A. arenaria* having panicles only 0.5–2 dm. long, the panicles of the Atlantic American plant ranging from 1.5–4 dm. in length. In its long panicle the American plant is more nearly approached by the Mediterranean *A. arenaria,* var. *arundinacea* (Host) Husnot, in which the panicles may be 3 dm. long.

In all its technical characters, however, the long-panicled Mediterranean *Ammophila arenaria,* var. *arundinacea* agrees with the more northwestern typical European *A. arenaria;* but in these characters the European and Atlantic American plants are quite distinct, the Old World species being known in America only on the Pacific coast, where it has very recently been introduced as a sand binder. Briefly stated, the two species differ as follows: In *A. arenaria* the upper surface of the leaf-blade is copiously puberulent along the cartilaginous nerves, in the American merely serrulate-scabrous; in *A. arenaria* the ligule is scarious, lance-attenuate and very prolonged, commonly 1.5–3 cm. long, and lacerate at tip; in the Atlantic American plant, on the other hand, the ligule is chartaceous or coriaceous, rounded and very short, ranging from 1–3 mm. in length. In *A. arenaria,* the lemma is sharply bidentate at tip and short-mucronate in the sinus and the palea is sharp-mucronate; but in the American plant the lemma and palea are both blunt, the former scarcely bidentate. Other differences of less taxonomic importance are the puberulent glumes of the American species contrasted with the more commonly glabrous glumes of the European; and, similarly, the puberulent axis of the panicle in the American, the axis in the European being nearly or quite glabrous.

That the two are thoroughly distinct species there can be no question; but the American plant seems to have no valid name. In 1818, Nuttall published the name *Phalaris maritima*[1] partly for a plant of New Jersey, but he gave absolutely no description and stated that his plant was *Arundo arenaria* L. and that it is an important grass of Europe. It would be entirely unwise to take up for our grass Nuttall's name which was intended merely as a substitute for *Arundo arenaria.* The Atlantic American plant may be called

AMMOPHILA **breviligulata,** n. sp., *A. arenariam* simulans; foliis supra serrulato-scabris, ligulis chartaceis vel coriaceis rotundatis 1–3 mm. longis; paniculis lineari-cylindricis 1.5–4 dm. longis, rhachi puberulo; glumis puberulis; lemmate obtuso nec bidentato; palea obtusa; caryopsibus 3.2–3.6 mm. longis.—Sand dunes and shores, Newfoundland to North Carolina, inland along the St. Lawrence system to the Great Lakes. TYPE: sandy sea-beach, Milford, Connecticut, August 27, 1902, *C. H. Bissell* (Gray Herb.).

GRAY HERBARIUM.

[1] Nutt. Gen. i. 48 (1818).

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,—XXXII.

VITACEAE.

CISSUS.

C. Ampelopsis Pers. Ipswich, growing in a dense mass over boulder in wild ground, perhaps from a neighboring cemetery (*R. A. Ware*, Oct. 16, 1909).

PSEDERA.

P. quinquefolia (L.) Greene. Dry rocky soil, common.

P. quinquefolia (L.) Greene, var. **hirsuta** (Donn) Rehder. Dry rocky woods, Boxboro (*F. W. Hunnewell & H. St. John*, May 30, 1914).

P. vitacea (Knerr) Greene. Medford, Concord, Wellesley, Sherborn.

VITIS.

V. aestivalis Michx. Dry open woods and thickets, apparently frequent, except in the southeast.

V. bicolor Le Conte. Woods and thickets, common.

V. labrusca L. Woods and roadsides, common throughout.

V. novae-angliae Fernald. Georgetown (*E. F. Williams*, Aug. 9, 1907); Sudbury (*C. W. Swan*, Sept. 2, 1885). See Rhodora xix. 144, 1917.

V. vulpina L. Sandy soil at Gloucester, Essex, Beverley, Ipswich and Bradford.

TILIACEAE.

TILIA.

T. americana L. Rich woods, frequent.

MALVACEAE.

ABUTILON.

A. Theophrasti Medic. Gardens and waste places, frequent, especially near Boston.

ALTHEA.

A. OFFICINALIS L. A single plant on rubbish heap in Cambridge (*W. Deane*, Aug. 5, Oct. 3, 16, 1886); reported from marsh at Salisbury according to J. Robinson, Fl. Essex Co. 40, 1880.

ANODA.

A. TRIANGULARIS (Willd.) DC. Woolwaste dump, Westford (*Miss E. F. Fletcher*). See RHODORA xviii. 143, 1916. Native of southwestern United States.

GOSSYPIUM.

G. HERBACEUM L. Self-sown and abundant on vacant lot on Huron Ave., Cambridge (*E. F. Williams*, Sept. 12, 1910). Probably an Asian plant.

HIBISCUS.

H. Moscheutos L. Salt or brackish marshes; Salisbury (*Mrs. C. N. S. Horner*, ——, 1882); old report at Swampscott (J. Robinson, Fl. Essex Co. 40, 1880); frequent from Hingham south. There is an especially fine station nearly an acre in extent at Mann's Hill, Scituate. This fine mallow also grows in fresh water marshes at various places along the Concord and Sudbury rivers as far inland as Framingham; there are occasional stations on the Charles River, and the plant is rather abundant at the northeast of Farm Pond, Sherborn (*A. J. Eames*).

H. TRIONUM L. Gardens and waste places, occasional.

MALVA.

M. ALCEA L. Escaped from gardens, or persistent, at seven places.

M. CRISPA L. Casual at Reading, Malden, S. Boston, Mansfield and Ashland. Native of Europe, and sparingly escaped from old gardens and elsewhere.

M. MOSCHATA L. Persistent and spreading.

M. PARVIFLORA L. Rubbish heap, Cambridge (*W. Deane*, Oct. 11, 1884). Introduced probably from the Pacific coast, where it is well established.

M. pusilla Smith (*M. borealis* Wallm. of Middlesex Flora). Vicinity of woollen mills at Westford (*C. W. Swan*, Sept. 15, 1884); Dracut (*C. W. Swan*, Aug. 1, 1883); also Lowell (*C. W. Swan*, no date). Native of northern Europe and Asia, introduced into California, and casual here. See Synop. Fl. N. Amer., A. Gray, ed. B. L. Robinson, i. pt. 1, 298–299, 1897.

M. rotundifolia L. Gardens and waste places, common.

M. sylvestris L. Sharon (*S. Harris*, July 12, 1894). Reported from dry open roadsides, Acton and Concord, Hosmer, Rhodora i. 223, 1899.

M. sylvestris L., var. mauritiana (L.) Boiss. Charlestown (*C. E. Perkins*, July 23 and Sept. 9, 1881). Specimens in herb. N. E. Botanical Club and Gray Herb. Casual from southwestern Europe.

MALVASTRUM.

M. coromandelianum (L.) Garcke. Woolwaste, Westford, Miss E. F. Fletcher in Rhodora xix. 132, 1917. Introduced from India.

SIDA.

S. hermaphrodita (L.) Rusby. Escaped from Fenway, Boston, also in field at West Cambridge. Persisting about old gardens, Jamaica Plain (*N. T. Kidder*, Sept. 20, 1888).

S. spinosa L. Dumps at Lowell, Dracut, Westford, Malden and Watertown.

SPHAERALCEA.

S. Munroana (Dougl.) Spach. Woolwaste dump, Westford, 1915, Miss E. F. Fletcher in Rhodora xviii. 143, 1916. Native of Rocky Mts. and portions of the northwest.

S. Fendleri Gray. Woolwaste, Westford, Miss E. F. Fletcher in Rhodora xx. 20, 1918. Native of western Texas and Arizona.

WISSADULA.

W. callimorpha (Hochr.) Hassl., var. Friesii Hassl. Woolwaste, Westford (*Miss E. F. Fletcher*, Sept. 5, 1917). Native of eastern Bolivia and adjacent Brazil. See Rhodora xx. 20, 1918.

TAMARICACEAE.

TAMARIX.

T. GALLICA L. Vacant lot, escaped from Fenway, Boston (*E. F. Williams*, May 23, 1909).

T. PARVIFLORA DC. Waste lands in Boston and Brookline, escaped from cultivation.

HYPERICACEAE.

HYPERICUM.

H. AUREUM Bartram. Roadside, Billerica and Westford (*Miss E. F. Fletcher*, August, 1909). See RHODORA xii. 55, 1910.

H. boreale (Britton) Bicknell. Shores of ponds and wet places, common.

H. canadense L. Moist or dry soil, very common throughout.

H. ellipticum Hook. Wet places, frequent northward, local southward.

H. gentianoides (L.) BSP. Dry sand and gravel, also on ledges; common throughout.

H. majus (Gray) Britton. Wet or dry soil, common.

H. mutilum L. Moist soil, common throughout.

H. PERFORATUM L. Fields and pastures, especially in dry soil, very common throughout.

H. PROLIFICUM L. Weston (*E. J. Winslow*, July 9, 1911, et seq.).

H. punctatum Lam. Open places in damp and dry soil, frequent.

H. virginicum L. Swamps and wet shores, common throughout.

ELATINACEAE.

ELATINE.

E. minima (Nutt.) Fisch. & Mey. Wet sandy margins of ponds, frequent. See RHODORA xix. 10–15, 1917.

C. H. KNOWLTON } *Committee on*
WALTER DEANE } *Local Flora.*

Juncus Gerardi Loisel., var. **pedicellatus**, n. var., cum inflorescentia 1–2 dm. longa; floribus plerumque pedicellatis, pedicellis 3–10 mm. longis; perianthiis 3.5–5 mm. longis.

Inflorescence 1–2 dm. long: flowers mostly pedicelled; the pedicels 3–10 mm. long: perianths 3.5–5 mm. long.—Wet sandy, gravelly or rocky coast, Maine to Rhode Island. Maine: Cutler, July 24, 1902, *Kate Furbish;* Dark Harbor, Islesboro, August 14, 1913, *Woodward, Bissell & Fernald,* no. 9,142; Matinicus, September, 1908, *C. A. E. Long,* no. 38 (type in herb. N. E. B. C.); August 9, 1919, *Long,* no. 147. Rhode Island: East Providence, July 20, 1890, *J. F. Collins.*

Differing from typical *J. Gerardi* in its large flowers and elongated pedicels, the perianths of the typical form of the species being 2–3 (rarely 3.5) mm. long, and the flowers mostly sessile or merely short-pedicelled. The extreme material of var. *pedicellatus* is very large, nearly 1 m. high, but other plants are low (about 3.5 dm.). The inflorescence, too, is longer than in most *J. Gerardi,* in which the inflorescence varies from 0.1–1 (rarely to 1.5) dm. long.—M. L. Fernald, Gray Herbarium.

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Rhodora

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SOLIDAGO LEPIDA, VAR. FALLAX IN KNOX COUNTY, MAINE.

NATHANIEL T. KIDDER.

ISLE AU HAUT is one of the outermost islands of Penobscot Bay, and lies about fifteen miles southwest of Mount Desert. It is botanically interesting both for the plants which grow there and for the number of mainland weeds which have not yet found a footing. Since my first visit in 1901 I have returned every year, and have spent many weeks in botanizing. Isle au Haut is included in the region described by Mr. Albert Frederick Hill in "The Vascular Flora of the Eastern Penobscot Bay Region, Maine," which was published in the Proceedings of the Portland Society of Natural History, Vol. III, Part 2 (1919).

Sometime I hope to publish a list of the plants of Isle au Haut, based on my collections on the island alone. Some of my finds are mentioned in Mr. Hill's Flora, but while his list was in press I was still adding to my collections. It is my hope that the Solidago of my heading may be found on Isle au Haut, as I have found there nearly everything which I have seen on the neighboring islands. To be sure, I have not explored them very thoroughly.

Just off the Northwest shore of Isle au Haut lies a little island known as Nathan's Island. Some three acres in extent, its greatest elevation not more than thirty-five feet above high water, this island must be blessed with very rich soil, for what grows on it at all is in very robust form. The trees are mostly spruce, and in the occasional openings are found much the same plants we find in similar spots on the larger islands about. On a casual visit to Nathan's September 3, 1917, I was struck by a thriving golden rod of which there were very few plants. I have already commented on the vigor shown by the growth on Nathan's. I very nearly passed those plants by as strong growing *Solidago canadensis*. Fortunately a second impulse led me to bring away one complete and one partial specimen. Prof. Fernald pronounced them to be *Solidago lepida* DC., var. *fallax* Fernald, and referred me to the first article in Rhodora XVII (1915) where on page 9 we read under this variety the range "Newfoundland to British Columbia, south to northern New Brunswick, northern Maine, northern Michigan, Utah and Washington." And Prof. Fernald has written on my sheet "first south of Aroostook Valley."

Milton, Massachusetts.

TRILLIUM RECTISTAMINEUM, A VALID SPECIES OF THE SOUTHEASTERN UNITED STATES.

Harold St. John.

In 1917 R. R. Gates described a new variety of *Trillium*, *T. lanceolatum* Boykin, var. *rectistamineum* Gates. He based it on a series of sheets with imperfect data from the Chapman Herbarium. Gates gives an adequate description, and states[1] that, "This plant, no doubt, constitutes a distinct species, differing from *T. lanceolatum* especially in the petals, anthers, and ovary, but as the specimens available are without locality and only one shows a complete flower, it seems desirable merely to designate this form as above indicated." When the writer reorganized the Trilliums in the Gray Herbarium, three sheets from Georgia, Florida, and Alabama were separated as a very distinct species. By the kindness of Dr. J. M. Greenman it has been possible to compare these with authentic material of *T. lanceolatum* Boykin, var. *rectistamineum* Gates and their identity is unquestionable. The additional material confirms the specific nature of the characters, and gives exact information as to the range of the plant. There is, consequently, no reason for keeping it in

[1] Ann. Mo. Bot. Gard. iv. 48 (1917).

any subordinate category, and the specific combination is made below. It is probable that the Florida specimens referred to by Rendle[1] are of this species.

Trillium **rectistamineum** (Gates) comb. nov. *T. lanceolatum* Boykin, var. *rectistamineum* Gates, Ann. Mo. Bot. Gard. iv. 48 (1917).—Georgia, northwestern Florida, and Alabama.—Georgia: rich woods northwest of Tennille, Washington County, June 14, 1902, *R. M. Harper*, no. 1,330. Florida: moist slopes in woods, Chattahoochie, March 14, 1901, *A. H. Curtiss;* near head of rich ravine on Aspalaga Bluff, Gadsden County, March 8, 1909, *R. M. Harper*, no. 25; Aspalaga, March, 1897, *Herb. Chapman.* Alabama: *Buckley.*

T. rectistamineum (Gates) St. John has broadly lanceolate petals, 4–6.5 cm. long, 1.2–1.8 cm. broad, the filaments one-quarter the length of the anthers, anthers straight, fruit ovoid, 3-angled, leaves broadly deltoid-lanceolate; while *T. lanceolatum* Boykin acc. to Small has lanceolate petals, long-clawed at the base, 2–5 cm. long, 3–8 mm. wide, the filaments about as long as the anthers, anthers incurved, fruit 6-angled (according to Watson),[2] leaves lanceolate. *T. rectistamineum* has broadly lanceolate dark purple petals, 4–6.5 cm. long, 1.2–1.8 cm. broad, leaves broadly deltoid-lanceolate, stems glabrous; while *T. viride* Beck has clawed greenish petals, the blade linear or nearly so, the claw usually purplish, leaves ovate, and the stem scabrous at the summit. *T. rectistamineum* has filaments one-quarter the length of the anthers, the connective projecting conspicuously beyond the tips of the anther sacs, petals broadly lanceolate, 4–6.5 cm. long, 1.2–1.8 cm. broad, leaves broadly deltoid-lanceolate; while *T. Underwoodii* Small has filaments not more than one-fifth the length of the anthers, the connective scarcely exceeding the tips of the anther sacs, petals lanceolate or ovate-lanceolate, 4–7 cm. long, 1–2.1 cm. broad, and the leaves ovate or orbicular-ovate. This series of contrasts should be of assistance in distinguishing *Trillium rectistamineum* (Gates) St. John from related species.

Gray Herbarium.

[1] Rendle, A. B. Journ. of Bot. xxix. fourth paragraph 325 (1901).

[2] Watson, S. Rev. N. Am. Liliaceae, Proc. Am. Acad. Arts and Sci. xiv. 273 (1879).

SECOND REPORT OF THE COMMITTEE ON FLORAL AREAS.

This committee published in October and November, 1918, a report on the New England *Ranunculaceae*. We have now prepared a similar report on *Polypodiaceae*, *Schizaeaceae* and *Osmundaceae*. All our species of these three families are native, none introduced, and they have been extensively collected and reported upon. More material is needed, however, for adequate reports on the lady-fern group. Merely formal varieties and casual hybrids are omitted, as their ranges are not of value here.

PRELIMINARY LISTS OF NEW ENGLAND PLANTS,—XXVII.

[The sign + indicates that an herbarium specimen has been seen; the sign — that a reliable printed record has been found.]

Polypodiaceae.	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
Adiantum pedatum L.	+	+	+	+	+	+
×Asplenium ebenoides R. R. Scott			+	+		+
Asplenium montanum Willd.						+
“ pinnatifidum Nutt.						—
“ platyneuron (L.) Oakes	+	+	+	+	+	+
“ Ruta-muraria L.			+	+		+
“ Trichomanes L.	+	+	+	+	+	+
“ viride Huds.	+		+			
Athyrium acrostichoides (Sw.) Diels	+	+	+	+	+	+
“ angustifolium (Michx.) Milde		+	+	+		+
“ angustum (Willd.) Presl	+	+	+	+	+	+
“ “ var. elatius (Link) Butters	+	+	+	+	+	+
“ “ var. laurentianum Butters	+					
“ “ var. rubellum (Gilbert) Butters	+	+	+	+	+	+
“ asplenioides (Michx.) Desv.				+	+	+
Camptosorus rhizophyllus (L.) Link	+	—	+	+	+	+

Polypodiaceae	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
Cheilanthes lanosa (Michx.) Watt .						+
Cryptogramma Stelleri (Gmel.) Prantl	+	+	+	+		+
Cystopteris bulbifera (L.) Bernh. .	+	+	+	+		+
" fragilis (L.) Bernh. . .	+	+	+	+	+	+
Dennstaedtia punctilobula (Michx.) Moore	+	+	+	+	+	+
Onoclea sensibilis L.	+	+	+	+	+	+
Pellaea atropurpurea (L.) Link. .			+	+	+	+
" glabella Mett.			+			
Polypodium vulgare L.	+	+	+	+	+	+
Polystichum acrostichoides (Michx.) Schott	+	+	+	+	+	+
" Braunii (Spenner) Fée	+	+	+	+		
Pteretis nodulosa (Michx.) Nieuwl.	+	+	+	+	+	+
Pteridium latiusculum (Desv.) Maxon . . .	+	+	+	+	+	+
" " var. pseudocaudatum (Clute) Maxon			—	+		
×Thelypteris Boottii (Tuckm.) Nieuwl.	+	+	+	+		+
Thelypteris cristata (L.) Nieuwl. .	+	+	+	+	+	+
" " var. Clintoniana (D. C. Eaton) Weatherby	+	+	+	+		+
" Dryopteris (L.) Slosson	+	+	+	+	+	+
" Filix-mas (L.) Nieuwl.			+			
" fragrans (L.) Nieuwl.	+	+	+			
" Goldiana (Hook.) Nieuwl.	+	+	+	+		+
" hexagonoptera (Michx.) Weatherby	+	+	+	+	+	+
" marginalis (L.) Nieuwl.	+	+	+	+	+	+
" noveboracensis (L.) Nieuwl..	+	+	+	+	+	+
" palustris Schott . .	+	+	+	+	+	+
" Phegopteris (L.) Slosson	+	+	+	+	+	+
" simulata (Davenp.) Nieuwl.. .	+	+	+	+	+	+

Polypodiaceae	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
Thelypteris spinulosa (O. F. Mueller) Nieuwl.	+	+	+	+	+	+
" " var. concordiana (Davenp.) Weatherby				+		
" spinulosa var. intermedia (Muhl.) Nieuwl.	+	+	+	+	+	+
" spinulosa var. americana (Fisch.) Weatherby	+	+	+	+		
Woodsia alpina (Bolton) S. F. Gray			+			
" glabella R. Br.	+	+	+			
" ilvensis (L.) R. Br.	+	+	+	+	+	+
" obtusa (Spreng.) Torr.	+	+	+	+	+	+
Woodwardia areolata (L.) Moore	—	+		+	+	+
" virginica (L.) Sm.	+	+	+	+	+	+
Schizaeaceae[1]						
Lygodium palmatum (Bernh.) Sw.		+		+	+	+
Osmundaceae						
Osmunda cinnamomea L.	+	+	+	+	+	+
" " var. glandulosa Waters					+	
" Claytoniana L.	+	+	+	+	+	+
" regalis L., var. spectabilis (Willd.) Gray	+	+	+	+	+	+

Generally Distributed Species.

Athyrium angustum, var. rubellum
Cystopteris fragilis
Dennstaedtia punctilobula
Onoclea sensibilis
Polypodium vulgare
Pteridium latiusculum
Thelypteris cristata
" marginalis
Thelypteris noveboracensis
" palustris
" spinulosa
" " var. intermedia
Osmunda cinnamomea
" Claytoniana
" regalis, var. spectabilis

[1] In the herbarium of the New England Botanical Club there is a specimen of *Schizaea pusilla* Pursh, distributed by Addison Brown and labelled as collected in Rhode Island by J. W. Congdon. When questioned in regard to it in 1907, Mr. Congdon wrote that he had never collected this species in Rhode Island or anywhere else, but that various specimens of it from New Jersey had passed through his hands in the course of exchanges and that one of these had, no doubt, got wrongly labelled.

These species seem, for the most part, to be distributed very evenly, although somewhat dependent on suitable habitats. *Cystopteris fragilis,* for instance, a plant of shaded rocks or rarely of woodland soil, is not known from Cape Cod, where such conditions are lacking. *Dennstaedtia punctilobula, Thelypteris marginalis, T. palustris* and *T. spinulosa* are apparently less common in northern Maine than elsewhere. Through them, the ranges grade off into those of the following division.

Species of Rich Soils.

Adiantum pedatum	Polystichum acrostichoides
Athyrium acrostichoides	Pteretis nodulosa

These ferns are abundant in rich soils, but avoid the spruce forest and sandy regions. The first three are woodland species, the *Polystichum* frequenting drier situations than the others. *Pteretis nodulosa* is by preference a plant of the richest alluvium, where it grows five or six feet tall. It grows also in moist upland country, especially where there is a trace of lime in the soil. Like the other species of this division, it avoids northwestern and extreme northern Maine and the coastal plain areas of Cape Cod; it also avoids the outer Maine coast east of the Kennebec and all of southeastern Massachusetts, and is rare in eastern Connecticut and Rhode Island (two stations, one now eradicated).

Northern Species.

A	B
Thelypteris Dryopteris	Athyrium angustum, var. laurentianum
" Phegopteris	Polystichum Braunii
Woodsia ilvensis	Thelypteris spinulosa, var. americana

The species of group A are northern types of wide range in New England and perhaps as well placed with the generally distributed species, but, unlike them, becoming notably less frequent in southern New England. *Thelypteris Dryopteris,* common northward, is rare in eastern Massachusetts and eastern Connecticut and is not reported from Cape Cod nor the southern islands. It has two Rhode Island stations, both in or near Providence, but is known to have been introduced at one of them; and the other is under suspicion. *T. Phegopteris* has a similar range, but is more frequent southward, has four stations in Rhode Island, and has been found during the past season in Falmouth at the base of Cape Cod. *Woodsia ilvensis*, a plant of sunny, dry ledges, apparently avoids northwestern Maine and southeastern Massachusetts and is known from only a single station in Rhode Island.

Group B is composed of strictly northern plants, confined, except for isolated stations on Mt. Greylock, to comparatively boreal habitats in the northern tier of states. *Athyrium angustum*, var. *laurentianum* was, when first described, known in our region only from extreme eastern Maine in Princeton. It has since been found at three stations in northern Maine. *Polystichum Braunii* grows in ravines and deep woods, usually at an altitude of 1000 feet or more. It has been found on Mt. Greylock, Mass., at many places in the Vermont mountains and in northern New Hampshire, at Grafton, Strong, Temple and New Vineyard in western Maine and at scattered stations on the slopes of mountains in northern Maine. *Thelypteris spinulosa*, var. *americana* has almost the same range, but is much more abundant, as it is a typical plant of the spruce forest at an elevation of 1000 feet or more. It also reaches a splendid development in the spruce woods along the Maine coast from the islands of Penobscot Bay eastward.

Southern Species.

A

Asplenium platyneuron
" Trichomanes
Athyrium angustum, var. elatius
Thelypteris cristata, var. Clintoniana
" hexagonoptera
" simulata
Woodsia obtusa

B

Asplenium montanum
" pinnatifidum
Athyrium asplenioides
Cheilanthes lanosa
Lygodium palmatum

As in the case of the northern species, the southern divide into two groups. Group A comprises species of rather wide distribution in southern New England, which become rarer and occur mostly at low altitudes northward and, with the exception of *Athyrium angustum*, var. *elatius*, reach in that direction no further than south-central Maine. *Asplenium platyneuron* is well known southward, reaching north to Burlington and St. Johnsbury, Vt., and North Woodstock, N. H. In Maine it is rare, known only from scattered stations, the northernmost of which is Anson and the most eastern Appleton and Union. *Asplenium Trichomanes* grows on ledges of various kinds of rock in southern New England. Further north it seems to prefer calcareous rocks. It is frequent in Vermont, occasional in southern New Hampshire and in western Maine. It apparently ascends to higher altitudes northward than the other species here placed. *Athyrium angustum*, var. *elatius* is known from scattered stations in other states, and along the Maine coast and on the Kennebec and upper Androscoggin Rivers, but not further north. (This generalization is based on 32 records.) *Thelypteris cristata*, var. *Clintoniana* is frequent west of the Connecticut, especially in the Taconic Mountains. It occurs here and there to the east, except in Rhode Island and on Cape Cod, as far as Mt. Desert. *T. hexagonoptera* is frequent in southern New England, occasional in Vermont, rare in New Hampshire (three stations) and occasional in Maine as far east as Charleston in Penobscot Co. *T. simulata* is known in Vermont only from Brattleboro and Hartland, but is occasional in southeastern New Hampshire north to Merrimac and southern Carroll Counties and in Maine along the coast to Southport and inland to Limington. It is abundant in eastern Massachusetts but apparently is less common in Rhode Island and Connecticut. *Woodsia obtusa* is frequent on ledges and in dry soil in southern New England; occasional in Vermont, reaching Burlington and St. Johnsbury; rare in southern New Hampshire; and in Maine known only from Winthrop (H. Metcalf, RHODORA iii. 236. 1901; specimen in herb. N. E. Botanical Club).

Group B consists of species, rare or local with us, which enter New England from the southwest and are confined, except for one New Hampshire station for *Lygodium*, to the three southernmost states. *Asplenium montanum* is known from six scattered stations on granite ledges in Connecticut. *A. pinnatifidum* is reported from Sharon and Southington, Conn. The specimen from Southington in the Gray Herbarium, however, is not *A. pinnatifidum*, but a state of *A. ebenoides* with obtuse segments; that record may be founded on an error in determination. There seems no reason to doubt the Sharon report. *Athyrium asplenioides* is known from the Boston region and from Sandwich, Mass., and from Rhode Island and Connecticut, in no case more than 25 miles from the coast. It may prove to be a coastal plain species when better known, but probably one of the heavier and less acid soils rather than the sand-plains. *Cheilanthes lanosa* occurs at a single station on trap cliffs at New Haven, Conn. (G. Van Ingen). *Lygodium palmatum* is found locally in the Connecticut basin as far north as Winchester, N. H., in the Merrimac Valley in Massachusetts and thence at scattered stations southward to Narragansett Bay. It is not known from Cape Cod.

Coastal Plain Species.

Osmunda cinnamomea, var. glandulosa	Woodwardia areolata
Pteridium latiusculum, var. pseudocaudatum	" virginica

These plants are coastal plain types which, however, for the most part intrude into acid areas further inland than the actual geologic coastal plain. The Osmunda has been found only at Barrington, R. I. *Pteridium latiusculum*, var. *pseudocaudatum* has been collected at Needham, Mass., on Cape Cod at Barnstable, Dennis, Brewster and Harwich, and on Nantucket. It has also been reported from the sand-plains in Colchester, Vt. All the New England specimens seen are somewhat transitional and by no means as clearly distinguishable as the material from further south (where the variety entirely replaces the typical form), and often appear like a mere ecological state. *Woodwardia areolata* occurs near the coast from Brownfield and Acton in southwestern Maine southward, penetrating inland in Connecticut to East Hartford, Newington and Middlebury, and occurring also on Nantucket, Martha's Vineyard and Block Island. *W. virginica*, a plant of sphagnous swamps, extends further inland. It appears at scattered localities in western Maine as far north as Chesterville and Belgrade and in the Penobscot valley at Oldtown. It is frequent throughout eastern Massachusetts and occurs in the sandy Springfield region, also at several places in the interior of Connecticut. It is also known at Rutland, Colchester and Franklin in the Champlain valley.

Calciphile Species.

Northern

Asplenium viride	Thelypteris Filix-mas
Cryptogramma Stelleri	" fragrans

Cystopteris bulbifera	Woodsia alpina
Pellaea glabella	" glabella

Southern

Asplenium ebenoides	Camptosorus rhizophyllus
" Ruta-muraria	Pellaea atropurpurea
Athyrium angustifolium	Thelypteris Goldiana

The term calciphile is here used in a somewhat general sense to cover all species whose ranges are, for the most part, identical with areas of calcareous rock. The actual lime requirements of the different species placed here probably differ considerably. *Asplenium Ruta-muraria,* for instance, is strictly confined to ledges of calcareous rock. *Camptosorus* and *Thelypteris fragrans* occur not uncommonly on other rocks. As shown by tests made by Dr. Edgar T. Wherry, of the Dept. of Agriculture, the former will grow in a weakly acid soil. *Thelypteris Goldiana* and *Athyrium angustifolium* are plants of rich woods, not always visibly associated with any source of lime other than leaf-mold. But it is probable that none of these species live in soils which do not contain soluble calcium compounds.

Since the calcareous areas of New England are chiefly west of the Connecticut River, these species are most abundant there. The valley between the Green Mts. and the Taconics is a rich area for them, and so are Mt. Toby in Massachusetts and Smugglers' Notch and the Willoughby Lake region in Vermont. *Cystopteris bulbifera* is the most widely distributed of these ferns east of the Connecticut, being known from Mt. Toby, from northern Coos Co., N. H., and from most of the calcareous areas in Maine. *Cryptogramma Stelleri* is probably next in abundance among the northern calciphiles, though in dry seasons it is likely to wither away early. It is very rare in western Connecticut, local in Franklin Co., Mass., and in eastern Vermont, and occasional in western Vermont. It has been found at Colebrook, N. H., by Dr. A. S. Pease and at West Paris, Maine, by W. L. Bacon (Rhodora x. 35. 1908).

Asplenium viride has been found at five stations in the Green Mts. of Vermont and in 1917 at Green Mt. on the north branch of the Penobscot in Somerset Co., Maine, by Dr. Harold St. John. *Woodsia glabella* has six Vermont stations and two on ledges along the Androscoggin at Berlin and Gorham, N. H. It also occurs at Moxie Falls, Somerset Co., and Chain of Ponds, Franklin Co., Maine. *W. alpina* is found only at Queechee Gulf, Smugglers' Notch and Mt. Willoughby in Vermont, though it closely approaches the Maine border in the Aroostook valley, New Brunswick. *Thelypteris Filix-mas* has been found at eight stations in central Vermont, where it thrives best in high pastures and thickets (see E. J. Winslow, The Male Fern in Vermont, Am. Fern Journ. vii. 87–90. 1917). *T. fragrans* is a fern of drier ledges (sometimes hardly calcareous) which occurs locally in the Green Mts. south to central Vermont, at Lake Sunapee and in gorges of streams north of the White mountains in New Hampshire and at scattered stations in Oxford, Franklin, Kennebec, Piscataquis and Aroostook Counties, Maine.

The ranges of the two species of *Pellaea* overlap in Vermont, where *P. glabella* is known from six stations from Willoughby Lake to Pownal. *P. atropurpurea* crosses the Connecticut eastward to Mt. Toby and Berlin, Mass. (Rhodora ii. 14. 1900), and occurs at Lincoln, R. I., and Bolton, Conn., while occasional westward.

Asplenium ebenoides is a rare hybrid reported from six places in Vermont, Sheffield, Mass., and Canaan, Berlin and Southington, Conn. *A. Ruta-muraria* is "scarce" on Mt. Toby and local in western Berkshire Co. in Massachusetts, and occasional in western Vermont (with a single station at Willoughby) and western Connecticut, and occurs rarely on the trap ridges of central Connecticut. East of the Connecticut, *Camptosorus* was once found in Winthrop, Maine, by Haven Metcalf (Rhodora iii. 236. 1901). It has been collected at Hudson and Windham, N. H., at Weston and Natick (eradicated) and Needham near Boston, at Brookfield, Amherst and Mt. Toby, Mass., and at Lincoln, R. I., and at a few scattered stations in eastern Connecticut. West of the Connecticut it occurs at numerous stations from New Haven, Conn., to the Canadian border, becoming locally common in the calcareous areas west of the Green Mts.

Athyrium angustifolium is a rich woods calciphile, running north in Vermont to St. Albans and Danville and known east of the Connecticut only at Alstead, N. H., and in the Mt. Toby region. *Thelypteris Goldiana* is a plant of similar habitats, but rather more common and with a wider range east of the Connecticut. It has scattered stations at Mt. Toby and in Worcester Co., Mass., at Alstead and in northern Coos Co., N. H., and in Franklin Co. and at Winthrop and Fairfield farther east in Maine.

Miscellaneous Species.

Athyrium angustum — Thelypteris Boottii

Thelypteris spinulosa, var. concordiana

Athyrium angustum, the dimorphic sun form of the lady-fern group, seems to be absent from large areas, for no obvious reason, unless that it has not been collected in sufficient quantity as yet.

Thelypteris Boottii, now generally regarded as a hybrid between *T. cristata* and *T. spinulosa,* var. *intermedia,* is well distributed but seldom abundant. It seems to prefer swampy places in rich woods areas, but is not reported from northern Maine and northern New Hampshire, nor from Rhode Island. *T. spinulosa,* var. *concordiana* was discovered by Henry A. Purdie and William Brewster at Concord, Mass., in 1902 (Rhodora vi. 313. 1904), and is as yet known certainly only from the type locality.

C. H. Knowlton,
W. S. Ripley, Jr.,
C. A. Weatherby.

INTERNAL GLANDULAR HAIRS IN DRYOPTERIS.

Theo. Holm.

Anatomical studies of the ferns reveal many points of interest, and especially with regard to the arrangement of the various tissues in the stem and stipe. Moreover it is in the ferns that internal, glandular hairs have been observed, and such are described by De Bary[1] as characteristic of *Dryopteris Filix-mas,* and *D. spinulosa.* These hairs were found in the ducts of the rhizome and the base of the petiole. Another type of internal hairs is known from *Pilularia, Nymphaeaceae, Araceae, Rhizophora* and *Limnanthemum,* but these hairs are not glandular.

Concerning the presence of these hairs in the ferns it does not seem that they have been found in the leaf except in the petiole, nor have they been recorded from any of the other species of Dryopteris, nor from other genera. Some few years ago, when engaged in studying the anatomy of some of our ferns from living specimens, I found these hairs in the intercellular spaces of the leaf-parenchyma in *Dryopteris*

[1] Vergleichende Anatomie der Vegetationsorgane der Phanerogamen und Farne. Leipzig, 1877, p. 230.

Filix mas (L.) Schott, *D. marginalis* (L.) Gray, *D. spinulosa* (O. F. Müll.) Kuntze, and *D. cristata* (L.) Gray, but not in *D. Thelypteris* (L.) Gray, nor in *D. noveboracensis* (L.) Gray. Furthermore I examined *Polystichum acrostichoides* (Michx.) Schott, some species of *Asplenium*, *Woodsia*, *Polypodium vulgare* L., *Adiantum pedatum* L., *Dicksonia punctilobula* (Michx.) Gray, and *Onoclea sensibilis* L., but failed to find any trace of internal hairs in these.

With respect to the structure of the leaf-segments (Fig. 1) *D. marginalis* shows a thick-walled epidermis, and the ventral surface is frequently papillose; the palisade tissue consists of two to three strata, very compact, covering open pneumatic tissue (P*),

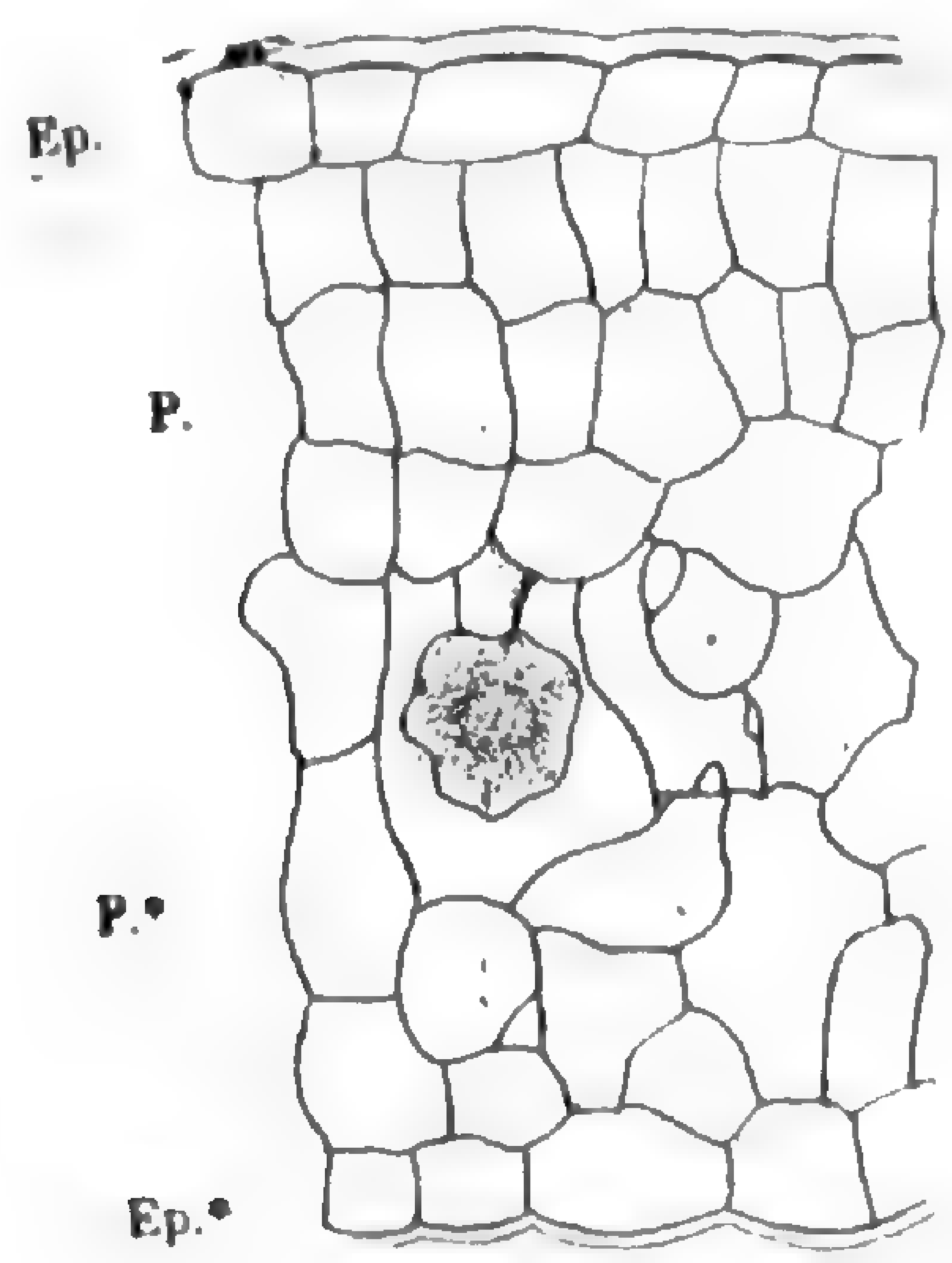

Fig. 1

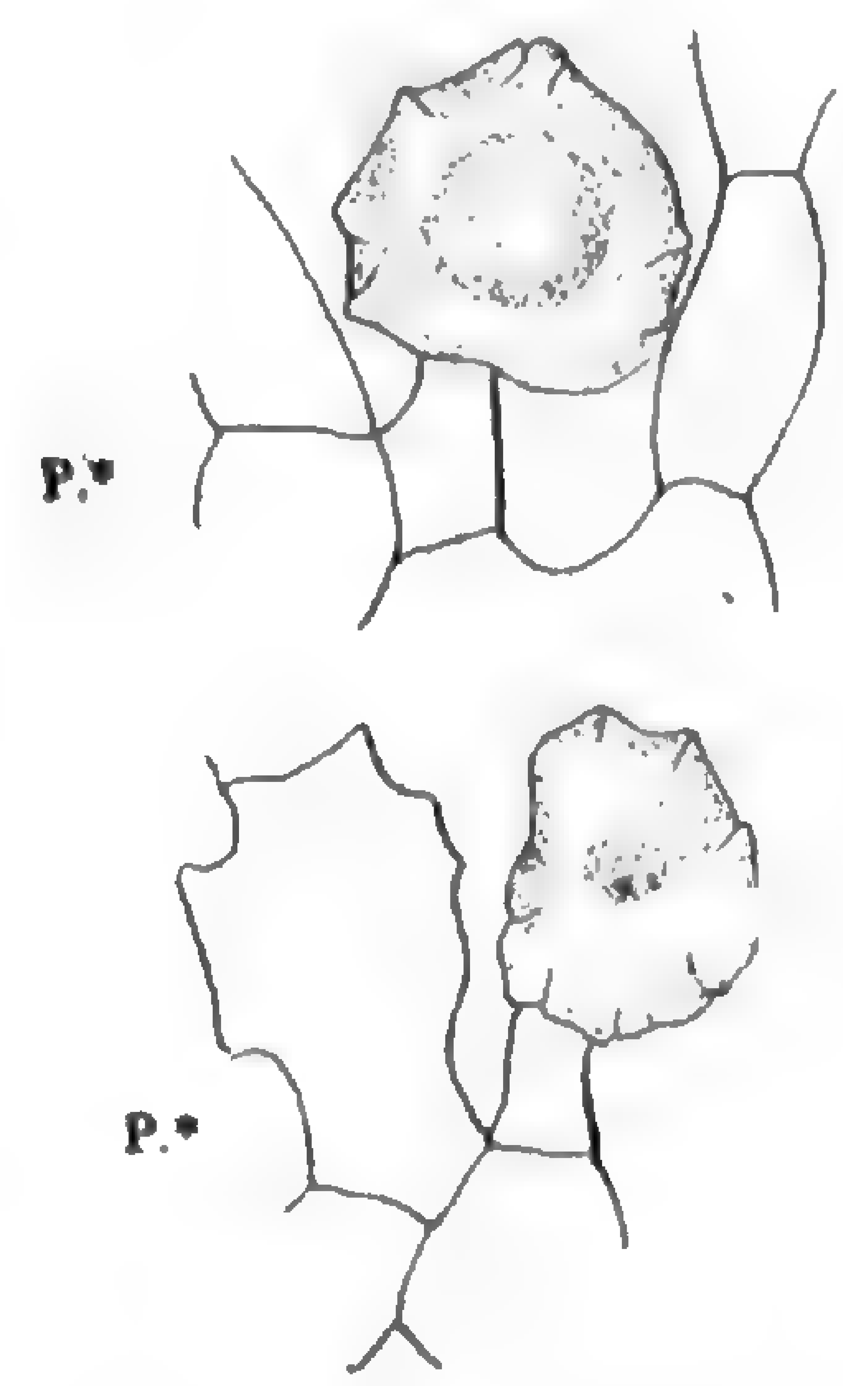

Fig. 2

Fig. 1. Cross-section of leaf-segment of Dryopteris marginalis; Ep., ventral, Ep.,* dorsal epidermis; P palisade tissue; P* pneumatic tissue with glandular hair in intercellular space. × 240.

Fig. 2. Two glandular hairs of same fern, from the pneumatic tissue. × 370.

of which the intercellular spaces contain numerous, relatively large, glandular hairs. The lateral veins are embedded in the chlorenchyma, each surrounded by a large-celled, green parenchyma-sheath, inside of which is a thin-walled endodermis. In the midrib, on the other hand, is a strand of hypodermal collenchyma, which extends to the parenchyma-sheath; a strand of mechanical tissue is located in the margins. A like structure recurs in *D. Filix-mas*.

The presence of these glandular hairs in certain species, and their absence from others within the genus Dryopteris, to which they are referred now, might indicate some generic distinction. Moreover the habit of the species is quite different. It may be an instance where the anatomical structure combined with the external is necessary in order to ascertain the true systematic position of these species. For this purpose I informed Mr. Christensen, the author of Index Filicum, about the presence of these hairs in the species mentioned above, and he kindly wrote me that this singular structure was a new proof of a probable generic distinction between *D. marginalis, D. Filix-mas, D. cristata,* and *D. spinulosa* on the one side, and *D. noveboracensis* and *D. Thelypteris* on the other.

The fact that Schmidel established the genus *Thelypteris* a year earlier than *Dryopteris* of Adanson has resulted in the transfer of all these species, including those of *Phegopteris* (Presl) Fée, to *Thelypteris,* thus involving no small amount of nomenclatorial change. To those who are familiar with these plants as they grow in nature, such classification does not appeal as being in any way natural. It may be true that rules of nomenclature are of no use unless conscientiously followed, but it is sad to think of how much time is given and in recent years has been given to hunting for old names instead of studying the plants themselves. I feel absolutely confident that an extended study of the anatomy of these ferns will reveal many facts, which will prove helpful from the taxonomic point of view.

And no critical investigator will feel obliged to submit to such rules of nomenclature, so long as they only involve endless confusion and add nothing whatever to the natural history of plants.

Clinton, Maryland.

A Flora of the Penobscot Bay Region.—Since the publication in 1894 of Rand & Redfield's *Flora of Mount Desert Island, Maine,* there has been great activity in the botanical exploration of the Maine coast and numerous papers have resulted therefrom, but now comes a study of more detailed character, by Mr. Albert Frederick Hill, who has spent many summers in the area. *The Vascular Flora of the Eastern Penobscot Bay Region, Maine,*[1] is a detailed enumeration and a phytogeographic consideration of the vascular flora of the region immediately to the west of Mount Desert Island.

[1] A. F. Hill, Proc. Portland Soc. Nat. Hist. iii pt. 2, pp. 199–304, with cuts and map. $1.50. 1919.

The paper opens with an account of the general geographic and physical features, followed by a well prepared catalogue of the flora of the mainland township of Brooklin and the adjacent insular townships of Deer Isle, Stonington, Swans Island and Isle au Haut. The region is one of great topographic charm but composed for the most part of acid rock and consequently with a meagre flora—a total of only 612 indigenous species, varieties and named forms, besides the usual introductions. On this account it is to be regretted that Mr. Hill so closely circumscribed his area, for by including the western side of Penobscot Bay with its more varied and often calcareous soils—Islesboro, Camden, Rockland, etc.—he would have added to his flora hundreds of species such as *Deschampsia caespitosa, Agropyron tenerum, Scirpus occidentalis, Carex aurea, Anemone canadensis, Vitis novae-angliae, Dirca palustris, Viola rotundifolia, Galium labradoricum* and *Erigeron pulchellus,* calcicolous or at least scarcely calcifuge plants which would have furnished a striking contrast to the group of acid-rock species which compose so much of the flora on the east side of Penobscot Bay.

In the compilation of his catalogue the author has shown great industry, and alertness to make his records complete and to bring them into accord with the latest critical studies. Aside from its great value as a local flora, therefore, the paper is a convenient compendium of references to recent monographic studies of such plants as reach Mr. Hill's area. In the main the work is carefully done, only a few minor points impressing one as inaccurate. For instance, *Lycopodium clavatum,* var. *megastachyon* is var. *monostachyon* of the *Manual* but not of Greville & Hooker, the latter plant being more boreal than ours. Similarly, *Potentilla pacifica* is not *P. Anserina* L., as the synonymy would indicate, but a distinct plant formerly included under *P. Anserina.*

The last part of the paper, "Phytogeographical Aspects of the Flora," is, most unfortunately, not of the high grade of the catalogue. The author has allowed himself to become fascinated by the alluring categories provided by Merriam's life zones and has felt obliged to thrust almost every species of his flora into a single restricted geographic pigeon-hole. The result is what might be expected, for any botanist of not too limited experience either in the field or the herbarium soon learns that "it can't be done." The majority of plants are not simply "Hudsonian," "Canadian," "Alleghanian," "Carolinian," etc.[1] Most of them occur in two or more of these

[1] Merriam's zones were defined chiefly by the characteristic animals: the Hudsonian, "the northern part of the great trans-continental forest . . . stretching from Labrador to Alaska. . . . In the north inhabited by the wolverine, woodland caribou, moose [probably better "Canadian"—see Scharff, Distrib. and Origin of Life in Am. fig. 3]. . . . In the eastern United States . . . restricted to the cold summits of the highest mountains"; the Canadian, "the southern part of the great trans-continental coniferous forest of Canada, the northern parts of

so-called zones, and anyone who has carefully mapped the detailed ranges of hundreds of species knows that no two maps are alike. In fact it is difficult from Merriam's definition to determine where the Carolinian begins for no two of the trees he indicates as indices have coincident northern limits. It is natural to attempt to sort the species into groups of similar range, but we are inclined to make our groups altogether too limited in number. As Colonel Harvey so aptly says of the sociologists' attempts to classify all human beings into a few categories, "There is no especial harm and there is much mental exercise to be obtained from reducing all mortality to these few theoretical types—no especial harm, that is, supposing that one bears ever in mind what a constant whopper is involved in the reduction of any individual to a type."[1]

Unfortunately, however, in the *Flora* before us the author seems not to have obtained "much mental exercise" in reducing all his plants to restricted geographic groups. At least it would be astonishing to a resident of Maryland or of Missouri, where *Galium triflorum* is common in woods, to find it classed unreservedly as a "Hudsonian" plant,—the more so since in the eastern part of the American continent we do not know it north of the southernmost border of Canadian Labrador. Similarly, *Dryopteris spinulosa, Deschampsia flexuosa, Festuca rubra, Arenaria lateriflora* and numerous others classed by the author as "Hudsonian" are surely common throughout most of southern New England and often much farther south, and most of them do not characterize Hudsonian areas. The same lack of very clear visualization of actual ranges of plants which is responsible for the above classifications is too apparent in succeeding lists: *Polygonum sagittatum, Ilex verticillata* and *Cornus alternifolia*, which extend from Florida, Alabama or Texas to southern Newfoundland and southernmost Canada, classed as "Canadian"; *Carex novae-angliae*, which occurs from Newfoundland to the mountains of New York and northern Pennsylvania [a splendid example of Canadian range], called "Alleghanian"; and *Juncus Greenei*, which covers the mountains of western Maine and northern New Hampshire (up to

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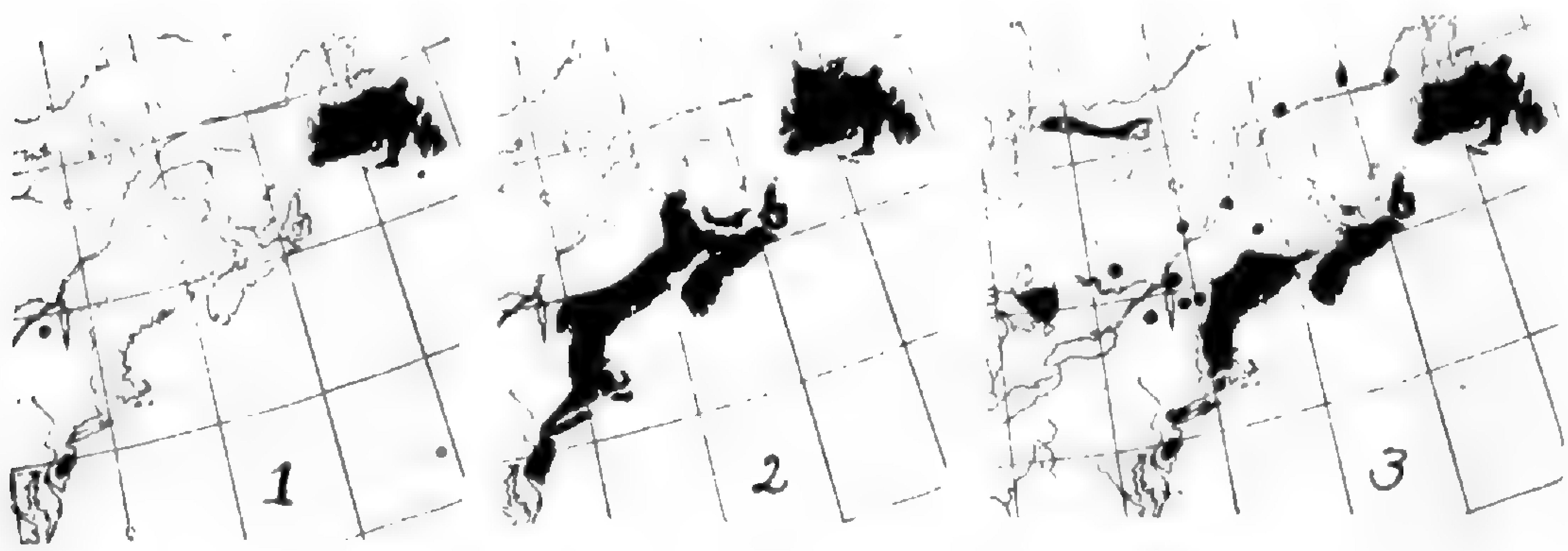
Maine, New Hampshire, and Michigan. . . . In the East it covers the Green Mountains, Adirondacks and Catskills, and the higher mountains" to western North Carolina and eastern Tennessee. "Among . . . characteristic mammals and birds . . . lynx, marten, porcupine, . . . spruce and dusky grouse, crossbills and Canada jays"; the Alleghanian, "the greater part of New England, southeastern Ontario, New York, Pennsylvania . . . and the Alleghanies . . . to Georgia," characterized by "chestnut, walnut, oaks, and hickories"; the Carolinian, occupying "the larger part of the Middle States, except the mountains . . . on the Atlantic coast it reaches from near the mouth of Chesapeake Bay to southern Connecticut, and sends narrow arms up the valleys. . . . Counting from the north, the Carolinian area is that in which the sassafras, tulip tree, hackberry, sycamore, sweet gum, rose magnolia, red bud, persimmon and short-leaf pine first make their appearance."

[1] Harvey's Weekly, ii. no. 47, pp. 12, 13 (Nov. 22, 1919).

3800 feet) and reaches its southern limit as a very rare plant in north-central New Jersey, classed as "Carolinian." But the most startling example of Hill's conception of a "Carolinian" plant is *Aster nemoralis*, an unusually distinct species which occurs from the bogs and mountains of Newfoundland to Hudson Bay and northeastern Massachusetts and southward very locally in cold bogs to the pine barrens of New Jersey. Yet, in spite of this well known distribution, the author presents a map purporting to show the "Carolinian" range of the plant.

Just why *Aster nemoralis* has been singled out for vague and unsupported generalizations by recent phytogeographers, who have not taken the slight trouble to look up either the large herbaria at hand or the equally accessible literature, it is difficult to say, unless, perhaps, it is the unusual color (for an Aster) of its pink rays. In his *Flora of the Vicinity of New York* in 1915, Taylor laid great emphasis[1] upon the supposed absence of *A. nemoralis* from the area between New Jersey and Newfoundland (a range indicated in Fig. 1), from which fictitious data he drew far-reaching conclusions; but, as the present reviewer[2] pointed out at that time, he had quite ignored



Figs. 1–3. Aster nemoralis Ait.

Range, fig. 1, as defined by Taylor; fig. 2, as published by Hill; fig. 3, as shown by the Gray Herbarium and standard local floras.

the abundant literature and the scores of herbarium-specimens which showed *A. nemoralis* to grow in every province and state (except Connecticut) between Newfoundland and New Jersey! The author of the *Flora* now under discussion has certainly read the latter review; nevertheless, he now publishes a map which is as misleading as was the imaginary statement of range above referred to. Hill gracefully acknowledges the placing at his disposal of the facilities of the Gray Herbarium, but a brief five minutes spent in looking up the material of *Aster nemoralis* in that collection would have shown it from the Natashquan River, entering the Gulf of St. Lawrence from the Lab-

[1] Taylor, Mem. N. Y. Bot. Gard. v. 24 (1915).
[2] Fernald, Rhodora, xvii. 68 (1915).

rador Peninsula; from Rupert River, entering Hudson Bay also from the Labrador Peninsula; from the shores of Georgian Bay and elsewhere in Ontario and northern Quebec; while reference merely to Macoun's *Catalogue* would have revealed other stations in the North: Lake Mistassini, Muskoka, etc.

This is not a matter of opinion nor a difference of interpretation. It is a statement of the quickly accessible facts which the author failed to get at. But why, without making sure to look up the most available sources of information, place before the always receptive botanical public such a map as is here reproduced in Fig. 2 (Hill's map), when it would have been almost as simple to prepare an approximately correct one, as indicated in Fig. 3? The author of Fig. 2 has colored solidly all of eastern New Brunswick, as well as all of southeastern Massachusetts (including Nantucket) and all southern Connecticut; but neither Fowler nor Macoun list *Aster nemoralis* in New Brunswick from northeast of the extreme southwest corner of the province; the reviewer, who has extensively explored in both eastern New Brunswick and in southeastern Massachusetts, knows of no evidence of the Aster in either area; and Bicknell, who certainly knows Nantucket, does not record the species from there. Neither is it mentioned in the Connecticut Botanical Society's *Catalogue of the Flowering Plants and Ferns of Connecticut.* In fact, the only authentic record from Connecticut seems to be that of a single station in Thompson,[1] the northeasternmost town of the state.

Other maps published by Hill display the same failure to check the immediately accessible data and show the ease with which supposed ranges can be mapped by those who do not realize that errors once born never die but, on the contrary, by others not situated to know the facts are continually mistaken for the truth and consequently perpetuated. For instance, the map said to show the distribution of *Viburnum dentatum* has the solid black extending nearly across Minnesota and Tennessee; but the really alert botanists of Michigan, Minnesota or Tennessee, should they see Hill's map, may well wonder where he got his data. The herbaria examined by him do not supply them, and it is significant that Beal, who has published the standard flora of Michigan, did not know of *V. dentatum* in the state, that Gattinger did not know it in Tennessee, and that, in their *Minnesota Trees and Shrubs,* Clements, Rosendahl & Butters do not mention it.

The reviewer regrets having to write so discouragingly of a piece of work which he would like wholly to commend. The first parts are decidedly praiseworthy but, although having some excellent points, like the discrimination of a comparatively rich flora overlying the small basic area of the region, the last part unfortunately contains so many assumptions that it must be classed as another addition to

[1] Weatherby, Rhodora, xxi. 75 (1919).

our too extensive mass of publications in which the tremendously interesting facts of distribution are replaced by vague and unsupported statements. That so many authors dealing with phytogeography are content to draw their deductions from inaccurate data is amazing, for, in this subject as in all others, as Byron long ago asserted, "truth is always strange,—stranger than fiction."—M. L. Fernald.

Dr. Frank Shipley Collins, one of the original members of the New England Botanical Club, for three years its president and for more than twenty-one years a faithful, effective, and highly valued member of the Editorial Staff of Rhodora, died suddenly on May 25th at New Haven, Connecticut in his seventy-third year. A biographical sketch and an account of his botanical activities will appear in an early issue of this Journal.

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THE GENUS GALINSOGA IN NORTH AMERICA.

Harold St. John and Donald White.

In his studies of the "Ferns and Flowering Plants of Nantucket,"[1] E. P. Bicknell has raised to specific rank, as *Galinsoga aristulata* Bicknell, the plant that had previously passed as *G. parviflora* Cav., var. *hispida* DC. This variety is distinguished from the species *G. parviflora* in the 7th edition of Gray's Manual[2] on having "Pubescence more copious, not appressed; pappus-scales of the disc-flowers attenuate and bristle-tipped." As Bicknell points out, the name *hispida* cannot be used for the plant in the specific category because of the earlier *G. hispida* Benth. He draws contrasts between the plant under consideration and various species in this and related genera, but his only comparison between it and the very closely related *G. parviflora* is, "This now widespread weed wherever I have met with it has not failed to prove itself always readily distinguishable from the true *G. parviflora* Cav., even without reference to the constant and pronounced differences in the pappus scales." If the plant does differ from its relative in a constant and pronounced character of the pappus-scales, as well as in vegetative characters, it would be reasonable to treat it as a species. The writers became interested in this question, and have endeavored to verify the point. As is very often the case, this small question led on to the larger one, of checking and evaluating the characters used to separate the species of the genus. We found that obvious and constant characters existed, especially in the pappus of the ray- and disc-flowers, and we

[1] Bicknell, E. P. Bull. Torr. Bot. Cl. xliii. 270 (1916).
[2] Robinson, B. L., and Fernald, M. L. Gray's Man. ed. 7. 843 (1908)

feel that these constant floral differences should be used as the primary characters in distinguishing the species. We present a synopsis of the North American species as we understand them. With these is included one Bolivian species not heretofore recognized.

Key to the Species.

A. Ray-flowers purple or roseate-purple.

B. Disc- and ray-flowers both purple; achene of ray-flower glabrous or nearly so, its pappus of a few bristles; leaves short, entire, petioled, narrowly deltoid-lanceolate; stem subsimple, strict, the internodes elongate....................1. *G. purpurea* St. John & White.

B′. Disc-flowers yellow; pappus of ray-flowers of linear-lanceolate fimbriate scales; leaves slender-petioled, coarsely serrate, ovate or ovate-lanceolate; stems freely branching.

C. Pappus of disc-flowers of linear-lanceolate fimbriate scales half the length of the corolla, corolla exceeding the achene; ligule oblong, 3-toothed at apex, its tube exceeding the linear fimbriate pappus-scale, the achene of the ray-flower glabrate or hispidulous on one side.....................2. *G. caracasana* (DC.) Sch. Bip.

C′. Pappus of disc-flowers firm, linear, fimbriate, long-aristate, equalling the corolla, disc-corolla barely equalling its achene; ligule tripartite, the two lateral lobes widely divergent, tube of ray-flower very broad, shorter than the glabrate or hispid achene and shorter than the linear minutely fimbriate aristate pappus-scale.
3. *G. bicolorata* St. John & White.

A′. Ray-flowers yellowish or whitish.

D. Pappus of disc-flowers aristate, fimbriate, equalling or nearly equalling the corolla; pappus of ray-flowers of linear minutely fimbriate scales equalling the tube of the flower, achene of ray-flowers densely hispid on the inner face; leaves ovate or ovate-lanceolate, coarsely serrate; stems at the nodes and the peduncles with a coarse spreading white often glandular hispidity....4. *G. aristulata* Bicknell.

D′. Pappus of disc-flowers not aristate; pappus of ray-flowers wanting or a few bristles, their achenes glabrous or minutely pilose on one side.

E. Pappus of disc-flowers linear-lanceolate, conspicuously fimbriate, equalling or even exceeding the corollas; pappus of ray-flowers wanting, the achenes glabrous or somewhat pilose at summit; a freely branching plant with slender-petioled ovate-lanceolate coarsely or bluntly serrate leaves; peduncles and stems near the nodes clothed with a fine appressed rarely glandular pilosity.
5. *G. parviflora* Cav.

E′. Pappus of disc-flowers linear, fimbriate, two-thirds the length of the corolla-tube; pappus of ray-flowers of a few short white bristles or wanting, the achenes minutely hispidulous at summit or glabrate; a strict plant rarely branching from the base; the internodes elongate; the leaves short-petioled, linear-lanceolate or narrowly deltoid-lanceolate, bluntly serrate to subentire; pedicels and nodes of the stem with a coarse partly appressed puberulence.
6. *G. semicalva* (Gray) St. John & White.

1. Galinsoga **purpurea** sp. nov. annua tenuis, 1–2.5 dm. alta; caulibus subsimplicibus, sparse hispidis, internodiis elongatis; foliis oppositis anguste deltoideo-lanceolatis breviter hispidis integris breviter petiolatis 1–2 cm. longis, 1.5–5 mm. latis; pedicellis hispidis; capitulis

pedicellatis globosis parvis 3–4 mm. altis, 2.5–3.5 mm. diametro, squamis 4–5 ovatis glabris scariosis flavo-viridibus, receptaculo conico, paleis pallidis linearibus anguste bidentatis; floribus radiatis femineis purpureis ca. 4, ligulis brevibus oblongis tridentatis, tubis pilosis, achaeniis oblanceolato-ovoideis, pappi squamis parvis; floribus disci hermaphroditis purpureis, tubis infundibuliformibus achaenia aequantibus, achaeniis deltoideo-obovoideis hispidis, pappi squamis lineari-lanceolatis fimbriatis attenuatis vel aristatis dimidiis vel bessibus longitudinis tubarum corollarum.

A slender annual, 1–2.5 dm. tall: stem nearly simple, sparsely hispid; leaves opposite, short-hispid, narrowly deltoid-lanceolate, short-petioled, 1–2 cm. long, 1.5–5 mm. broad: pedicels hispid: flower heads pedicelled, small, 3–4 mm. high, 2.5–3.5 mm. in diameter; involucral scales 4–5, ovate, glabrous, scarious, yellowish-green; receptacle conical; chaff pale, linear, narrowly bidentate; ray-flowers pistillate, about 4 to a head, the ligules purple, short, oblong, 3-toothed, the corolla-tube pilose, the achenes oblanceolate-ovoid, pappus of a few bristles; disc-flowers perfect, the tube purple, funnel-shaped, as long as the achenes, achenes deltoid-obovoid, hispid, pappus-scales linear-lanceolate, attenuate or aristate-fimbriate, half or two-thirds the length of the corolla-tube.

Bolivia: Bolivian Planteau, 1891, *Miguel Bang*, no. 1,148 (type in Gray Herb.).

2. G. caracasana (DC.) Sch. Bip., Linnaea xxxiv, 529 (1865–6). *Vargasia Caracasana* DC., Prodr. v. 676 (1836).

Native of South and Central America, introduced into eastern North America and established especially near the larger cities. *C. F. Parker* found it at Camden, New Jersey, as early as 1870.

3. G. **bicolorata** sp. nov. annua ramosa, 2–3 dm. alta; caulibus hispidis infra glabratis, nodis superioribus valde hispidis; foliis oppositis petiolatis lanceolato-cordatis breviter caudatis grosse obtuseque serratis hispidis, 1.5–4 cm. longis, 4–35 mm. latis; pedunculis glanduloso-pilosis; capitulis hemisphaericis, 3–4 mm. altis, 3–5 mm. diametro, squamis exterioribus sparse glanduloso-pilosis, receptaculo conico, paleis pallide bruneis linearibus minute ciliatis; floribus radiatis femineis purpureis, corollis achaenia aequantibus vel vix superantibus, ligulis tridentatis cruciformibus dentibus lateralibus valde divergentibus, tubis latis pilosis, achaeniis obdeltoideis angulatis hispidis, 2 mm. longis, pappi squamis firmis albidis tubum corollae superantibus linearibus longe aristatis fimbriatis; floribus disci hermaphroditis, tubis flavis achaenia superantibus, pappi squamis firmis albidis linearibus fimbriatis longe aristatis tubum corollae aequantibus vel paulo superantibus, achaeniis obdeltoideis 1.5–2 mm. longis hispidis.

A branching annual, 2–3 dm. tall: stem glabrate below, hispid at the nodes and strongly so above: leaves opposite, petioled, hispid, lanceolate-cordate, short-caudate, coarsely and bluntly serrate, 1.5–4 cm. long, 4–35 mm. broad: peduncles glandular-pilose: heads hemispherical, 3–4 mm. high, 3–5 mm. in diameter; outer involucral bracts sparsely glandular-pilose; receptacle conical; chaff pale brown, linear, minutely ciliate; ray-flowers pistillate, purple, equalling or slightly exceeding their achenes, ligule 3-toothed, cruciform, the lateral teeth widely divergent, corolla-tube broad, pilose, achene obdeltoid, angular, hispid, 2 mm. long, pappus firm, white, longer than the corolla-tube, linear, fimbriate and long-aristate; disc-flowers perfect, corolla yellow, the tube exceeding the achene, pappus firm, white, linear, and long-aristate, equalling or slightly exceeding the corolla-tube, achenes obdeltoid, hispid, 1.5–2 mm. long.

MEXICO: altitude 4000–5500 feet, Tumbala, Chiapas, Oct. 20, 1895, *E. W. Nelson*, no. 3,356 (TYPE in Gray Herb.). COSTA RICA: altitude 4,250 feet, Cartago, Prov. Cartago, Oct., 1887, *Juan J. Cooper*, no. 5,815, in part; altitude 1,500 m., San Rafael de Cartago, Aug. 28, 1892, *H. Pittier*, no. 6,989.

Recently introduced in eastern North America. MASSACHUSETTS: shore of Charles River between Mass. Ave. and Anderson Bridge, Cambridge, Sept. 26, 1916, *F. S. Collins*, no. 3,797.

4. G. ARISTULATA Bicknell, Bull. Torr. Bot. Cl. xliii. 270 (1916). *G. parviflora* Cav., *γ. hispida* DC., Prodr. v. 677 (1836), not *G. hispida* Benth.

Native of South and Central America, introduced and becoming very common in the eastern United States. In 1866 it was found by Joseph Blake at Gilmanton, New Hampshire.

5. G. PARVIFLORA Cav., Icon. Descr. Pl. iii. 41, t. 281 (1795).

Native of South and Central America, and Mexico, introduced in the United States, where it is casual, especially near the larger cities, from the Atlantic to the Pacific coast. Dr. Gray in his Manual ed. 2, 225 (1856) reports the plant on waste places at Cambridge, New York, and Philadelphia.

6. G. **semicalva** (Gray) comb. nov. *G. parviflora* Cav., var. *semicalva* Gray, Pl. Wrightianae ii. 98 (1853). This native species of the mountains of northern Mexico and the southwestern states was first collected by Charles Wright in 1851, and described by Asa Gray as a variety of *G. parviflora*. Wright's no. 1,268, the type of var. *semicalva* has, as Gray pointed out, the ray achenes glabrous and lacking pappus. Wright's no. 1,267, collected in the same region, has the ray-achenes "slightly hairy near the summit, and furnished with a very small setiform pappus." This collection Gray identified with *G. caracasana*, a purple-flowered species. Wright's no. 1,267 does not appear to have purple rays. Its natural affinity seems to the writers to be with *G. semicalva*, the slender native species of that region. An inspection of these two specimens, and others from the adjacent regions, shows that the ray-achenes may be hispidulous at summit

or glabrate and have the pappus of a few short white bristles or wanting. All these plants differ constantly from the other species in the reduction of ray pappus, as well as the other floral and foliage characters emphasized in our key. Consequently, having studied abundant material of the group and realizing the constancy and importance of particular floral characters, especially those of the pappus, we raise var. *semicalva* to specific rank.

New Mexico: side of mountains, at copper mines, Oct., 1851, *Charles Wright,* no. 1,268 (type); Valley of Coppermine Creek, Aug., Oct., 1851, *Charles Wright,* no. 1,267; altitude 7,000 feet, White Mountains, Aug. 12, 1897, *E. O. Wooton,* no. 501; Forest Nursery, Fort Bayard, Oct. 1, 1905, *J. C. Blumer,* no. 102. Arizona: altitude 8,100 feet, Grand View, Chiricahua Mts., Sept. 10, 1907, *J. C. Blumer,* no. 1,652; in shade, sandy alluvium, near Cedar Gulch, Paradise, altitude 5,300 feet, Chiricahua Mts., Sept. 21, 1907, *J. C. Blumer,* no. 1,713; sandy washes, Mule Mts., Oct. 8, 1910, *L. N. Goodding,* no. 924. Chihuahua: altitude 7,500 feet, near Colonia Garcia in the Sierra Madres, Aug. 7, 1899, *C. H. T. Townsend & C. M. Barber,* no. 241; near Colonia Garcia, Aug. 1–20, 1899, *E. W. Nelson,* no. 6,212; along road to Porral, near San Julian, altitude 7,000–8,000 feet, Sept. 8, 1898, *E. W. Nelson,* no. 4,936. San Luis Potosi: in arenosis circa urbem, Sept., 1876, *J. G. Shaffner,* no. 234.

Gray Herbarium.

A NEW DIGITARIA FROM NEW HAMPSHIRE

M. L. Fernald

The only indigenous species of *Digitaria* heretofore recognized as far north as New England is *D. filiformis* (L.) Koeler, which reaches its northern limit in the gravelly and sandy regions of northern Essex County, Massachusetts, and southern Hillsboro County, New Hampshire. Slightly to the north, however, in northeastern Hillsboro County, the late F. W. Batchelder discovered in September, 1901, a remarkable species which he distributed to various herbaria as *Syntherisma filiforme* (L.) Nash (= *D. filiformis*) but which, except for its superficial resemblance, is quite distinct from the latter species. A detailed review of all the North American species of the genus clearly shows that Mr. Batchelder's plant is a unique species as nearly allied to the two local species of Florida, *D. gracillima*[1]

[1] Digitaria **gracillima** (Scribn.), n. comb. *Panicum gracillimum* Scribn. Bull. Torr. Bot. Cl. xxiii. 146 (1896). *Syntherisma gracillima* [*um*] (Scribn.) Nash, Bull. Torr. Bot. Cl. xxv. 295 (1898).

and *D. Bakeri*[1] as to the more northern *D. filiformis*. The New Hampshire plant may be called

Digitaria **laeviglumis,** n. sp., annua, habitu staturaque ut apud *D. filiformem;* foliis remotis vaginibus glabris vel hirsutis, laminis planis glabris 1.5–9 cm. longis, ligula scariosa subtruncata erose dentata 1 mm. longa; panicula longe exserta, racemis 2–3 valde adscendentibus 2–9 cm. longis 1–2 mm. latis, rhachi flexuoso angulato-filiforme; spiculis 1.8–2 mm. longis ellipsoideis glaberrimis; gluma inferiore obsoleta, superiore hyalina elliptico oblongata apice rotundata valde 3-nervia; lemmate obtuso 5–7-nervato; caryopsi ellipsoidea acuminata atrata puncticulato-striata.

Annual, with the habit and stature of *D. filiformis:* leaves remote; the sheaths glabrous or hirsute; blades flat, glabrous, 1.5–9 cm. long; ligule scarious, subtruncate, erose-dentate, 1 mm. long: panicle long-exserted; racemes 2–3, strongly ascending, 2–9 cm. long, 1–2 mm. wide; the rhachis flexuous, angulate-filiform: spikelets 1.8–2 mm. long, ellipsoid, strictly glabrous: lower glume obsolete; second glume hyaline, elliptic-oblong, rounded at summit, prominently 3-nerved: lemma obtuse, 5–7-nerved: caryopsis ellipsoid, acuminate, black, puncticulate-striate.—New Hampshire: Manchester, rare, September 11, 1901, *F. W. Batchelder* (type in Gray Herb.).

From *D. filiformis* quickly distinguished by its glabrous spikelet, translucent hyaline glume, and truncate erose-dentate ligule; *D. filiformis* having the spikelet pubescent with gland-tipped hairs, the opaque glume and lemma ciliate and the more prolonged ligule fimbriate-ciliate. As stated, *D. laeviglumis* is as nearly related to two rare species of the sands of Florida, but both *D. gracillima* and *D. Bakeri* are tall (0.6–1 m.) perennials with very long and slender leaves and long racemes (1.5–3 dm. long) and ligules, the former species with a very short subtruncate second glume, the latter with longer spikelets (2.5 mm.) and with the acute second glume pilose at the apex.

D. laeviglumis is another addition to the already considerable list of distinctive plants of the sands of New England which show close affinities to or identities with plants of the pine barrens of Florida and southern Georgia—such plants as *Sagittaria teres* Watson, from which *S. isoetifolia* J. G. Sm. is scarcely separable; *Scirpus Hallii* Gray, and *Sabatia Kennedyana* Fernald, nearest related to *S. decandra* (Walt.) Harper (see Rhodora, xviii. 150). That the New England *Digitaria* showing this Floridian relationship should

[1] **D. Bakeri** (Nash), n. comb. *Syntherisma Bakeri* Nash, Bull. Torr. Bot Cl. xxv. 296 (1898).

come from southern New Hampshire rather than southeastern Massachusetts is, however, somewhat surprising, although the New Hampshire stations for *Rynchospora Torreyana* Gray and *Sclerolepis uniflora* (Walt.) BSP. are in nearly the same latitude and only thirty to thirty-five miles away. The discovery of these three plants indicates that the sandy regions of Hillsboro, Merrimack, and eastern Sullivan Counties need very careful exploration.

In organizing the North American material of *Digitaria* in the Gray Herbarium it has been found necessary to make the following transfers.

D. SANGUINALIS (L.) Scop., var. **marginata** (Link), n. comb. *D. marginata* Link, Enum. Hort. Bot. Berol. i. 102 (1821). *Panicum sanguinale*, var. Trin, Spec. Gram. t. 93 (1828). *P. sanguinale*, var. *longiglume*, 1. *marginatum* (Link) Doell in Mart. Fl. Bras. ii. pt. 2. 133 (1877). *Syntherisma marginatum* Nash, N. A. Fl. xvii. pt. 2, 154 (1912).

D. ISCHAEMUM Schreb., var. **mississippiensis** (Gattinger), n. comb. *Panicum glabrum*, var. *mississippiense* Gatt. Tenn. Fl. 95 (1887). without proper description; Scribn. Grasses Tenn. pt. 2, 39 (1894). *P. lineare*, var. *mississippiense* Gatt. ex Beal, Grasses N. A. ii. 111 (1896). *Syntherisma linearis mississippiensis* (Gatt.) Nash, Bull. Torr. Bot. Cl. xxv. 300 (1898).—Described by Gattinger and by Scribner as common in sections of Tennessee, this characteristic variety has been collected also in Maryland and Iowa.

D. **Simpsoni** (Vasey), n. comb. *Panicum sanguinale*, var. *Simpsoni* Vasey, Contrib. U. S. Nat. Herb. iii. 25 (1892). *P. Simpsoni* (Vasey) Beal, Grasses, N. A. ii. 109 (1896). *Syntherisma Simpsoni* (Vasey) Nash, Bull. Torr. Bot. Cl. xxv. 297 (1898).

D. **distans** (Chase), n. comb. *Syntherisma distans* Chase, Contrib. U. S. Nat. Herb. xvii. 220 (1913).

D. **argyrostachya** (Steud.), n. comb. *Panicum argyrostachyum* Steud. Syn. Pl. Glum. i. 40 (1854). *Syntherisma argyrostachya* (Steud.) Hitchc. & Chase, Contrib. U. S. Nat. Herb. xviii. 294 (1917).

D. **curvinervis** (Hack.), n. comb. *Panicum curvinerve* Hack. Oesterr. Bot. Zeitschr. li. 335 (1901). *Syntherisma curvinervis* (Hack) Hitchc. & Chase, Contrib. U. S. Nat. Herb. xviii. 295 (1917).

D. **panicea** (Swartz), n. comb. *Milium paniceum* Swartz, Prodr. Veg. Ind. Occ. 24 (1788). *Agrostis jamaicensis* Poir. in Lam. Encycl. Suppl. i. 258 (1810). *Axonopus paniceus* (Swartz) Beauv. Ess. Agrost. 12, 154 (1812). *Syntherisma paniceum* (Swartz) Nash, N. A. Fl. xvii. 152 (1912).

The combination *D. panicea* Willd. ex. Steud. Nom. ed. 2, pt. 1, 508 (1840) was published as a pure synonym of *Panicum sanguinale* and therefore has no nomenclatorial status.

D. **leucocoma** (Nash), n. comb. *Panicum phaeothrix* Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 7, 58 (1897), not Trin. Sp. Gram. Ic. iii. t. 91 (1827). *Syntherisma leucocoma* Nash, Bull. Torr. Bot. Cl. xxv. 295 (June, 1898). *Panicum leucocomum* Scribn. l. c. ed. 2, 58 (July, 1898).

D. **badia** (Scribn. & Merr.), n. comb. *Panicum badium* Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 24, 12, fig. 3 (1900). *Syntherisma badia* (Scribn. & Merr.) Chase, Proc. Biol. Soc. Wash. xix. 191 (1906).

D. **argillacea** (Hitchc. & Chase), n. comb. *Syntherisma argillacea* Hitchc. & Chase, Contrib. U. S. Nat. Herb. xviii. 296 (1917).

Gray Herbarium.

REGARDING GENTIANA ANDREWSII IN THE COASTAL PLAIN OF NEW JERSEY.

Bayard Long.

Some time before the appearance in 1917, of Professor M. L. Fernald's paper on the Closed Gentians of northeastern America[1] so clarifying of difficulties taxonomic, it had been realized by the field-student of southern New Jersey that the distributional status of *Gentiana Andrewsii* in that area was far from satisfactory. From the knowledge of its general distribution in the Piedmont of adjacent Pennsylvania there had been little hesitancy in believing the plant to be more or less frequent in the northern, Piedmont part of New Jersey, but its occurrence in the southern, Coastal Plain portion had not been accepted so readily.

Dr. Britton in 1889 in his *Catalogue of Plants Found in New Jersey* had noted the species from five localities in the southern part of the state. In 1903 Keller and Brown in their *Flora of Philadelphia and Vicinity* had considered it to be generally distributed and omitted all localities. Dr. Stone in 1911 in *The Plants of Southern New Jersey* had reported it as "occasional in the Middle district and rare on the coast and Cape May peninsula." Mr. Norman Taylor in his *Flora of the Vicinity of New York,* the latest treatment covering the state, records the distribution thus: "N. J. Throughout the state, decreasing southward and wanting in the pine-barrens, but found,

[1]Fernald, Rhodora, xix. 147 (1917).

rather rarely, near Cape May." This concise statement, summarizing previous reports, on its face, raises no challenge. But in Dr. Stone's work, with its detailed list of localities and notation of specimens as distinguished from mere records, one at once notices that out of eight localities only half are supported by verifying specimens. This in itself, in a work so carefully compiled, need not have attracted attention, had not a personal element entered into consideration—a continual failure during more than ten years rather systematized field-work, to find *Gentiana Andrewsii* growing in southern New Jersey.

This circumstance led to a thorough examination into the generally accepted occurrence of *G. Andrewsii* in the area. During the past several decades, as Prof. Fernald has pointed out, there seems to have been a strong tendency to refer all our Closed Gentians to *G. Andrewsii*. This coupled with the fact that half of the localities noted by Dr. Stone are fairly old records, apparently unsubstantiated by specimens, was at once suggestive. Furthermore, a critical examination of the specimens cited and exploration of stations recorded for the species led to some rather definite conclusions.

There are three specimens at the Philadelphia Academy referred to *G. Andrewsii*—from Kaighn's Point, Absecon, and Cape May.

That from Kaighn's Point, Camden, is a large, excellent specimen, collected some years ago by Alexander MacElwee, and is quite above reproach. Mr. MacElwee tells me that he definitely recalls the collection of the plant. It grew in a large clump on open marshes along the Delaware River above Kaighn's Point. It is well known that many interesting upland species have been collected from the marsh- and swamp-land about Kaighn's Point in former days. Whether the plant actually occurs there now is another matter: every year sees less and less of the natural marsh-land in this part of Camden. Further up the Delaware, in the Coastal Plain area of Mercer County, *G. Andrewsii* occurs below Trenton on the edge of alluvial marshes of the river: probably a habitat very similar to that at Camden.

Considerable light is thrown upon the Absecon material of *G. Andrewsii* by an examination of the specimen supporting the record of *G. Saponaria* from the same locality. With our present knowledge of the group, the basis of this proves to be a specimen of *G. clausa*. This material bears an original label and is part of the collector's own herbarium. The specimen of *G. Andrewsii,* with identical label data, is a portion of another herbarium and was undoubtedly received from the original collector as a duplicate. *G. Saponaria* is unquestionably the species to be expected in southern New Jersey, and it seems very unlikely that both these characteristically upland species should have been found at the far edge of the Pine Barrens and on almost the outer margin of the Coastal Plain. This collector's specimens, unfortunately, are not always above suspicion, and in the present case some mixing of material must have occurred. Until corroborative evidence is obtained on the presence of *G. Andrewsii* and *G. clausa* at Absecon the authenticity of these specimens may be doubted.

The record in Britton's *Catalogue* of *G. Andrewsii* at Absecon, however, suggested the veritable occurrence of a gentian of this type at this locality. Through the kindness of some friends and a resident naturalist of Absecon, I was assured that *Gentiana Andrewsii* could be found along Ohio Avenue. This street proved to parallel Absecon or Doughty Creek, and without difficulty I was able to find in late autumn of 1917, along moist thicket-margins and swales bordering the creek, specimens of *Gentiana Saponaria*—but no other.

The Cape May basis of *G. Andrewsii* consists of two small specimens of that species, with a label not written by the collector, received among accumulated material given the Academy. Demonstrated errors in other critical cases support a common belief that the label-data of this collector's plants was frequently compiled from memory long after collection—and must be valued accordingly. Mr. O. H. Brown, one of the most acute field-observers and collectors in New Jersey, who has spent many years specializing in Cape May County, writes me that he knows nothing of *G. Andrewsii* in Cape May other than the record in *The Plants of Southern New Jersey.* I am confident that the specimen basis of this record cannot be accepted as authentic. Material from Cape May Court House, collected by myself, and from Fishing Creek, Bennett and Cold Spring, by Mr. Brown, shows that the characteristic gentian of Cape May is *G. Saponaria.*

The Mickleton record by B. Heritage, dating from Britton's *Catalogue,* was considered by Dr. Stone to have been verified in the Heritage Herbarium. In late autumn of 1917, a Bottle Gentian was distinguished from the train in a small pasture-meadow not far north of Mickleton Station. Exploration October 27, showed the plant to be *G. Saponaria.* On following the rill passing through this spot, the species was found flourishing abundantly in a wet swale within sight of the outlying houses of Mickleton village. When there was balanced with these observations the statement obtained shortly thereafter from Mr. C. D. Lippincott that the Bottle Gentian is not rare through Gloucester and Salem Counties, and that he and Mr. Heritage (with whom he was closely associated) had always considered this frequent plant to be *G. Andrewsii,* it was felt that there was little need for further concern over the Mickleton record. However, when opportunity occurred the following year to examine the Heritage Herbarium, now deposited at the George School, near Newtown, Penna., the basis of this record was searched for and two sheets of specimens from Mickleton were found, so named. They both represent *G. Saponaria.*

Of the several records in Britton's *Catalogue* for *G. Andrewsii* which were accepted by Dr. Stone, but for which he was unable to find substantiating specimens, the apparently authentic basis of the one from Pemberton has been since located. It seems not improbable that this record by L. H. Lighthipe may have been accepted from report only, and that its basis is the material preserved in his own private herbarium. He has kindly written me: "The 'Gentiana Andrewsii' from Pemberton in my collection was first marked as being that species but I find I afterward changed the name to 'G. Saponaria' which I think is the correct name." The specimen has been generously sent me for personal examination and may be noted as characteristic *G. Saponaria.*

Upon the remaining unverified records—those from Wecksville, Keyport, and Shark River—certain rather significant evidence has been obtained from field-study, more or less indirect evidence but in its general purport, it is believed, pointing to logical solutions.

F. L. Bassett is the authority for the record of *G. Andrewsii* in Britton's *Catalogue* from Wecksville (=Weekstown).[1] Some years ago the local plants in Bassett's herbarium were presented to the Philadelphia Botanical Club by his surviving brother, Mr. George W. Bassett, but unfortunately there is no material substantiating

[1] From his location at Hammonton and the region which he is known to have explored, it seems quite clear that "Wecksville" is Weekstown ("Weeksville" of Dr. Stone) on the Mullica River.

this record. On enquiring of Mr. Bassett during the autumn of 1917 whether he could throw any light on this record, it was gratifying to learn that *G. Saponaria* was known to him at Herman—which is within a very short distance of Weekstown, on the opposite side of the Mullica River, and in the same floristic area. Exploration shortly thereafter under the guidance of Mr. Bassett showed the Soapwort Gentian to be frequent at this locality. At Crowleytown, about a mile above Herman, it was seen again. From the additional evidence of material collected along the Mullica at Pleasant Mills by C. A. Gross and at Port Republic by M. L. Johnson (for the examination of which specimen at the New York Botanical Garden I am indebted to Mr. K. K. Mackenzie) it seems reasonable to conclude that the "Wecksville" record of *G. Andrewsii* was based upon *G. Saponaria.*

Through correspondence with Mr. Macy Carhart of Keyport (whose list of ferns will be recalled as particularly interesting for Keyport)[1] I learn that he has been collecting for ten years in Monmouth County and is of the opinion that *Gentiana Andrewsii* does not occur in the region. He has kindly sent me material of *G. Saponaria* which is the only species of this type which he knows in the vicinity of Keyport.

Up to 1917, all gentians of this group from the area, in my own experience, had proved conclusively to be *G. Saponaria.* During that year Mr. Mackenzie and myself had detected *G. clausa* in Burlington County in low woods along Crosswicks Creek above Bordentown. This was apparently a species new to this portion of the state and another of the numerous Alleghanian types that are found to enter the Coastal Plain at this point. But of equal interest was the possible solution to be found therein of the old Shark River record. This dates back to 1856 to Knieskern's *Catalogue of Plants Growing in the Counties of Monmouth and Ocean.* The troublesome point lies in the fact that while recording *G. Andrewsii* from Shark River as "not rare" he notes *G. Saponaria* from the same locality as "rare!" It is not clear whether the records refer to the village formerly called Shark River or to the river itself. Accordingly the most readily accessible spot along the river near the village was selected for exploration and in the autumn of 1919, a day was occupied in endeavoring to solve the supposed frequence of *G. Andrewsii* in this local-

[1]Carhart, Am. Fern Journ. vi. 51 (1916).

ity. The prompt discovery of *G. clausa* as a frequent and characteristic plant of the low, swampy woods along Shark River above the village of Hamilton (formerly Shark River) left little to be desired in the matter of a solution for "*G. Andrewsii.*" When to this frequence of *G. clausa* was added only a single station for *G. Saponaria* (and that well across the country toward Farmingdale) discovered during the day's tramp, one could readily believe in the acuteness of Knieskern's observation.

In middle New Jersey the Coastal Plain covers a considerable portion of Mercer and Middlesex Counties and touches several other counties near New York City, but there are no published locality records for the species from this area. Correspondence and the examination of collections has brought to light little information on stations, additional to Trenton, occurring about this portion of the Coastal Plain. Dr. F. W. Pennell writes me of a specimen at the New York Botanical Garden labeled as collected in Bergen County at Moonachie—which is on the edge of the Hackensack Marshes. Mr. Mackenzie tells me that he has collected the species a short distance south of Hackensack (a region very close to Moonachie) and notes that the flora here is predominantly Piedmont. The Coastal Plain is often such a narrow strip in this region that one would hesitate to believe that the plant along the Hackensack Marshes belongs to this association rather than to the general Piedmont flora.

Though this evidence, it must be confessed, is not wholly conclusive that *G. Andrewsii* is one of the rarest of plants in the Coastal Plain of New Jersey, it is certainly significant that the only satisfactory demonstration of its occurrence in this area rests upon material from the alluvial marshes of the Delaware River. The species is a frequent and characteristic plant of the adjacent Piedmont Plateau of Pennsylvania, and in the Piedmont region of New Jersey, the impression of Mr. Mackenzie, who is probably more familiar with that area than any other botanist, is that, while not abundant the plant is widely distributed and occurs in many places. It thus seems logical to believe that the Camden and Trenton stations represent very unusual Piedmont extensions, following the course of a large river.[1]

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SOME NOTEWORTHY MATINICUS PLANTS.

C. A. E. Long.

During the past two years I have employed a certain amount of my leisure in the study and collection of the plants of this island, and I find many interesting species growing here, both indigenous and introduced. From among them I am sending an account of a few which may be of interest to readers of Rhodora.

Avena fatua L. I have found this growing for three successive seasons in the same location, increasing in numbers each season. It is in a waste corner of a dooryard. Rare in New England.

Athyrium angustum (Willd.) Presl, var. laurentianum Butters. This is the extreme northeastern form of our lady fern and is here found somewhat south of its previously known limits. It is moderately abundant in an extensive swampy tract overgrown with Alder, *Betula lutea, Amelanchier, Lonicera, Acer rubrum,* etc., while our more common var. *rubellum* frequents the heavier and somewhat drier woods.

Triglochin palustris L. Growing on the extreme southwestern end of the island in sand, along with *Glaux maritima, Potentilla paci-*

[1] Prof. Fernald and Dr. Pennell inform me that there are no specimens from either Staten Island or Long Island at the Gray Herbarium or the New York Botanical Garden, respectively. This additional absence in well known Coastal Plain areas, together with the apparent lack of the species in Connecticut and the adjacent Coastal Plain associations of southern New England, as indicated by Prof. Fernald in his recent paper, at once directs attention to the great body of the southern Coastal Plain, and here the species is completely absent—a fact apparently not very generally recognized. This absence in the southern Coastal Plain was first suggested by the lack of material in the Philadelphia Academy Herbarium and later corroborated by Prof. Fernald at Cambridge and Dr. Pennell at New York. The most southeasterly stations are in the southern Alleghanies—Blowing Rock, Roan Mountain, etc. In view of a recent, surprising statement in the *Flora of the District of Columbia and Vicinity* that *G. Andrewsii* and *G. Saponaria* intergrade and are doubtfully distinct, it is of interest to find that *G. Andrewsii* is essentially absent from the Coastal Plain while *G. Saponaria* is a most characteristic type of that area, extending but rarely back into the Piedmont.

fica, *Juncus Gerardi*, etc., in a small depression protected by a ledge from the severe ocean storms. This species was formerly known on the coast of Washington Co. and at Wells, but not on the coast between.

Eriophorum angustifolium Roth., var. majus Schultz. Rare south of Hancock Co. A small dense colony growing in an open bog. Very beautiful when in full fruit, having much the appearance of a miniature cotton field.

Antennaria neglecta Greene, var. simplex Peck. The first station for this variety since its original discovery in New York. While "browsing about" in an old field, I was very agreeably surprised to run across a small cluster of about a dozen or fifteen plants of this *Antennaria* with very strict stems, and solitary heads. Dry knoll, with the type.

Montia lamprosperma Cham. This rare and interesting plant grows in matted profusion in one locality, in an opening in wet woodland. This is a range extension somewhat to the southwest.

Amsinckia Douglasiana A. DC. I found this far western plant growing here in 1918, and have noted in Rhodora its appearance. It is evidently making an attempt to establish itself, as during the past season there was an abundance of plants which grew, blossomed and matured their seed.

Linum catharticum L. While on a visit to the mainland last summer, I spent a few hours in the vicinity of "Lily Pond," Rockport, Maine. While there I found an abundance of a delicate white-flowered annual growing on turfy banks, and also, but less luxuriantly, on dry cliffs of abandoned lime quarries, which proved to be *Linum catharticum* L. This is one of the two known stations in New England, and is undoubtedly the one discovered by the Josselyn Botanical Society, in 1913.

Specimens of all the above plants have been verified by Prof. M. L. Fernald, and have been deposited in the herbarium of the New England Botanical Club.

Matinicus, Maine.

A New Albino Raspberry.—Among specimens of *Rubus* collected on the wooded slopes of Caribou Mountain, Mason, Maine by Mr. Robert A. Ware, on July 24, 1919, and preserved in the herbaria of Mr. Ware and Mr. Walter Deane is a form of *Rubus idaeus* L., var. *canadensis* Richardson with amber-white or honey-colored instead of the usual red fruit. The "white"-fruited raspberry already known in New England is a form of var. *strigosus* recently taken up as *R. idaeus*, var. *strigosus* (Michx.) Maxim., forma *albus* (Fuller) Fernald, Rhodora, xxi. 96 (1919). The form discovered by Mr. Ware, being a variant of var. *canadensis*, should be called

Rubus idaeus L., var. canadensis Richardson, forma **Warei,** n. f., fructibus flavis.—Maine: rich woods, slopes of Caribou Mountain, Mason, July 24, 1919, *R. A. Ware* (type in herb. W. Deane). —Walter Deane and M. L. Fernald, Cambridge, Mass.

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VARIETIES OF PITYROGRAMMA TRIANGULARIS.

C. A. Weatherby.

Ever since the publication of Eaton's Ferns of North America, the "California gold and silver ferns" have been treated as a single species with one variety or as two species. This disposition, however, fails to account for all the forms which, as shown by later and much more ample collections than Eaton had before him, exist in this, within certain limits, highly variable group. Instead of two, there are four distinguishable extremes, occupying different ranges, but separated by characters either too slight in themselves or too little constant to warrant their segregation as species. They are, nevertheless, well worth recognition as geographic varieties.

Eaton's description still serves very well for the group as a whole: it may, however, be expanded and amended in some particulars. In addition to the narrow scales of the rootstock, the lower portion of the stipe often bears broader, thinner, pale brown, ovate-lanceolate, acuminate scales which may or may not have a narrow, blackish, sclerotic median band. The stipes vary from bright red-brown to blackish in color. In all varieties the pinnae vary considerably in shape and cutting. The large lower pinnae do not always have the basal segments on the lower side elongated; sometimes, even in well-developed fronds, they are no longer than the others. When greatly developed, they are usually narrowed toward the base. The basal segments of the upper side sometimes equal the others, sometimes are shorter. The lower basal segments of the second pair of pinnae are sometimes elongated like those of the first pair, sometimes shorter than the others. In one variety, the spores are trilobate in outline; in all, they are vernicose-reticulate with low, flat-topped ridges.

The farinose indument of the lower surface of the lamina is secreted by minute glands, well described and figured by Blasdale, Erythrea, i. 253, pl. 2. When they occur on the leaf-surface, these glands are borne on short unicellular stalks, as figured by him: when, however, they grow along the veins, among the sporangia, the stalks lengthen, becoming two or three cells long and raising the secreting terminal cells above the sporangia. In addition, many specimens of *P. triangularis* bear on the under surface of the lamina long-stalked glands with shining, wine-colored, pyriform heads nearly twice as large as those of the indument-secreting glands. What their function may be is not apparent. When glands occur on the upper surface, they are similar in size and structure to the secreting glands of the lower surface. They produce either a somewhat farinose or an apparently gummy substance, but only in small quantities.

Occasionally, as noted by D. C. Eaton, Contr. Nat. Herb. iv. 227, the glands of the lower surface fail to function (perhaps, as he suggested, because of an excess of moisture or shade), producing little or none of the usual farinose indument. They then appear as distinct but numerous, yellow dots and these, seen against the green of the leaf-tissue, probably give the appearance which has led to such specimens being distributed as "bronze-powdered forms." A merely glandular appearance of the lower surface must, however, be taken with some caution in the case of old herbarium specimens which may have been poisoned with corrosive sublimate. The alcohol in this compound, if applied in sufficient quantity, entirely removes the soluble indument. A good example of its effect is seen in the National Herbarium specimen of Palmer's no. 856 in 1889 from Guadelupe Island, Lower California. In this plant, the under surface appears merely glandular except for the tips of the pinnae which escaped the corrosive sublimate bath or brush and are thickly covered with white indument. With a little practice, one learns to distinguish poisoned specimens by a certain drenched and matted appearance under a lens.

Maxon, Contr. Nat. Herb. xvii. 173 (1913), has shown that the correct generic name for the group here considered is Pityrogramma Link, Handb. Gewachs. iii. 19 (1833).

The descriptive key which follows will serve to indicate the distinguishing characters of the three varieties here recognized. They include nearly all the plants which have hitherto passed as white-powdered forms of *P. triangularis.* True *P. triangularis* with white indument appears to be rare, as one would expect in the case of an albino form. Except as noted under var. *viscosa,* the size and cutting of the lamina covers an essentially similar range of variation in all the varieties, though with more or less marked tendencies toward a certain type in each and a consequent difference of aspect much more easily seen than described.

I have had the privilege of examining in addition to the specimens in the Gray Herbarium, the material in the United States National Herbarium, the herbaria of Yale and Leland Stanford Universities and the Philadelphia Academy of Natural Sciences.[1] For this valuable opportunity I am indebted to the authorities of these institutions. I am also under special obligation to Rev. George L. Moxley for procuring for me living plants of var. *viscosa,* to Mr. Bayard Long for needed information on various matters and to Mr. William R. Maxon for encouragement and helpful criticism throughout. I take pleasure in dedicating one of the segregates here described as new to Mr. Maxon, as some small evidence, if it may pass as such, partly of personal gratitude for many courtesies received, but still more of the appreciation of his admirable work which all fern-students must feel.

A. Upper surface of the usually coriaceous lamina *glabrous;* stipe usually bright red-brown and shining in young fronds, turning darker with age, essentially glabrous; indument bright to pale *yellow,* rarely white or lacking; basal segments of the lowest pinnae usually elongate and pinnatifid; spores round to deltoid in outline............1. *P. triangularis*

A. Upper surface of the lamina *glandular* or *viscid* or both; indument *white,* rarely pale yellow or lacking

  B. Upper surface of the usually coriaceous lamina *viscid,* often also with yellowish, stalked, resinous glands; stipe red-brown, essentially glabrous; lower basal segments of the lowest pinnae usually only undulate-crenate, not pinnatifid; spores round to deltoid in outline; plant of southwestern California............................var. *viscosa*

  B. Upper surface of the often rather thin lamina *glandular* only, not viscid; lower basal segments of the lowest pinnae usually elongate, dilated and deeply pinnatifid.

    C. Stipes mostly *blackish* and *glandular* and *white-farinose* above and near the base, not very lustrous; lamina thin and soft, usually

[1] Indicated in the citation of specimens by the following symbols: Gray Herb., G; U. S. National Herb., N; Herb. Phil Acad., P; Herb. Stanford Univ., S; Herb. Yale Univ., Y.

thickly beset above with whitish glands, giving it a gray appearance; spores *round* to *deltoid* in outline; plant of the mountain regions of central California.................................var. *pallida*

C. Stipes mostly *red-brown* and essentially *glabrous;* lamina subcoriaceous, beset above with usually rather sparse yellowish glands; spores *trilobate* in outline; plant chiefly of Arizona, southeastern California and adjacent portions of Mexico ....var. *Maxoni*

Pityrogramma triangularis (Kaulf.) Maxon Contr. Nat. Herb. xvii. 173 (1913). *Gymnogramma triangulare* Kaulf. Enum. Fil. 73 (1824); Brack. U. S. Expl. Exp. xvi. Bot. Fil. 23 (1854). *Gymnogramme triangularis* Hook. & Grev. Ic. Fil. ii. t. 153 (1831); Hook. Fil. Exot. t. 10 (1859); Hook. Sp. Fil. v. 146 (1864); Hook. & Bak. Syn. Fil. 384 (1868); D. C. Eaton, Ferns of the Southwest 304 (1878), Ferns of N. Am. ii. 15 t. 48, figs. 1–5 (1879) and in Watson Bot. Calif. ii. 335 (1880); Meehan, Fl. and Ferns of the U. S., ser. 2, i. 177, t. 44 (1880). *Gymnogramma triangularis* Hook. & Arn. Bot. Beechey Voy. 161 (1833); Hook. Fl. Bor. Am. ii. 259 (1840); Torrey, Pac. R. R. Rep. iv. 160 (1856). *Gymnogramme oregana* Nutt. in D. C. Eaton, Ferns of the Southwest 305 (1878) and Ferns of N. Am. ii. 16 (1879), as syn. *Gymnopteris triangularis* Underw. Our Nat. Fern ed. 6, 84 (1900). *Ceropteris triangularis* Underw. Bull. Torr. Bot. Club xxix. 630 (1902); Christensen, Ind. Fil. 170 (1905).

In the case of a plant so well known as is the typical form of *P. triangularis*, it seems hardly worth while to cite the very numerous specimens examined. As to range, specimens have been seen from Clark Co., Nevada; San Diego, Riverside, San Bernardino, Los Angeles, Santa Barbara, Kern, San Luis Obispo, Inyo, Monterey, Santa Cruz, Santa Clara, Mariposa, Alameda, Tuolumne, Calaveras, Amador, Marin, Sonoma, Yuba, Butte, Mendocino, Plumas, Tehama and Humboldt Counties, California; Coos, Douglas, Lane, Linn, Marion and Multnomah Counties, Oregon; Klickitat, Pierce, Clallam and Island Counties, Washington; Vancouver Island, B. C.: and the northern part of Lower California. In specimens from Spring Valley, San Diego Co., Cal., (Feb.–May, 1900, *Laura F. Kimball*, N) and from Panamint Mts., Inyo Co., Cal. (*Coville & Funston*, 610, N) the lamina is merely glandular beneath with no evidence of poisoning. *Leiberg* 3508 from near Sinartville, Yuba Co. (N), and part of the material under Mrs. R. M. Austin's no. 977 from Quincy, Plumas Co. (N) represent white-powdered forms.

All but one of the specimens seen from north of California, most of those from the northern and more inland portions and some from the southern part of that state, have the red glands mentioned above.

Those from the coastal region from Sonoma County south to Santa Barbara County, on the contrary, show no trace of these glands and average somewhat larger in size. This difference, however, correlates with no other character and seems to call for no taxonomic recognition. Chamisso's type collection of *P. triangularis* was made at San Francisco Bay and doubtless belongs to the glandless form. The original material of *Gymnogramme oregana* Nutt., preserved at the Philadelphia Academy, consists of two plants, one well-developed, with stout stipes 2–5 dm. long, the other small, with slender stipes 1–2 dm. long, and of two detached fronds. In all, the fronds are very young, the lamina hardly fully expanded, and have a whitish indument. They show the red glands which seem to be characteristic of the northern material of *P. triangularis*. Nuttall himself has, on his label, crossed out the name *oregana* and written in *triangularis* with a reference to Hooker and Greville's plate of that species.

Var. **viscosa** (Nutt. ex. D. C. Eaton), n. comb. *Gymnogramme triangularis*, var *viscosa* D. C. Eaton, Ferns of N. Am. ii. 16 (1879) and in Watson Bot. Cal. ii 335 (1880). *Gymnogramme viscosa* Nutt. in D. C. Eaton, Ferns of the Southwest 305, (1878) as syn. and Ferns of N. Am. l. c. *Gymnogramme pyramidalis* Nutt. in D. C. Eaton, l. c., as syn. *Ceropteris viscosa* Underw. Bull. Torr. Bot. Club xxix. 631 (1902); Christensen, Ind. Fil. 170 (1905). *Pityrogramma viscosa* Maxon, Contr. Nat. Herb. xvii. 173 (1913).

California. San Diego County: Mission Hills, May 5, 1903, *LeRoy Abrams*, 3396 (G, S: glandular above; basal segments pinnatifid); shady ledges, Howard Cañon, La Jolla, Apr. 14, 1914, *F. E. & E. S. Clements*, 2 (G: indument yellowish); Rancho de la Nacion, *Kimball* (G); sides of ravines, Del Mar, March, 1894, *Canby* (G: glandular above; mixed with *P. triangularis*); dry hillsides, Linda Vista, July 6, 1915, *Macbride & Payson*, 788 (G); Jamul Valley, 1875, *Palmer*, 433 (G: glandular above); Eucalyptus Cañon, *hb. M. Rodman* (G); moist ravine, 15 miles north of San Diego, March 7, 1862, *J. G. Cooper*, 439 (N: glandular above); Otay Mesa, May 14, 1915, *Collins & Kempton*, 79 (N); San Miguel Mts., Feb.–May, 1900, *Kimball* (N: glandular above); San Diego, March 14, 1882, *M. E. Jones*, 3067 (N); Apr., 1875, *hb. G. C. Woolson* (Y); *D. Cleveland* (Y); Pala, June 1880, *Parish* (Y); Evendido, Apr. 11, 1914, *Parish*, 9092 (S); Coast Mts., June, 1897, *Parish* (S: mixed with *P. triangularis*); Old Mission Dam, alt. 350 ft., Apr. 10, 1904, *H. P. Chandler*, 5055 (S: glandular above); San Diego, *Nuttall* (P: types of *Gymnogramme viscosa* and *G. pyramidalis*). Riverside County: Pigeon Pass Road, near summit of Box Springs Mt., alt. 1800 ft., Feb. 27, 1910, *Reed*, 2947 (N). Los Angeles County: Santa

Catalina Isl., "common in canons" Avalon, June 2, 1895, *Trask* (N); dry hillsides, March 29, 1900, *Grant*, 122 (S); Apr. 21–24, 1904 (S); 1885, *W. S. Lyon* (G).

Nuttall's material of *Gymnogramme viscosa* in the Herbarium of the Philadelphia Academy consists of two small detached fronds about 5 cm. long, with the characteristic habit of extreme var. *viscosa* and without glands on the viscid upper surface of the lamina. The specimen of *G. pyramidalis* is a single large frond, 10 cm. long, again with the characteristic *viscosa* habit and with stalked glands plainly apparent on what little of the upper surface shows. Underwood's statement, l. c. 630, that one of Nuttall's Oregon specimens was labelled by him "*viscosa" indicates an error somewhere. Var. *viscosa* is a very local plant, known only from southwestern California.

Var. *viscosa* varies considerably in leaf-form. The extreme and most characteristic form figured by Eaton has rather distant pinnae and comparatively few, likewise distant, segments. But both pinnae and segments may be as close and the latter as numerous as in the typical form of the species, thus constituting a transition to it, so far as these characters are concerned. The most remarkable variation in this direction is found in specimens collected at San Diego by D. Cleveland (Y) and at San Miguel Mt., near National City by Miss Laura F. Kimball in 1900 (N). These have very large fronds (14 cm. long) with viscid upper surface and white indument, but tripinnatifid, with numerous segments and the lower basal pinnules very large and deeply pinnatifid. Their appearance is altogether that of luxuriant states of typical *P. triangularis*. Specimens collected by Blanche Trask at Avalon, Santa Catalina Island (N) have the characteristic habit of var. *viscosa*, but the upper surface of the lamina glabrous, and in this respect are transitional to the typical form. The fronds in these specimens are young; but in all other specimens of var. *viscosa* seen, the fronds even when very young are strongly viscid. Collins & Kempton 88 from the Otay Mesa, San Diego, May 14, 1915 (N) has the thick frond and general habit of var. *viscosa*, but the upper surface of the lamina is densely glandular and not at all viscid and the spores are somewhat trilobate. In these respects, it is transitional to var. *Maxoni*. In some specimens, every distinctive character of var. *viscosa* breaks down in the direction of one or another of the other varieties; Underwood's raising of it to specific rank seems not to have been justified.

Var. **pallida**, n. var. Stipitibus nigrescentibus superne basinque versus plerumque minute glandulosis et albo-farinosis; laminis tenuibus, supra propter glandulas albidas opacas subfarinosas plerumque numerosas pallidis, subtus albo-farinosis; pinnarum infimarum segmentis vel pinnulis basiscopis elongatis dilatatis profunde pinnatifidis; sporis circumscriptione rotundis vel deltoideis angulis obtusissimis.

CALIFORNIA: SANTA CLARA COUNTY: *Mrs. Bush* (G). TULARE COUNTY: Kaneah, Apr. 28, 1895, *Eastwood* (G). MADERA COUNTY: Hills about three miles above Pollasky, Apr. 11, 1906, *Heller*, 8141 (TYPE in Hb. Gray; also N, S). AMADOR COUNTY; White Bar, alt. 1000 ft., May 13, 1896, *Hansen*, 1637 (N). ELDORADO COUNTY: rocky bluffs along Camp Creek. 8 miles north of Grizzly Flats, June 1, 1902, *W. G. Watkins*, 16 (N). BUTTE COUNTY: Iron Cañon, 1870, May, 1883, May, 1896, 197, May, 1897, *Mrs. Austin* (all N). WITHOUT DEFINITE LOCALITY: 1879, *Miss E. D. Pelton* (Y).

Heller's comment on the type collection describes very well the obvious external characters of this variety which he supposed to be *viscosa*. "When fresh," he says, "the upper side of the frond is much paler than is that of the other species [*triangularis*] and the whole plant less stiff." The specimen of the type number in the Herbarium of the Philadelphia Academy has the stipe more nearly glabrous than usual and the white indument scanty or lacking.

So far as the material at hand shows, var. *pallida* holds its characters better than any of the other varieties. These characters, however, are rather slight and comparative, and in the region where both occur, *P. triangularis* exhibits some tendency to develop white-powdered forms which suggest a transition to var. *pallida*. Everything considered, I am unable to regard the latter as more than a well-marked variety.

Var. **Maxoni**, n. var. Stipitibus rubro-brunneis nitidis glabris, laminis subcoriaceis vel tenuibus supra plerumque sparse glandulosis, glandulis flavescentibus juventute nitidis aetate opacis; pinnarum infimarum segmentis vel pinnulis basiscopis plerumque elongatis et profunde pinnatifidis; sporis circumscriptione trilobatis, lobis rotundatis.

ARIZONA: Santa Catalina Mts., Apr. 23, 1881, *Pringle* (G); shaded pass, rocky cañons of the Santa Catalina Mts., May 23, 1881, *Pringle* (N); under rock shelf near falling water, head of Rincon Valley, Rincon Mts., alt. 3500 ft., July 27, 1909, *J. C. Blumer*, 3271

(TYPE in Nat. Herb.; G, S,); Salt River, 16 miles north of McMillinville, alt. 2800 ft., May 24, 1916, *E. A. Goldman*, 2672 (N).

CALIFORNIA. SAN DIEGO COUNTY: Jacumba Hot Springs, May 23, 1894, *E. A. Mearns* (International Boundary Commission, 3320 (N); desert slopes of San Jacinto Mts., Apr., 1882, *Parish*, 501a. RIVERSIDE COUNTY: Whitewater, Feb., 1881, *Vasey* (N); under rocks in Palm Ca~on, May 19, 1917, *Reed*, 3871 in pt. (N). SAN BERNARDINO COUNTY: Mentone, 1904, *R. J. Smith*, 25 (G); Palm Springs, Apr. 30, 1913, *Eastwood*, 3018 (N); Andreas and Murray Cañons, Palm Springs, Aug. 23, 1906, *T. H. Kearney* (N). SANTA CLARA COUNTY: Coast Range, Dec. 28, 1878, *L. G. Yates* (S: mixed with *P. triangularis* and possibly not actually from this locality). WITHOUT DEFINITE LOCALITY: 1876, *Parry & Lemmon*, 431 (G); desert district between California and Arizona, 1876, *Parry* (G).

LOWER CALIFORNIA: Sierra de Laguna, Jan. 23, 1897, *Brandegee* (N); Cedros Isl., *Brandegee* (N).

SONORA: damp cool shade, Huchuerachi, Dec. 12, 1890, *F. E. Lloyd*, Lumholtz Exp., 484 (G).

The large suite of specimens in the National Herbarium shows every gradation from the round spores of typical *P. triangularis*, through blunt-angled deltoid shapes, to the strongly trilobate spores of var. *Maxoni*. Palmer's no. 856 in 1889 from Guadelupe Island, Lower California (N), and his no. 101 in 1875 from the same place (G, Y) have the glabrous upper surface and general habit of typical *P. triangularis*, but white indument and some of the spores more or less trilobate. Specimens collected at Nine Mile Cañon, Ariz., by J. H. Ferriss (P) have the habit, in different fronds, of both var. *Maxoni* and the typical form, the glandular surface of the former and the yellow indument and round spores of the latter. No. 1589 of the Mexican Boundary Commission (Emory Expedition; N) has a glandular upper surface and round spores. R. H. Alderson's no. 754 from Witch Creek, San Diego Co., California, has the frond finely cut and the upper surface slightly glandular but yellow indument. All of them are in one way or another transitional to the typical form. It may be added that transitional specimens usually do not show exceptional vegetative vigor (the Cleveland and Kimball collections mentioned above are exceptions; more often just the contrary is the case), shrivelled spores or any other of the usual indications of hybridity.

GRAY HERBARIUM.

PYROLA ROTUNDIFOLIA AND P. AMERICANA.

M. L. Fernald

When, in 1904, I pointed out[1] the distinctions between the northern Eurasian *Pyrola rotundifolia* L. and the Alleghenian *P. americana* Sweet, no material was available which clearly broke down the distinctions between the two, and this fact was reinforced by the isolation of the two plants and the decidedly southern and dry habitat of *P. americana,* contrasted with the northerly and more varied habitat of *P. rotundifolia.*

In 1904 a single collection was at hand which somewhat bridged the gap between the two plants. This material, from a sphagnum swamp at Manuel's, Newfoundland (*Robinson & Schrenk*), smaller in all details than the continental *P. americana,* was at that time supposed to be referable to *P. asarifolia* Michx., var. *incarnata* (Fisher) Fernald. Subsequent experience in Newfoundland, however, has shown that the plant of the Manuel's sphagnum swamp is generally distributed throughout the central and southeastern acid region of the island and that in every character it exactly connects Eurasian *P. rotundifolia* and Atlantic American *P. americana.* The Newfoundland plants have been studied with the greatest care at different intervals during a period of several years, always with the same result, namely: the Newfoundland plant seems inseparable from Eurasian material of *P. rotundifolia,* var. *arenaria* Mert. & Koch and this differs in no morphological character from the continental and more southern *P. americana.* The only differences are those of size, var. *americana* running larger in all its parts. The latter plant throughout most of its range, from Nova Scotia, Prince Edward Island, western Bonaventure and Rimouski Cos., Quebec to Frontenac Co., Ontario, South Dakota and Georgia, inhabits dry or sandy woods, but northward, at the northeastern limits of its range, for example, on the upper St. Francis in Maine, at Bic, in Rimouski Co., Quebec, and at Nouvelle in Bonaventure Co., Quebec, var. *americana* is found only in wet, mossy, spruce woods or at the borders of sphagnum bogs. In this interchange of habitats *P. rotundifolia,* var. *americana* falls into the same class of oxylophytes as *Cypripedium acaule* Ait., *Epigaea*

[1] Rhodora, vi. 201 (1904).

repens L., *Gaultheria procumbens* L. and *Gaylussacia dumosa* (Andr.) T. & G. (as var. *Bigeloviana* Fernald), which southward are characteristic of dry silicious habitats (pine or oak barrens and dry woods, etc.) but which northward, especially in the dominantly calcareous areas bordering the Gulf of St. Lawrence, are apparently able to exist, at least are found only in the acid bogs and black spruce swamps.

In Newfoundland, *P. rotundifolia*, var. *arenaria* likewise has interchangeable habitats, sometimes occuring in open sandy or gravelly thickets or on pond-shores, but oftenest in wet sphagnous bogs or spruce swamps. In the latter habitat the branches of the subterranean stems become greatly elongated and their coriaceous, brown, oblong, blunt or mucronate bracts consequently remote; in the drier habitats the caudex is short and the bracts more crowded as in most European specimens. Var. *arenaria*, although not definitely known from the American continent, is the representative of the species in Greenland; and, now well known from Newfoundland, it is to be sought on the Labrador Peninsula and elsewhere in our northern regions.

The two American varieties of *P. rotundifolia* may be distinguished as follows:

P. ROTUNDIFOLIA L., var. ARENARIA Mert. & Koch in Roehling, Fl. Deutschl. iii. 103 (1831); Koch, Syn. 478 (1838); Lange, Consp. Fl. Groenl. 84 (1880); Andres, Oesterr. Bot. Zeitschr. lxiv. 239 (1914). *P. intermedia* Schleich. Cat. Pl. Helv. ed. 3, 23 (1815). *P. maritima* Kenyon, Phytol. ii. 727 (1847). *Thelaia intermedia* (Schleich.) Alef., Linnaea, xxviii. 65 (1856).—Leaf-blades 1.8–5 cm. long, 1.5–4 cm. broad: racemes 3–13-flowered, in anthesis 2–9 cm. long: lower bracts 1–2 mm. broad: calyx 5–7 mm. broad, its firm lance-oblong to oblong-obovate lobes 1.6-3 mm. long: petals 5-7 mm. long, 4-6 mm. broad: anthers 2–2.7 mm. long.—Northern and middle Europe and Asia; Greenland and Newfoundland. The following NEWFOUNDLAND specimens belong here: sphagnum swamp, Manuel's, August 8, 1894, *Robinson & Schrenk;* cool thicket, Western Bay, Conception Bay, August 21, 1914, *G. S. Torrey*, no. 94; boggy places on hill southwest of Tilt Cove, August 21, 1911, *Fernald, Wiegand & Darlington*, no. 6001; open bogs among the hills, Grand Falls, July 26, 1911, *Fernald, Wiegand, Bartram & Darlington*, no. 6000; wet boggy woods, Millerton Junction, *Fernald, Wiegand & Darlington*, no. 5998; gravelly beach, Middle Birchy Pond, July 11, 1910, *Fernald & Wiegand*, no. 3812.

Var. **americana** (Sweet), n. comb. *P. americana* Sweet, Hort. Brit. ed. 2, 341 (1830); Fernald, RHODORA, vi. 201 (1904); Andres, Oesterr. Bot. Zeitschr. lxiv. 243 (1914), in part.—Leaf-blades 2.5–8 cm. long, 2-7 cm. broad: raceme 5–21-flowered, in anthesis 0.25–2 dm. long: lower bracts 2–4 mm. broad: calyx 6.3–10 mm. broad; its firm oblong to rhombic lobes 2.5–4.3 mm. long: petals 6.5–10.5 mm. long, 3.5–8 mm. broad: anthers 2.7–3.6 mm. long.—Chiefly in dry woods or clearings, or northward in bogs and swamps, Nova Scotia, Prince Edward Island and western Bonaventure County, Quebec to Frontenac Co., Ontario, Minnesota, South Dakota, and Georgia.[1]

Gray Herbarium.

REPORTS OF THE FLORA OF THE BOSTON DISTRICT,—XXXIII.

CISTACEAE.

HELIANTHEMUM.

H. Bicknellii Fernald (*H. majus* BSP.; see Rhodora xxi. 36, 1919). Dry soil, common, especially southward.

H. canadense (L.) Michx. Dry rocky and sandy soil, very common throughout.

HUDSONIA.

H. ericoides L. Cohasset Narrows (*W. G. Farlow*, August, 1877). Specimen in Herb. Gray.

[1] Andres gives a much broader range and cites specimens from Montana, Colorado, Utah and Idaho. These plants are certainly not var. *americana*. In his articles on *Pyrola* (as *Pirola*) Andres has frequently misinterpreted American plants and American literature. Thus, for example, he makes an amazing interpretation of a note by the present writer. In discussing the absence from Newfoundland of many common Canadian species the writer said: "But 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. Among such species . . . are *Lycopodium sabinaefolium, Adiantum pedatum, Dryopteris marginalis, Pyrola elliptica* and *Chimaphila umbellata*," etc. But Andres's Germanic mind has interpreted this list as an indication of the *plant association* to which *Pyrola elliptica* belongs; in his monographic studies of the genus saying under *P. elliptica* "Begleitpflanzen siehe Fernald. Expeditions [Expedition] to New-Foundland [Newfoundland]. Rhodora XIII. (1911) 147: *Lycopodium sabinaefolium, Adiantum peltatum* [*pedatum*], *Drypopteris* [*Dryopteris*] *marginalis, Chimophila* [*Chimaphila*] *umbellata.*" (Andres, Allgem. Bot. Zeitschr. xx. 117. 1914).

H. tomentosa Nutt. Sandy seashore and sand dunes from Amesbury to Duxbury.

LECHEA.

L. intermedia Leggett. Dry sandy and rocky soil, common.

L. Leggettii Britton & Hollick. Norwood, border of Purgatory Swamp (*K. M. Wiegand*, July 23, 1909).

L. maritima Leggett. Dry sand, very common along the coast, but frequent inland.

L. maritima Leggett, var. **interior** Robinson. Sandy soil at Andover, Tewsbury, Watertown, Sudbury, Dedham and Hingham.

L. minor L. Dry gravelly roadside, Eliot St., near Morseville, Natick (*K. M. Wiegand*, Sept. 28, 1911); Sherborn (*Miss M. L. Loomis*, July 31, 1913); Hingham (*C. E. Faxon*, August 16, 1885; *T. T. Bouvé*, August, 1884).

L. tenuifolia Michx. Dry sterile soil, common throughout.

L. villosa Ell. Dry fields and woods, very common throughout.

VIOLACEAE.

VIOLA.

V. adunca J. E. Sm. (*V. arenaria* of Am. auth., not DC.; see Rhodora xv. 108, 1913). Wellesley Hills (*Miss F. C. Prince*, May 4, 1896). This specimen is in herb. Boston Soc. Nat. Hist. It is far out of range, the nearest station being in Northern Worcester Co. near Fitchburg.

V. affinis Le Conte. Low woods, bank of Charles River, Wellesley (*K. M. Wiegand*, May 15, Aug. 26, 1909; *C. F. Batchelder*, May 7, 1910).

V. arvensis Murr. Medford St., Somerville (*C. E. Perkins*, no date, see Rhodora v. 156, 1903); Arlington (*Miss Mary N. Plummer*, no date); old field, Cambridge (*M. L. Fernald*, May 25, 1891); Dr. Geo. G. Kennedy's land, Milton (*E. F. Williams*, May 12, 1901).

V. blanda Willd. Rare, in moist rich woods; Merrimac, Gloucester, Andover, Braintree, Hyde Park, Newton, Lexington.

V. Brittoniana Pollard. River meadows along the Concord and Charles Rivers, also at Georgetown, Brookline, Stony Brook Reservation, Medfield and Mansfield.

V. CHINENSIS G. Don. (see RHODORA x. 39, 1908). Weed in Botanic Garden, Cambridge (*M. L. Fernald*, May 21, 1906, May 17, 1907; *W. Deane*, May 3, 1913). Native of eastern Asia.

V. conspersa Reichenb. Moist fields and open woods, common. White-flowered form at Acton and Concord (*A. W. Hosmer* in RHODORA i. 223, 1899).

V. cucullata Ait. Swamps, very common throughout. White-flowered form collected at Purgatory Swamp, Norwood (*N. T. Kidder,* June 4, 1885).

V. eriocarpa Schwein. (*V. scabriuscula* Schwein.; see Bull. Torr. Bot. Club xxxviii. 194, 1911). Damp soil, often in woods, occasional.

V. fimbriatula J. E. Sm. Sandy places, very common throughout.

V. incognita Brainerd, var. **Forbesii** Brainerd. Damp woods at Salisbury, Boxboro, Arlington, N. Cambridge, Brookline and Weston.

V. lanceolata L. Swamps, meadows and wet shores, common throughout.

V. ODORATA L. Garden escape; reported from eight scattered stations.

V. pallens (Banks) Brainerd. Wet woods and swamps, common throughout. White-flowered form without lines at Franklin (*L. R. Perkins* in RHODORA xi. 164, 1909).

V. palmata L. One plant only, on shore of Concord River, Carlisle, with the abundant *V. Brittoniana* (*M. L. Fernald,* May 21, 1911). This is the only specimen of the species known from this region, and is entered on the authority of a determination by Dr. E. Brainerd.

V. papilionacea Pursh. Rich low ground, mainly about dwellings, common.

V. pectinata Bicknell. Meadows near Charles River in Needham and Dedham.

V. pedata L., var. **lineariloba** DC. Dry sand and gravel, common throughout. A form with rose-colored petals (*V. pedata,* f. *rosea* A. L. Sanders, RHODORA xiii. 172, 1911) has been found at Wayland (*Miss A. L. Sanders*); and also (see RHODORA xiv. 22, 1912) at Framingham (*A. J. Eames*) where noticed to be inconstant in color. A white-petaled form (*V. pedata,* f. *alba* (Thurb.) Britton, see RHODORA, xiii. 172, 1911) has been observed to persist at Wayland (*Miss A. L. Sanders*). A form with leaves digitately lobed was collected in bloom at Prospect Hill, Waltham, by *H. A. Purdie,* Oct. 17, 1907 (specimen in herb. W. Deane) and at Carlisle, by *M. L. Fernald,* May 21, 1911 (specimen in Herb. Gray).

V. primulifolia L. Swampy ground, common throughout.

V. pubescens Ait. Rich woods, occasional.

V. rotundifolia Michx. Rich woods, occasional in Essex Co., also reported from Framingham, S. Braintree and Holbrook.

V. sagittata Ait. Fields, occasional from Blue Hills northward.

V. septentrionalis Greene. Fields and open woods; frequent north of Boston; only reported southward from Franklin.

V. sororia Willd. Moist fields and woods; occasional, except in southeastern towns.

V. TRICOLOR L. Gardens and fields, spontaneous and spreading, occasional.

V. triloba Schwein. Rich dry woods, rare. Fifteen stations from Norwood northward.

[V. CORNUTA L. was reported from a garden in Lexington by Miss M. P. Cook in RHODORA i. 81, 1899, but no specimens are available. This was also one of Minot Pratt's introductions at Concord, along with *V. rostrata, V. striata,* and *V. canadensis,* but these have all been extinct in this region for many years, see RHODORA i. 171, 1899. There is in herb. Boston Soc. Nat. Hist. a specimen of *V. canadensis* collected in 1822 by Dr. F. Boott, and marked "Boston, U. S. A." It is hardly likely that this could have been collected wild in our area and some clerical error is suspected.]

HYBRIDS.

These reports are all based on actual specimens. Those reported by Mr. Forbes were transplanted to his garden in Brookline, and are growing there.

C. Brittoniana Pollard × **fimbriatula** J. E. Sm. Near Fresh Pond, Cambridge (*A, Gray,* 1843); Needham (*C. E. Faxon,* May 1877, *W. Deane,* June 7, 1884).

C. Brittoniana Pollard × **lanceolata** L. Needham, Charles River meadows, only one plant found (*F. F. Forbes,* see RHODORA xi. 14, 1909).

V. Brittoniana Pollard × **pectinata** Bicknell. Charles River meadows, Needham and Dedham (*F. F. Forbes,* June, Aug., Sept., 1906); Needham (*C. E. Faxon*, May, 1877, *W. Deane*, June 7, 1884); Sherborn (*H. A. Purdie*, Sept. 11, 1898, *E. F. Williams, J. M. Greenman*, Sept. 18, 1898).

V. Brittoniana Pollard × **sagittata** Ait. Needham (*W. Deane*, June 2, 1888).

V. cucullata Ait. × **fimbriatula** J. E. Sm. Hamilton, Arlington, Concord, Brookline and Milton.

V. cucullata Ait. × **papilionacea** Pursh. Dedham (*M. L. Fernald*, June 4, 1899).

V. cucullata Ait. × **septentrionalis** Greene. Arlington Heights (*M. L. Fernald*, May 12, 1905); Framingham (*F. F. Forbes*, May 19, Aug. 18, 1907; July 28, 1906).

V. cucullata Ait. × **sororia** Willd. Arlington (*F. F. Forbes*, May 24, Aug. 7, 1908).

V. cucullata Ait. × **triloba** Schwein. Granny Hill, Lexington (*J. M. Greenman*, — , 1905). See Rhodora vii. 56, 1906; xv. 115, 1913.

V. fimbriatula J. E. Sm. × **papilionacea** Pursh. Brookline (*F. F. Forbes*, May 19, July 7, 1907).

V. fimbriatula J. E. Sm. × **sagittata** Ait. Carlisle (*C. H. Knowlton*, Sept. 6, 1902); Lincoln (*C. H. Knowlton*, May 17, 1908); Arlington (*M. L. Fernald*, June 5, 1904).

V. fimbriatula J. E. Sm. × **septentrionalis** Greene. Amesbury, dry bank, Tyngsboro (*C. H. Knowlton*, May 30, 1901), Lincoln, Lexington, Arlington, Newton, Brookline.

V. fimbriatula J. E. Sm. × **sororia** Willd. Arlington (*F. F. Forbes*, May 22, July 28, 1907); dry field, Sharon, (*C. H. Knowlton*, May, 1907).

V. fimbriatula J. E. Sm. × **triloba** Schwein. Crevices in rocks in open woods with parents, Granny Hill, Lexington (*B. L. Robinson & J. M. Greenman*, Sept. 20, 1903; see Rhodora xv. 114, 1913).

V. septentrionalis Greene × **sororia** Willd. Arlington (*F. F. Forbes*, June 21, 1908).

C. H. Knowlton } *Committee on*
Walter Deane } *Local Flora.*

Stachys lanata in Ontario.—There were received recently for identification at the U. S. National Museum specimens of an unfamiliar labiate plant of striking appearance collected near Owen Sound, Ontario, by Mr. W. R. McColl. It proved to be *Stachys lanata* Jacq., a native of the Caucasus region, which has perhaps not been reported previously from North America, although no thorough search of literature has been made for verification of this point. A somewhat similar species, *Stachys germanica* L., has been found on ballast in the eastern United States.

In general features *Stachys lanata* is quite unlike our native species of the genus, and when growing it must be very conspicuous. It is a rather tall, coarse perennial with large leaves and dense flower spikes, and all parts are closely covered with long, white, matted hairs. Mr. McColl has kindly communicated the following information, which seems to indicate that the species has become well established: "Until this fall I never saw the plant except for a small clump growing on a grassy roadside in Sydenham Township, Gray County, Ontario. This fall, however, I came across a patch of it perhaps 400 yards long by 100 yards wide, on a grassy, sloping hillside facing the east, west of which is limestone rock about 30 feet high, with plenty of talus in front. The plants grow from the talus down the slope, and appear to prefer dry situations. Rev. Dr. Campbell of Montreal has combed western Ontario rather carefully and did not find the plant, but Mr. Newton Tripp of Forest, Ontario, found a specimen a year ago and sent it to the Guelph Agricultural College, where they named it 'sheep's lug.' Apparently the plant is rare. Outside of the big lot found this fall, I know of no other station for it. Mr. Maynard, upon whose farm the plants grow, says that while they spread rapidly from seed, they are easily killed by ploughing under once."—Paul C. Standley.[1]

[1]Published by permission of the Secretary of the Smithsonian Institution.

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FLORA OF BIRCH ISLAND IN ATTEAN POND.

Louise H. Coburn.

Attean Pond is one of the Moose River chain of lakes, which extend from west to east across the northern part of Somerset County, Maine, and drain into the Kennebec by way of Moosehead Lake. It lies in Attean township, a wild-land township of upper Somerset, is in about latitude 45° 35′, and has an elevation at low water of 1157.5 feet. It is an irregular and shallow lake, about six miles in longest dimension, is very nearly surrounded by mountains, and contains forty-two islands of various sizes, all of which are encircled by, not to say constructed out of, granite boulders. Each island appears to have its backbone of granite boulders, glacier borne from Mt. Sally and other rocky heights to the north, while the sand and gravel of their beaches show the same origin. Birch Island, which is the largest, is very irregular in outline, with many projecting points and deep coves, and has an area of something over twenty-five acres.

The larger part of the body of the island is covered with a nearly pure stand of fir, unmixed except for the ancient white birches which rise at intervals, and lift their foliage entirely above the firs, thus forming a sort of second story of the forest. In this arboreal architecture it is evident that the second story was built before the first. The fir forest is replacing a former birch one. To an observer from the lake the island appears to be birch covered.

In the densest parts of the fir woods there is absolutely no vegetation underneath. In some parts, a little less dense, there is a scattered growth of *Aralia nudicaulis*, and in others of *Aralia* and *Ribes pros-*

tratum, while in more open places there may be found in addition seedlings of *Pyrus sitchensis, Acer spicatum* and *A. rubrum*. In drier parts of the woods the undergrowth sometimes consists exclusively of *Aralia nudicaulis* and *Vaccinium canadense*. At intervals one finds an enormous boulder with two or three young fir trees and a cherry or mountain maple growing precariously on its summit, and its slopes heavily hung with *Polypodium vulgare* and *Ribes prostratum*. At intervals also one comes to an open space thickly carpeted with *Taxus canadensis*. Along the trails or where the windfall of a giant birch has cut an open lane there grow a few kinds of forest ferns and flowers, such as bunchberry, star-flower, goldthread, wood sorrel, Clintonia, violets, twinflower, *Pyrola secunda*, two-leaved Solomon's seal, and the hay-scented and wood ferns. The most abundant is the twinflower, which throws a green drapery over decaying stumps and low rocks, and blossoms from June to September. Upon the points of the island, and in the neighborhood of the shore the fir of the woods is replaced by or mixed with red and white spruce and arbor vitae, and the undergrowth presents a larger variety.

There are two groups of tall white pines upon the highest ground of the island, and both gray and red pine are numerous near the shore.

The gray or Jack pine (*Pinus Banksiana*) is a picturesque feature of many of the islands of Attean, growing on the shore generally in groups and often very near the low water line. These trees seem to have a preference for the western or weather end of the islands, and are twisted by the winter storms into one-sided and fantastic shapes, thus presenting an appearance quite different from the columnar Norways with which they are commonly associated. The habit of growth of the two kinds of pine is also different, the individual Norways standing generally well-spaced from each other, while the Jacks are huddled in clusters together. On the Attean islands the Jack pines are nearly as tall as the Norways, growing on Birch Island fourteen to sixteen inches in diameter breast-high, and when not crippled in their upper limbs to a height of from fifty to sixty feet. The Jack pine is abundant enough to constitute a noticeable feature of the landscape on the shores of Holeb Pond, which lies in Holeb township, west of Attean. I am told by woodsmen that in Township No. 4, southeast from Attean, there is a large tract of the Jack pine, lying a mile or so from Moose River—about five hundred acres of predominating Jack pine with some mixture of Norway. Since the Jack is not at present used for timber or pulp it is commonly cut for firewood for the log-haulers, as it dries out more quickly than hard wood. In a recent season five hundred cords of it were cut. In this same township, No. 4, there is another large section of burnt-over land, which has been naturally seeded and is growing up thickly with young Jacks.

Of deciduous trees on Birch Island, in addition to the ubiquitous paper birch, there is one group of three or four yellow birches. In the woods near the shore and on the shore grow poplars, both the large-toothed and the aspen, and red maple is abundant both on the shore and in open places in the woods. One aged elm maintains itself on a point of the island, and one large balsam poplar, surrounded by a few young ones, was found on the rocky shore. There are three apple-trees, probably of accidental human planting, growing on the cleared ground. Of the lesser trees, the mountain and the striped maple, the red cherry, and the mountain ashes, both *Pyrus americana* and *P. sitchensis*, are common in the woods. *Pyrus sitchensis* is the more common of the two and becomes often quite a large tree, one upon the island measuring ten inches in diameter breast-high, and over thirty feet in height. The black ash and the shad-bush are frequent on the shore, and the latter also in the woods. A few willows on the island, belonging to the species *Salix discolor* and *S. rostrata*, are large enough to deserve to be classed as lesser trees. This completes the island's silva.

In contrast with the general monotony of the woods the flora of the rocky shore is everywhere abundant and varied. The lake has tributary to it a large area of high precipitation, as a result of which the seasonal tide is six to eight feet in height, with a couple of feet more under occasional flood conditions. The period of high water lasts through the early summer, normal low water not generally being reached before the last of July. I have picked Rhodora in August from a bush low on the shore, recently out of the water, whose flowers and leaves were hurrying to maturity together. The tidal zone presents a border from ten to thirty feet in width around the shore of the island, the greater part of it covered with granite boulders, large and small, and thickly planted between the rocks with water-tolerant shrubs and trees. One here perceives why so many of our native shrubs are of the water-enduring kind. Since in the natural forest only the swamps and the borders of the lakes and streams are open enough for shrub growth, they learned perforce to live with their feet in the water for a considerable part of the year. The soil of the rocky shore consists of a little gravel in the crevices between the rocks, which are kept well washed out, and there is not much herbaceous growth except *Osmunda regalis,* which unrolls its fronds at the edge of low water in July.

In October when the red maple is scarlet, the poplar and black ash golden, the dogwood and blueberry assorted shades of red and yellow, and the shad-bush a mixture of the two, the royal fern forms a cinnamon-colored edging at the water line around a large part of the island, as well as of many of the other islands of Attean. As one looks upon one of the small islands from a boat, one sees a border of royal fern and sweet gale at the water's edge, then dogwood and other low shrubs, then a continuous row of alder, above which arise the Jack pine and the white birch, the Jack occasionally stepping nearer the lake than any of the birches.

In the reentrant angles of the island, at the base of three of the larger coves, there are marshes of some size. Their soil consists of a layer two or three inches deep of muck over an underlying deposit of gravel. Much of their surface is dried out enough in August to be walked upon dry shod, but not for a sufficiently long time to permit the growth of any but strictly marsh plants. One of the marshes is filled for much of its area with big tussocks of *Carex stricta,* interspersed with *Spiraea latifolia* and *Salix pellita,* with an occasional bunch of *Calamogrostis,* and it runs out into the water with a border of *Scirpus cyperinus.* Another marsh contains uniform growth of *Osmunda regalis,* mixed with *Carex arcta,* and interspersed with *Alnus incana, Spiraea latifolia, Viburnum dentatum, Ilex verticillata, Myrica Gale, Cornus stolonifera, Salix pellita,* etc. Another marsh has a portion of it filled exclusively with *Osmunda regalis, Carex vesicaria* and *Salix pellita.* Along the shore edge of these last two marshes are narrow gravel beaches a little raised above the marsh, making a kind of bar. At the base of the smaller indentations of the shore are gravel beaches, some of which have behind them wet places containing a few marsh plants. These gravel beaches bear a few special plants of their own.

The larger coves with their shallow water and gravel bottoms are well filled with water weeds and other pond plants.

The cleared slope in front of the row of camps that extends along part of the ridge of the island affords a habitat for numerous field and wayside plants, probably mostly of recent introduction from the south, while the waste ground back of the camps and round the chicken pens has been seized upon by some of the weeds that follow habitation.

The flora of Birch Island divides itself naturally into seven lists:

I. The forest flora.
II. Flora of the rocky shore below high water line.
III. Flora of the marshes.
IV. Flora of the gravel beaches.
V. Water flora of the coves.
VI. Flora of the cleared ground.
VII. Waste ground flora.

These lists somewhat overlap. In a few cases I have placed the same name in two or more lists, where the plant seemed to have more than one natural station. The total number of species and varieties found on Birch Island is 255. Specimens of all plants mentioned have been examined and their names verified by Prof. M. L. Fernald of Gray Herbarium, Harvard University.

I. Forest Flora

Polypodium vulgare L.
Phegopteris polypodioides Fée.
P. Dryopteris (L.) Fée.
Pteris aquilina L.
Aspidium noveboracense (L.) Sw.
A. cristatum (L.) Sw.
A. spinulosum (O. F. Müller) Sw.
A. spinulosum, var. intermedium (Muhl.) D. C. Eaton.
Dicksonia punctilobula (Michx.) Gray.
Osmunda Claytoniana L.
O. cinnamomea L.
Botrychium ternatum (Thunb.) Sw., var. intermedium D. C. Eaton.
Lycopodium lucidulum Michx.
L. annotinum L.
L. clavatum L.
L. obscurum L.
L. complanatum L., var. flabelliforme Fernald.
Taxus canadensis Marsh.
Pinus Strobus L.
P. Banksiana Lamb.
P. resinosa Ait.
Picea canadensis (Mill.) BSP.
P. rubra (DuRoi) Dietr.
Abies balsamea (L.) Mill.
Thuja occidentalis L.
Panicum boreale Nash.
Agrostis hyemalis (Walt.) BSP.
A. perennans (Walt.) Tuckerm.
Poa nemoralis L.
Carex stellulata Good.
C. rosea Schuhr., var. radiata Dewey.
C. brunescens Poir.
C. debilis Michx., var. Rudgei Bailey.
C. intumescens Rudge, var. Fernaldii Bailey.
Clintonia borealis (Ait.) Raf.
Maianthemum canadense Desf.

Trillium erectum L.
T. undulatum Willd.
Salix discolor Muhl.
S. humilis Marsh.
Populus tremuloides Michx.
P. grandidentata Michx.
Betula lutea Michx. f.
B. alba L.,
var. papyrifera (Marsh) Spach.
Ulmus americana L.
Coptis trifolia (L.) Salisb.
Ribes prostratum L'Hér.
Pyrus americana (Marsh.) DC.
P. sitchensis (Roem.) Piper.
Amelanchier laevis Wiegand.
Rubus triflorus Richards.
Prunus pennsylvanica L. f.
Oxalis Acetosella L.
Nemopanthus mucronata (L.) Trel.
Acer pennsylvanicum L.
A. spicatum Lam.
A. rubrum L.
Viola septentrionalis Greene.
V. blanda Willd.
V. incognita Brainerd,
var. Forbesii Brainerd.
Aralia hispida Vent.
A. nudicaulis L.
Cornus canadensis L.
Chimaphila umbellata (L.) Nutt.
Pyrola secunda L.
P. elliptica Nutt.
Monotropa unifolia L.
Kalmia angustifolia L.
Vaccinium pennsylvanicum Lam.
V. canadense Kalm.
Trientalis americana (Pers.) Pursh.
Scutellaria lateriflora L.
Lycopus virginicus L.
Lonicera canadensis Marsh.
Linnaea borealis L.
Viburnum cassinoides L.
Sambucus racemosa L.
Aster macophyllus L.
A. macrophyllus L.,
var. velutinus Burgess.
A. umbellatus Mill.
A. acuminatus Michx.
Anaphalis margaritacea (L.) B. & H.

II. Flora of the Rocky Shore.

Osmunda regalis L.
Pinus Banksiana Lamb.
Thuja occidentalis L.
Panicum boreale Nash.
Muhlenbergia racemosa (Michx.) BSP.
Smilax herbacea L.
Salix lucida Marsh.
S. cordata Muhl.
S. balsamifera Barratt.
S. discolor Muhl.
S. humilis Marsh.
S. sericea Marsh.
S. rostrata Richards.
S. humilis × discolor.
Populus tremuloides Michx.
P. balsamifera L.
Myrica Gale L.
Alnus mollis Fernald
A. incana (L.) Moench.
Thalictrum polygonum Muhl.
Spiraea latifolia Borkh.
Amelanchier laevis Wiegand.
Rosa blanda Ait.
Ilex verticillata (L.) Gray.
Nemopanthus mucronata (L.) Trel.
Acer rubrum L.
Cornus stolonifera Michx.
Rhododendron canadense (L.) BSP.
Kalmia angustifolia L.
Vaccinium canadense Kalm.
Fraxinus nigra Marsh.
Viburnum dentatum L.
V. cassinoides L.
Eupatorium purpureum L.,
var. foliosum Fernald.
Aster vimineus Lam.

III. Flora of the Marshes.

Aspidium Thelypteris (L.) Sw.
Onoclea sensibilis L.
Osmunda regalis L.
Poa perennans (Walt.) BSP.
Calamagrostis canadensis (Michx.) Beauv.
Glyceria borealis (Nash) Batchelder
Dulichium arundinaceum (L.) Britton.
Scirpus cyperinus (L.) Kunth., var. pelius Fernald.
S. pedicellatus Fernald.
S. atrocinctus Fernald.
Carex arcta Boott.
C. canescens L.
C. crinita Lam.
C. torta Boott.
C. stricta Lam.
C. flava L.
C. vesicaria L.
C. vesicaria L., var. jejuna Fernald.
C. vesicaria L., var. distenta Fries.
C. rostrata Stokes.
C. rostrata Stokes, var. utriculata (Boott.) Bailey.
Juncus effusus L.
Smilax herbacea L.
Iris versicolor L.
Habenaria fimbriata (Ait.) R.Br.
Salix lucida Muhl.
S. petiolaris Sm.
S. sericea Marsh.
S. pellita Anders.
S. sericea × petiolaris
Myrica Gale L.
Alnus incana (L.) Moench.
Radicula palustris (L.) Moench.
Spiraea latifolia Borkh.
Potentilla palustris (L.) Scop.
Ilex verticillata (L.) Gray.
Nemopanthus mucronata (L.) Trel.
Hypericum boreale (Britton) Bicknell.
H. virginicum L.
Sium cicutaefolium Schrank.
Cornus stolonifera Michx.
Vaccinium macrocarpon Ait.
Lysimachia terrestris (L.) BSP.
Scutellaria galericulata L.
Lycopus uniflorus Michx.
Mentha arvensis L.
M. arvensis L., var. glabrata (Benth.) Fernald.
Veronica scutellata L.
Galium trifidum L.
G. Claytoni Michx.
Viburnum dentatum L.
V. cassinoides L.

IV. Flora of the Gravel Beaches.

Equisetum arvense L.
Sparganium diversifolium Graebner., var. acaule (Beeby) Fernald & Eames.
Eleocharis acicularis (L.) R. & S.
E. tenuis (Willd.) Schultes.
Carex lenticularis Michx.
C. Oederi Retz.
Juncus filiformis L.
J. brevicaudatus (Engel.) Fernald.
J. pelocarpus Mey.
J. subtilis Mey.
Ranunculus Flammula L. var. reptans (L.) Mey.
Potentilla palustris (L.) Scop.
Hypericum ellipticum Hook.
H. boreale (Britton) Bicknell.
Sium cicutaefolium Schrank.
Lysimachia terrestris (L.) BSP.
Scutellaria lateriflora L.
Lycopus uniflorus Michx.
L. americanus Muhl.

V. Water Flora of the Coves.

Equisetum littorale Kuehlewein.
Sparganium fluctuans (Morong) Robinson.
Potamogeton natans L.
P. epihydrus Raf.
P. amplifolius Tuckerm.
P. heterophyllus Schreb.
P. bupleuroides Fernald.
P. pusillus L.
P. dimorphus Raf.
P. Robinsii Oakes.
Najas flexilis (Willd.) Rostk. & Schmidt.
Sagittaria latifolia Willd., forma diversifolia (Engelm.) Robinson.
Eleocharis palustris (L.) R. & S.
E. acicularis (L.) R. & S.
Scirpus subterminalis Torr.
S. cyperinus (L.) Kunth.
Eriocaulon articulatum (Huds.) Morong.
Nymphaea advena Ait., var. variegata (Engelm.) Fernald.
Castalia odorata (Ait.) Woodville & Wood.
Ranunculus aquatilis L., var. capillaceus DC.
Myriophyllum alterniflorum DC.
M. verticillatum L., var. pectinatum Wallr.
M. Farwellii Morong.
Utricularia vulgaris L., var. americana Gray.
Lobelia Dortmanna L.

VI. Flora of the Cleared Ground

Asplenium filix-femina (L.) Bernh.
Anthoxanthum odoratum L.
Phleum pratense L.
Agrostis alba L., var. vulgare (With.) Thurb.
A. alba L., var. maritima (Lam.) G. F. W. Mey.
A. hyemalis (Walt.) BSP.
Danthonia spicata (L.) Beauv.
Poa annua L.
P. trifolia Gilib.
P. pratensis L.
Bromus ciliatus L.
Carex tribuloides Wahlenb., var. reducta Bailey.
Carex Crawfordii Fernald.
Juncus bufonius L.
J. tenuis Willd.
Asparagus officinalis L.
Sisyrinchium angustifolium L.
Ranunculus acris L.
R. acris L., var. Steveni (Andrs.) Lange.
Pyrus Malus L.
Fragaria virginiana Duchesne.
Rubus idaeus L., var. aculeatissimus (C. A. Mey.) Regel & Tilling.
Trifolium pratense L.
T. repens L.
T. hybridum L.
T. agrarium L.
Oxalis corniculata L.
Epilobium angustifolium L.
E. adenocaulon Haussk.
Oenothera pumila L.
Carum Carui L.
Apocynum androsaemifolium L.
Prunella vulgaris L.
Plantago major.
Veronica serpyllifolia L.
Solidago canadensis L.
Erigeron philadelphicus L.
E. ramosus (Walt.) BSP.
Antennaria canadensis Greene.
Achillea Millefolium L.

Chrysanthemum Leucanthemum L. var. pinnatifidum Lecoq & Lamotte.
Cirsium arvense (L.) Scop.
Taraxacum officinale Weber.
Lactuca canadensis L.
Hieracium aurantiacum L.
H. scabrum Michx.

VII. Waste Ground Flora

Echinochloa crusgalli (L.) Beauv.
Setaria glauca (L.) Beauv.
S. viridis (L.) Beauv.
S. italica (L.) Beauv.
Rumex obtusifolius L.,
R. Acetosella L.
Polygonum aviculare L.
P. aviculare L., var. vegetum Ledeb.
P. lapathifolium L.
P. Persicaria L.
P. Convolvulus L.
Chenopodium album L.
C. album L., var. viride (L.) Moq.
Amaranthus retroflexus L.
Stellaria media (L.) Cyrill.
Cerastium vulgatum L.
Agrostemma Githago L.
Lepidium virginicum L.
L. apetalum Willd.
Capsella Bursa-pastoris (L.) Cosson.
Brassica juncea (L.) Cosson.
B. campestris L.
Potentilla monspeliensis L.
P. monspeliensis L., var. norvegica (L.) Rydb.
Vicia Cracca L.
Galeopsis Tetrahit L.
Solanum rostratum Dunal.
Erigeron canadensis L.
Gnaphalium uliginosum L.
Ambrosia artemisiifolia L.
Anthemis Cotula L.

A short list is added of plants which were found in Attean township, outside of Birch Island.

In the woods: *Equisetum sylvaticum* L., *Streptopus roseus* Michx., *Cypripedium acaule* Ait., *Acer saccharum* Marsh, *Viola incognita* Brainerd, *V. renifolia* Gray, *Circaea alpina L.*, *Galium triflorum* Michx.

On a high knoll covered with Norway pine: *Spiranthes Romanzoffiana* Cham., *Epipactis tesselata* (Lodd.) A. A. Eaton, *Pyrola americana* Sweet, *Ledum groenlandicum* Oeder.

On the mountain: *Vaccinium pennsylvanicum* Lam., var. *nigrum* Wood, *V. pennsylvanicum* Lam., var. *myrtilloides* (Michx.) Fernald.

On burnt land: *Corydalis sempervirens* (L.) Pers.

In a bog: *Habenaria blephariglottis* (Willd.) Torr., *Calopogon pulchellus* (Sw.) R. Br., *Arethusa bulbosa* L.

On the rocks of a small island: *Potentilla tridentata* Ait.

On the shore of the mainland: *Crataegus macrosperma* Ashe, *Rhus typhina* L., *Aster radula* Ait.

In the pond: *Polygonum amphibium* L.

In Moose River: *Sagittaria arifolia* Nutt.

On the edge of a field: *Chelone glabra* L., *Senecio Robinsii* Oakes.

The following were found in No. 4, R. 7, just across the line from Attean.

On the muddy bank of Moose River: *Alopecurus geniculatus* L., var. *aristulatus* Torr., *Callitriche palustris* L., *Ilysanthes dubia* (L.) Barnh.

In Moose River: *Nymphea microphylla* Pers.

In woods near the river: *Cinna latifolia* (Trev.) Griseb., *Solidago macrophylla* Pursh.

Skowhegan, Maine.

ANTENNARIA ALPINA AND A. CARPATHICA.

Theo. Holm.

In view of the fact *Antennaria alpina* (L.) R. Br. and *A. carpathica* (Wahlenb.) R. Br. are about to be excluded from the flora of this continent according to some authors of recent date, the writer wishes to call attention to some points relative to the geographical distribution and external structure of these species.

While both species were included by Asa Gray in his Synoptical Flora of North America, and by John Macoun in his Catalogue of Canadian Plants, with a range extending from Labrador throughout the northern part of the continent to Alaska and Oregon, Greene has expressed the opinion that *A. alpina* is not known to occur on our continent "unless perhaps a sheet of specimens in Canadian Survey collection, said to have been collected on the Arctic sea coast by Dr. Richardson, may represent it;"[1] and this author makes the following statement about *A. carpathica:* "I am still without evidence that true *A. carpathica* exists in North America" (l. c. p. 289). In Coulter & Nelson's New Manual of Botany of the Rocky Mountains (1919) twenty-one species of *Antennaria* are enumerated, but *A. alpina* and *A. carpathica* are excluded; finally in P. A. Rydberg's Flora of the Rocky Mountains and Adjacent Plains (1917) *A. carpathica* has been left out, and *A. alpina* is credited only to some of the British provinces.

However, if we combine the geographical distribution of both species in the Old World with that given by Gray and Macoun for this continent, we notice at once that *A. alpina* is circumpolar, and *A.*

[1] Greene, E. L., Pittonia Vol. III. Washington 1896–1898, p. 284.

carpathica almost so. Thus we should naturally expect that both species would be indigenous to the greater part of the Rocky Mountain region, and it would indeed seem very unnatural, if neither of them had found its way to this continent, inasmuch as *A. alpina* is frequent in Greenland, and the other species has been reported from many stations in Arctic Siberia.

It is true that only the pistillate plant of *A. alpina* is common, and that the staminate plant, so far, has only been found a few times in Scandinavia, France and Alaska, but, on the other hand, it is well known that the pistillate plant through pathenogenesis produces fertile seeds in abundance[1]; the same being the case with several of the other species endemic to this country. It would thus, from a geographic point of view, be most natural to expect that these two species do occur on this continent, and let us now examine the reason why they have been denied citizenship.

By a careful examination of various collections the result has been, that both species exist in Canada as well as in the United States, and by comparing the statements of certain authors, who have excluded these species, it becomes evident that the literature has either been ignored or completely misunderstood. For instance, with regard to the staminate plant of *A. alpina,* Greene states that "true *A. alpina* is one of the few species of its genus in which the pappus-bristles are only more strongly barbellate at the apex without being clavellate-dilated" (l. c. p. 284). None of the Scandinavian authors, who had the opportunity to examine this extremely rare plant, has made any statement to that effect, and Lamarck & De Candolle (Flore Française) describe the pappus thus: "les poils sont filiformes et dentés dans les fleurs fertiles, et écrasés au sommet en massue applatie, dans les fleurs stériles."

Considering the vast distribution of these species, it must be expected that they do not always exhibit the same external structure, but that they sometimes appear as varieties, more or less well marked. Moreover we must remember that species which depend on parthenogenesis, as our *A. alpina,* are known to be polymorphic.

Let us then examine *A. alpina* as it occurs in Europe and Asia. In the typical plant the leaves are glabrous on the upper face, villous or

[1]Kerner: Parthenogenesis einer angiospermen Pflanze (Sitzungsber. der Acad. der Wissensch. Wien. Math.-naturw. Cl. Vol. 74. 1876. p. 659). See also Juel, H. O.: Parthenogenesis bei *Antennaria alpina* (L.) R. Br. (Bot. Centralbl. Vol. 74, No. 13. 1898. p. 1).

tomentose on the lower. But in Greenland and Scandinavia a variety is not uncommon with the leaves villous on both faces, by Lange described as var. *canescens*[1]; this variety is thus identical with var. *Friesiana* Trautv.[2] and has been collected in Labrador[3]. The width of the leaf-blade is also subject to variation, and in Greenland I noticed the leaves to be broader in the var. *canescens* than in the typical plant. The same observation was made in Colorado, where the variety was found on several peaks, at elevations from 11,500 to 13,000 feet. Then there is also a var. *corymbosa* Fries[4]; "triplo majus, corymbo multifloro, pedunculis praelongis subfastigiatis," recorded from Lapland and Norrland. A monocephalous state, known in many other *Compositae*, is known also in *A. alpina* viz. "*monocephala* DC.", from Alaska and Siberia[5], but Kjellman[6], who found it on the Asiatic coast of Bering Strait, observed that mono- and plio-cephalous stems may occur upon the same individual. In Greenland I found a very interesting form, perfectly glabrous, the so-called var. *glabrata* I. Vahl:[7] "foliis utrinque viridibus, calathiis solitaris iv. paucis, periclinio glabriusculo." This variety has since been raised to specific rank by Greene as *A. glabrata* (l. c. 285), and recently also by Porsild[8] under the same name. However, the few points by which it differs from the typical *A. alpina* are variable in the latter, thus it would seem more correct to consider it a variety only.

Similar variation is known in several other plants, for instance *Gnaphalium uliginosum* L. var. *nudum* Ehrh., *Arabis hirsuta* Scop. var. *glaberrima* L., *A. petraea* Lam. var. *glabra*, *A. alpina* L. var. *glabrata*, etc.

Finally a variety *ungavensis* has been described by Prof. Fernald (l. c.), distributed as *A. labradorica* Nutt., but evidently distinct from this; it differs from the *A. alpina* by its very tall stature, numerous

[1] Flora Danica: XLVII. Tab. 2786. Copenhagen, 1868.

[2] Trautvetter, E. R.: Flora terrae Tschuktschorum (Acta Hort. Bot. Petr. VI. p. 1. 1879).

[3] Fernald, M. L.: Some allies of *Antennaria alpina* from Newfoundland and the Labrador Peninsula. (Rhodora, XVIII, p. 237. Boston, 1916).

[4] Fries, Elias: Nov. Florae Suecicae Mant. III. p. 102. 1832–1842.

[5] Trautvetter, E. R.: Plantas Siberiae Borealis ab A. Czekanowski et F. Mueller annis 1874 et 1875 lectas. (Acta Hort. Bot. Petr. V. p. 1. 1877).

[6] Kjellman, F. R.: Asiatiska Beringsunds-Kustens Fanerogam-flora (Vega-Exped. vetensk. arb. p. 502).

[7] Flora Danica, 1. c. Fig. 4.

[8] Porsild, M. P.: On the genus Antennaria in Greenland. (Medd. om Groenland; LI. Copenhagen, 1915.

cauline leaves, and in the long-peduncled lower head of the two-headed inflorescence.

These are, so far as I know, the described varieties of *A. alpina*, but it has also been stated by several authors abroad that the species varies with reference to the development or absence of stolons, etc. Porsild (l. c. p. 269) for instance summarizes the variations in the Greenland plant as follows: "Shoot-formation; the procumbent runnerlike shoots are more or less developed, or sometimes quite missing. Hairiness; sometimes the leaves are closely white-felted on their lower surfaces only (*A. alpina α*, in Lange, Flora Danica) and at other times on both surfaces (*β canescens* Lge.); or the felt can be more loose and tufted. Besides this, the seasons can influence the hairiness, the earliest shoots in spring often being more densely felted than those developed later. The inflorescence; the number and size of the heads (capitula). The colour of the involucre is generally dark olive-brownish, but sometimes it can be more reddish. I have however never seen such light reddish-brown colours as are apparently common in Scandinavian specimens." By this same author an interesting series of figures is given, which show the variation in outline of the leaves, and also of the involucre, as observed by him in the species of the genus, represented in Greenland. The comparative method followed by Porsild is highly to be recommended, and would undoubtedly, if adopted by American authors, prove very successful in reducing the almost untold number of species described recently.

According to Fernald the var. *canescens* replaces in Eastern America the typical green-leaved plant, and such specimens are recorded from Labrador; as stated above this same variety is represented in Colorado, where I found it on James's Peak, Mt. Massive, Mt. Kelso, Long's Peak, headwaters of Clear Creek, etc.; but I have also seen specimens from Wyoming: Teton Mts., from Central Montana: Little Belt Mts., from Oregon: Crater Lake, etc., most of these having been labelled *A. mucronata* E. Nelson. In establishing this species Mr. Nelson[1] compares it with *A. umbrinella* Rydbg.; a comparison, however, with *A. alpina* might have proved these to be identical.

Now with respect to *Antennaria carpathica* (Wahlenb.) R. Br., this also has met the same fate as *A. alpina*. When establishing the species *A. lanata* Greene (l. c. p. 289) states, that in *A. carpathica* "the leaves are green and glabrate above." By Hooker (Flora Bor.

[1]Nelson, Elias: The Wyoming species of Antennaria (Bot. Gaz. March 1899).

Am.) the plant is considered a variety: *lanata* of *A. carpathica*. I am at a loss to understand how Greene could make any such statement, since the European authors, who were familiar with the plant, describe the leaves as follows: Wahlenberg[1] says about the Swedish plant:" β foliis inferioribus lanceolatis, trinervibus subtus (supraque) lanuginosis;" Blytt[2] and Hartman[3] describe the leaves as white- or grayish-woolly on both faces; Koch[4] writes "foliis utrinque lanatis," and Trautvetter[5] describes the variety *Laestadiana;* "foliis utrinque magis minusve albo-tomentosis." Finally Elias Fries (Nov. Fl. Suec. l. c.) demonstrates that *A carpathica* shows exactly the same varia. tion as *A. alpina* with regard to inflorescence and foliage. It may be mentioned at the same time, that *A. carpathica* is not enumerated by Ledebour in his Flora Rossica, but Trautvetter[6], has recorded several stations for it in Russia and Siberia, "Zona artica Rossiae europaeae et Siberiae."

Having examined a number of specimens of *A. lanata* Greene I find it impossible to distinguish them from *A. carpathica,* but they all belong to the var. *lanata* Hook., and this variety occurs, furthermore, in Europe and Asia, as stated above. It is interesting to notice that a monocephalous state is known also in this species according to Gray (l. c. p. 232). Thus these two species, *A. alpina* and *A. carpathica,* are remarkably uniform in their modes of variation. With regard to the var. *pulcherrima* Hook. of the latter, this is a lowland plant, and seems quite different from *A. carpathica* vera; thus it is undoubtedly correct to consider it a distinct species: *A. pulcherrima* Greene.

Having studied the genus in the Arctic regions, in the Rocky Mountains of Colorado, in Maryland and Virginia the writer has reached the conclusion that the genus is very susceptible to the influence of environment; the variation according to latitude resembles that of altitude in the mountains; with respect to the lowland species, specimens growing in the open, in fields, open thickets, etc., are sometimes quite distinct from those which inhabit the woods, as may be seen especially in *A. arnoglossa* Greene, *A. fallax* Greene, *A. alsinoides* Greene and *A. neodioica* Greene.

Clinton, Maryland.

[1] Flora Suecica. Upsala 1826. p. 515.
[2] Norges Flora. Christiania 1874. p. 575.
[3] Skandinaviens Flora. Stockholm 1879. 11th ed. p. 13.
[4] Synopsis Florae Germanicae et Helvetiae. Leipzig 1857. Vol. 1. p. 312.
[5] Flora terrae Tschuk. l. c. p. 24.
[6] Incrementa Florae phaenogamae Rossicae. Vol. 2. Petropolis 1883. p. 412.

A European Primrose in New England.—I had some trouble in believing my eyes when, in May, 1917, I ran across a colony of *Primula officinalis* (the English cowslip) very much at home on a shaded river-bank in Salisbury, Conn. There were forty or fifty plants within a fifty-foot square, perhaps a dozen of them in bloom, the others small and appearing like seedlings from their larger and more vigorous neighbors. The colony was visited again in 1918, and found to be flourishing, having increased somewhat both in number of plants and area covered. Last summer Mr. C. C. Hanmer showed me specimens of the same species collected by him in the township of Greene, Maine, where two or three small patches had been discovered along a rivulet in a meadow by Miss Mutty of Lewiston.

P. officinalis Jacq. (or *P. veris* L., according to one's interpretation of the Linnaean treatment) is a common and wide-spead Eurasian species, sometimes grown in gardens here. It is reported to set seed freely in cultivation. The Salisbury station is near a spot where a steep bank between road and river offers to inhabitants of nearby houses an inviting opportunity to get rid of rubbish. Debris from gardens or earth from flower pots, thrown down here and containing *Primula* seeds may account for its presence.

A search in the literature at hand has failed to disclose any previous record of *Primula officinalis* as spontaneous in the eastern United States. In his *Catalogue of Canadian Plants,* however, Professor John Macoun says of it: "Well established in meadows about a mile inland from North Sydney, Cape Breton; also in meadows at Victoria, Vancouver Island."—C. A. Weatherby, East Hartford, Conn.

Oxalis montana.—In 1918 I pointed out[1] several characters by which the northern Wood Sorrel of eastern America differs from the Old World *O. Acetosella* L. and took up for the American plant the name *O. americana* Bigelow (1824). But unfortunately I overlooked, as others have done, the fact that the American plant had been properly named in 1818 by Rafinesque. In his review of Pursh's *Flora Americae Septentrionalis* Rafinesque said: "*Oxalis acetosella,* P. is in the same predicament [different from the European species],

[1] Fernald, Rhodora, xx. 76–78 (1918).

and is called *O. Montana,* by Raf."[1] In most such publications of Rafinesque's the names proposed are not associable with any statement of differential characters and the proposed names are therefore *nomina nuda* and not to be taken up. In the case of his *Oxalis Acetosella,* however, Pursh clearly stated important characters which differentiate our plant from the European, saying: "Flowers large, white, with red veins and yellow at the bottom; the petals are cuneate, emarginate, and narrower than the European species."[2] The characters of narrower, emarginate petals were the only points of difference indicated by Bigelow who, like Rafinesque, may have taken his cue from Pursh; and it is clear that our plant should be called Oxalis montana Raf. (1818) = *O. americana* Bigelow (1824).

The form with purple petals should be called

O. montana Raf., forma **rhodantha,** n. comb. *O. americana* Bigelow, forma *rhodantha* Fernald, Rhodora, xx. 78 (1918).

M. L. Fernald, Gray Herbarium.

[1] Raf. Am. Mo. Mag. ii. 266 (1818).
[2] Pursh, Fl. Am. Sept. i. 322 (1814).

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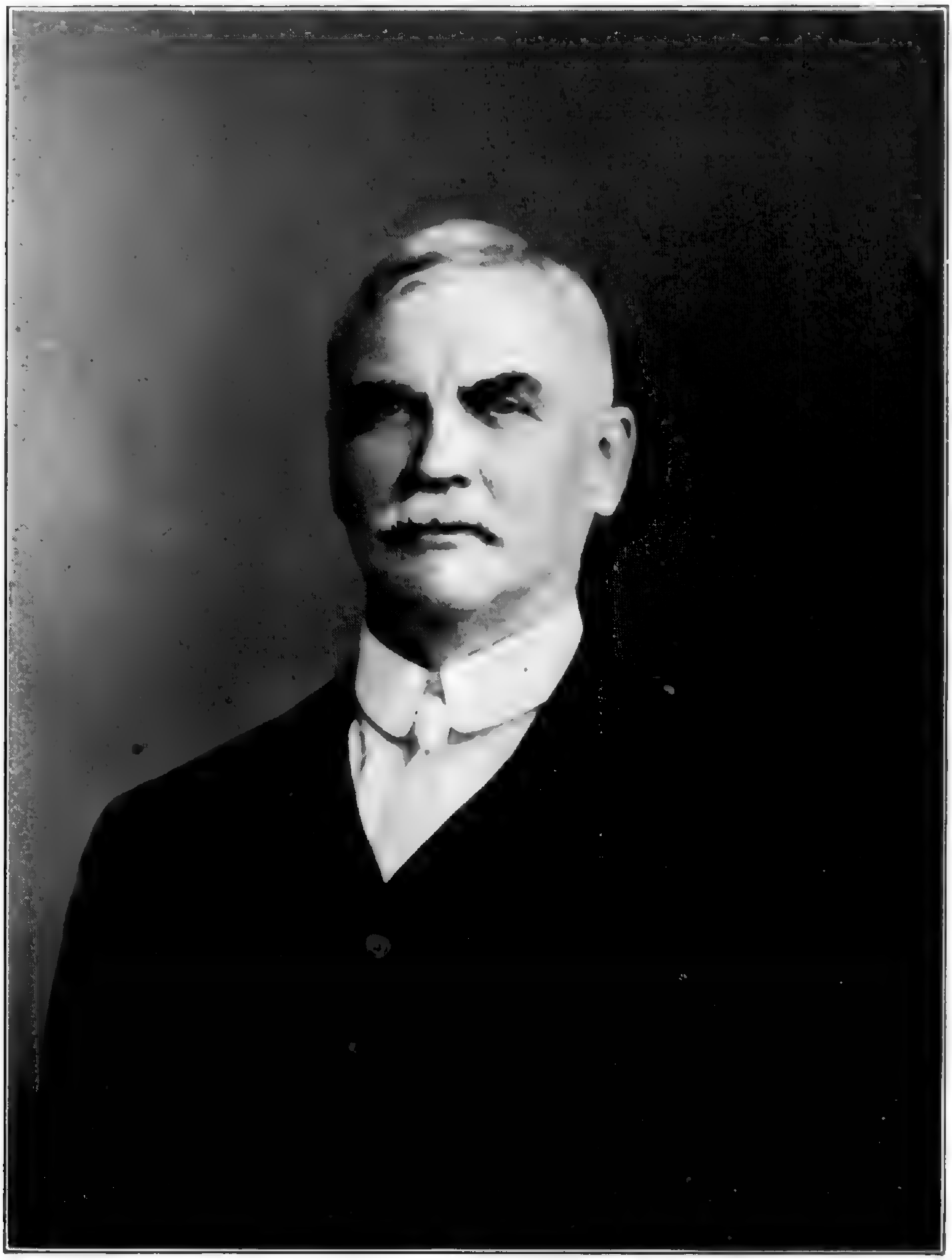

Very truly yours
J. E. McDonald

Rhodora

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FRANCIS EUGENE M'DONALD

Virginius H. Chase.

(With Portrait)

Francis Eugene McDonald was born at Wyanet, Illinois, Feb. 23, 1860. The family moved to Peoria in his childhood and he received his education in that town. After completing his school days, F. E. McDonald took up the study of law under Judge Bigelow. He stood third in a class of twenty-six and was admitted to the bar, January 8, 1883. He had taken the law course because his mother wished it, but controversies and quarrels were so absolutely contrary to his nature that he never could bring himself to practice his profession.

On account of the illness of his father, who was in the railway mail service, he took his place for some months as railway mail clerk between Galva and Quincy, Ill., and in 1884 was given a regular appointment between Rock Island, Ill., and St. Louis, Mo., which he held up to the time of his death.

As a child he greatly admired a little "herbarium" prepared by his mother in her school days, but just how great his admiration for it was she never realized until she thoughtlessly gave it away. Before many years he began to collect and prepare herbarium specimens for himself, and by the time he was married, Sept. 25, 1890, to Miss Ida Trine of Chicago, he had a large local collection. He added to this by exchange with all the best collectors in the country, until at the time he sold it to the University of Illinois, about ten years ago, it numbered over ten thousand specimens.

His numerous correspondents were always delighted with the ample, beautifully prepared specimens. He never sent out a poor specimen or gave one space in his own herbarium. Taking up the study of the local flora just about the time Dr. Brendel was laying it down, he derived much pleasure from finding species overlooked by the Docter, and in watching the introduction of many new weeds. His beautifully prepared book of records is now one of my most treasured possessions. I hope it may be published as a fitting companion to Dr. Brendel's Flora Peoriana and as a real contribution toward a state flora.

Except for a few notes his writing never appeared in print, but his beautiful specimens are in most public herbariums and in many private ones, and have helped many a student in understanding difficult species.

After disposing of his general herbarium he devoted his study almost entirely to mosses, of which he had a large collection from all parts of the world, although especially rich in Illinois material. His interest in plants never faltered. Twice the past summer he visited the Starved Rock region for mosses, and during his last illness he had botanical magazines on his bed to read when he was able. He died of pneumonia at his home in Peoria on Jan. 30, 1920, leaving a wife and son. Truly one of Nature's noblemen, he is now laid to rest in his beloved "Springdale" among whose wooded hills he has gone to welcome the coming of the springtime.

Peoria, Illinois.

ADDITIONAL NOTES ON AMELANCHIER.

K. M. Wiegand

It is now eight years since the writer contributed to this Journal two articles on the Amelanchiers of Eastern North America (Rhodora, xiv. 117, and 239. 1912). During this time a large quantity of material has been received, and much information has been accumulated relating to the species in Eastern America. In the light of this increased knowledge it is now apparent that several forms which gave trouble at that time are really good species. These and others are presented in the following pages.

A. INTERMEDIA Spach, Hist. Veg. ii. 85, (1834).—A tall shrub, rarely a small tree, widely branching near the ground or at first growing in clumps: winter buds dark brown: leaves elliptic-oblong or elliptic-obovate on the shoots; base rounded; apex acute; margin finely but somewhat distantly serrate, the serrations slightly more distant on the shoots; veins irregular; surface moderately tomentose when young, slightly so at maturity on the veins beneath and on the petiole; young leaves often reddish: racemes short (2–4 cm. long), 5–8-flowered, sparingly hairy: lower pedicels 8–14 mm. long: hypanthium cup-shaped, sparingly hairy outside: sepals short (2–3 mm. long), irregularly recurved, hairy on the inner face: petals short (7–8 mm. long), oblong-cuneate: summit of the ovary glabrous or somewhat woolly: fruit dark purple, juicy: fruiting racemes short, subcorymbose: lower pedicels about 15 mm. long: tube of the hypanthium not prominent: sepals irregularly spreading. In boggy soil: western Vermont, central New York and western Pennsylvania to the mountains of North Carolina. VERMONT: Blueberry Hill Bog, Rutland, 1899, *W. W. Eggleston*, no. 1179, 1180 (probably). NEW YORK: Labrador Swamp, Fabius, 1914, *Wiegand*, nos. 2533 to 2538; Green Lake, Preble, 1914, *Wiegand*, nos. 2539 and 2542; Featherbed Bog, Victory, 1916, *Wiegand*, no. 6608; Miller's Bog, Spring Lake, Conquest, 1916, *Wiegand*, no. 6609; Lowery's Pond, Junius, 1914, *Wiegand*, no. 2540 & 2541; Round Marshes, Dryden, 1882, *W. R. Dudley*, also 1913, *Eames & MacDaniels*, nos. 644 & 646, also 1914, *Wiegand*, nos. 2524 to 2532; South Hill Marsh, Ithaca, 1914, *Wiegand*, also *Wiegand & Eames*, nos. 2512 to 2520; Michigan Hollow Swamp, Danby 1913, *Eames & MacDaniels*, no. 645, also 1914, *Eames & Wiegand*, nos. 2521 to 2523. PENNSYLVANIA: Half-moon Swamp, Mercer County, 1906, *O. E. Jennings;* Moosic, 1907, *A. Twining.* NORTH CAROLINA: Macon County, mountain swamp, 1912, *T. G. Harbison*, no. 917, and Highlands, 1918, *Harbison*, no. 9, 1919, *Harbison*, no. 194; Orange County, 1919, *Harbison*, no. 23.

As long ago as in 1886 Dudley (*Cayuga Flora*, p. 34) called attention to this plant, listing it as "*A. canadensis*, Torr. and Gray; (form). (In sphagnum marshes, and agreeing with var. *oligocarpa* in character of the leaf and length of petals, but racemes usually have 4–6 flowers.) Round Marshes. South Hill Marsh." In the first of the above cited papers in RHODORA (p. 135 and 149) the writer again called attention to it, noting its affinity with *A. oblongifolia.* Since that time the plant has continued to give trouble in Central New York, where it is abundantly distinct from any local species; yet in all this time it has not been reported from outside the New York region. Species with a limited range of this sort occur very exceptionally in New York State, and then under special conditions. Consequently the recognition of this plant as a species has been delayed with the hope that more information might give it a natural range. A study of additional material in the Gray Herbarium and the herbarium of the Arnold Arboretum now shows that the plant has a typical Alleghanian range. Ashe has recently cited (Bull. Torr. Bot. Club, xlvi. 222, 1919) what is presumably the same plant as "frequent in bogs near Beltsville, Maryland." One of the specimens cited above from North Carolina is from the Piedmont Region; so the plant probably ranges over this region as well as in the mountains. Very likely it extends also to the mountains of Georgia. There is in the Gray Herbarium a fragmentary flowering specimen supposed to have come from Spach and labelled *A. intermedia.* So far as can be determined, this fragment agrees perfectly with our plant. Since Spach's description also agrees sufficiently well, it has seemed safe to adopt this name for the plant in question. It is probably a part of the *A. canadensis* var. *obovalis* of Sargent's *Silva* (iv. 129, 1892), but not *A. obovalis* of Sargent's *Manual of Trees.* It is also *A. intermedia,* in part, of Britton's publications. Most authors have confused it with *A. oblongifolia* of the Coastal Plain, and also to some extent with *A. canadensis. A. intermedia* is most closely related to *A. oblongifolia.* If it grew on the Coastal Plain it would be mistaken for a hybrid of that species and *A. laevis,* as it seems to combine the characters of these two species. It is more distantly related to *A. canadensis,* which, however, is an entirely different plant. The three species may be contrasted as follows.

	A. intermedia	A. oblongifolia	A. canadensis
Range:	Piedmont and Alleghany Mountains.	Coastal plain.	Piedmont and westward.
Habitat:	Bogs.	Swamps.	Uplands.
Habit:	Alder-like.	Alder-like.	More arborescent.
Leaf:	Oblong, acute, of shoots more *laevis*-like, becoming subglabrate, often reddish when young; teeth fine, more distant.	Oblong, obtuse or acute, not *laevis*-like, becoming subglabrate, not reddish when young; teeth fine, close.	Ovate or obovate, acute or acuminate usually permanently hairy except far south and west, not reddish when young; teeth medium, sharp, broad-based.
Sepals:	Narrowly deltoid, irregularly recurved.	Narrowly deltoid, erect-spreading.	Broadly ovate, abruptly reflexed.
Fruit:	Dark, juicy.	Dark, juicy.	Red-purple, dry or juicy-mealy.

In the summer of 1912 Professor M. L. Fernald collected a quantity of a strange Amelanchier on the Magdalen Islands, and in 1914 in western Newfoundland. The writer is inclined to agree with Fernald that this is an undescribed species of the region about the Gulf of St. Lawrence, a similar plant having been secured by Fernald in Gaspé Co., Quebec. It inhabits lime barrens or strongly calcareous gravelly shores and swamps, and may be described as follows:

A. **Fernaldii**, sp. nov., humilis 3–6 dm. alta diffusa stolonifera subcaespitosa, foliis ad anthesin semiexpansis glabris et viridibus, maturitate submagnis 5–8 cm. longis, late elliptico-oblongis vel subobovatis, basi rotundatis vel subcordatis, apice subacutis, margine e basi ad apicem dentibus mediocribus acute serratis, laminis glabris subtus paullo pallidioribus irregulariter venosis, petiolis tenuibus sparce villosis; racemis multi- vel pauci-floris glabris laxis, pedicellis inferioribus 1.5–3 cm. longis, hypanthio submagno 5 mm. lato campanulato, sepalis 3–4 mm. longis lanceolato-deltoideis irregulariter divaricatis vel recurvatis conspicuis glabris vel intus subtomentosis, petalis liguliformibus 1–1.5 cm. longis, ovario ad apicem tomentoso, fructo atropurpureo succulento, tubo hypanthii paulo evoluto, pedicellis fructiferis saepe 3-4 cm. longis. Western Newfoundland and the Magdalen Islands to the coast of Quebec, and apparently some distance up the St. Lawrence river. NEWFOUNDLAND: limestone tableland of Table Mountain, Port à Port Bay, 1914, *Fernald & St. John*, no. 10840 & 10842. MAGDALEN ISLANDS: Grindstone, 1912, *Fernald, Long & St. John*, no. 7592 (TYPE in Gray Herb.), also nos. 7589 & 7590, also *Fernald, Bartram, Long, & St. John*, no. 7586; between East Cape and East Point, Coffin Island, 1912, *Fernald, Bartram, Long & St. John*, no. 7587. QUEBEC: banks of the Grand River, Gaspé Co., 1904, *Fernald;* Isle aux Coudres, 1917, *Bro. M. Victorin*, no. 4318 (apparently this species).

This plant at first glance suggests a hybrid between *A. laevis* and *A. stolonifera*, but *A. stolonifera* is not a plant of lime barrens, and has not been found in the region from which this plant was collected. Moreover the leaves of our plant are never hairy. It suggests also a combination of *A. Bartramiana* and *A. laevis*, but the leaves are too blunt. The plant wherever found gives the impression of being the same, and seems to form a definite unit, not a fluctuating hybrid. *A. Fernaldii* is not to be confused with *A. sanguinea*, var. *gaspensis* which has coarse teeth, more parallel veins, and a more pronounced hypanthium-tube.

A. **grandiflora**, comb. nov. *A. sanguinea*, forma *grandiflora* Wiegand, RHODORA, xiv. 139 (1912). *A. sanguinea*, var. *grandiflora* Rehder in Standard Cyclop. Hort. i. 272 (1914).—A more extended acquaintance with this plant in central New York has led to the opinion that it is specifically distinct from *A. sanguinea.* The hypanthium is much broader and more shallow (saucer-shaped), the petals are longer, and there are other distinctive characteristics given in the table under the next species. Its range, so far as known at present, is from central and western New York to Ontario. In central New York it inhabits the crests and ledges of shale cliffs bordering the ravines and lake shore. These cliffs are usually more or less calcareous. The plant is probably a calciphile, but this should be verified. New York: Paine's Creek Ravine, Ledyard, 1916, *Wiegand* no. 6589, 6589a, 6592; King's Ferry, Genoa, 1916, *Wiegand,* no. 6590; Portland Point, Lansing, 1916, *MacDaniels & Wiegand,* no. 6591; Esty's Glen, Lansing, 1914, *Wiegand,* no. 2497; McKinney's Glens, Lansing, 1897, *Wiegand,* also 1914, *F. P. Metcalf,* no. 2496; Cayuga Heights Road, Ithaca, 1914, *Wiegand,* no. 2498; Fall Creek Ravine, Ithaca, 1897, *Wiegand* (type of f. *grandiflora,* in Gray Herb.), also 1914, *Wiegand,* no. 2501, also *A. J. Eames* no. 2502 & 2506; Enfield Ravine, 1914, *Eames & MacDaniels,* no. 2508; Elm Beach, Romulus, 1915, *A. J. Eames,* no. 4288; Hemlock Lake, Canadice, 1915, *C. C. Thomas,* no. 4289; along the Genesee River in the Rochester parks, *B. H. Slavin.* Ontario: vicinity of Ottawa, 1898, *J. M. Macoun,* no. 20074; Guelph, 1904, *A. B. Klugh* (probably this); Gravehurst, 1897, *Biltmore Herb.* no. 5664.

A. **huronensis**, sp. nov., frutex vel arbor parva 3–7 m. alta, foliis ad anthesin semiexpansis maturitate magnis oblongo-ovalibus vel suborbicularibus vel late obovatis 4–7 cm. longis, 3.5–5.5 cm. latis, basi rotundatis vel plerumque cordatis, apice rotundatis vel rare subacutis, margine basi ad apicem argute et crasse serrato-dentatis, subtus juventate tomentosis maturitate leviter tomentosis, nervis conspicue pinnatis sed ad apicem irregularibus, petiolis tenuibus, racemis multifloris ad anthesin subdensis subtomentosis, pedicellis inferioribus 15–20 mm. longis, hypanthio subglabro mediocri vel magno 6–8 mm. lato alte patelliformi, petalis mediocribus obovato-linearibus apice latis 12–16 mm. longis, ovario ad apicem tomentoso, fructo atropurpureo succulento, tubo hypanthii in fructo juniore conspicuo, sepalis longis et manifestis, fl. 3–3.5 mm. longis fr. 4–5 mm. longis, pedicellis fructiferis, 20–30 mm. longis.—Sandy soil, Lake Huron, Lake Michigan and Lake Superior. Michigan: Partridge Point near Alpina, 1895, *C. F. Wheeler;* Alpina, 1907, *C. K. Dodge,* no. 56; Sand Point, Huron County, 1908, *Dodge,* no. 74, also 76 (type in Gray Herb.); Stony Island, Saginaw Bay, 1908, *Dodge,* no. 75; lake shore, Keweenaw County, 1916, *Goessl,* no. 38709. Wisconsin: Washington Island, Door County, 1916, *C. Goessl,* no. 39104; Ellison Bay, Door County, 1916, *Goessl,* no. 39000; on limestone, Ozaukee County, 1909, to 1912, *H. V. Ogden,* nos. 12 to 16.

This plant is a close relative of *A. grandiflora* and *A. sanguinea.* From the former it differs in the broad obtuse leaves with more persistent tomentum, more regular veins and slightly shorter petals. From the latter it differs in the more obtuse leaves, much larger hypanthium, longer petals, and more open fruiting inflorescence. The plant grows on sand dunes in Michigan but on limestone rocky banks in other portions of its range. These two soils at first seem contradictory in nature, but the sands of Huron County are underlaid by limestone, and are, judging from other plants in the vicinity, more or less calcareous. *A. huronensis* is probably a calciphile. This species together with *A. humilis* probably forms the basis of the records of *A. florida* Lindl. from the region of the Great Lakes.

	A. HURONENSIS	A. GRANDIFLORA	A. SANGUINEA
Soil:	Calciphile.	Calciphile.	Neutral or acid clay or gravel over sandstones.
Habit:	Not in clumps.	Not in clumps.	In substoloniferous clumps.
Leaves:	Broadly oval, obtuse.	Ovate-oval, subacute.	Ovate-oval, subacute.
Veins:	Parallel.	Irregular, more *laevis*-like.	Parallel.
Tomentum:	Persistent.	Early deciduous.	Persistent.
Racemes:	Loose, lower pedicels long.	Loose, lower pedidels long.	Denser, lower pedicels short.
Lower pedicels:	Fl. 15-20 mm., fr. 20–30 mm., long.	Fl. 27–40 mm., long, fr. the same.	Fl. 7–10 mm., fr. 7–25 mm. long.
Hypanthium	Large, 6–8 mm. broad.	Large, 7–9 mm. broad.	Small, 3.5–6 mm. broad.
Petals:	12–16 mm. long, broad.	16–22 mm. long, medium.	2–14 mm. long, narrow.
Length of sepals:	3–3.5 mm. in fl., 4–5 mm. in fr.	4.5–5 mm. long.	2–3 mm. long.
Fresh anthers:	0.6 mm. long.?	1.0 mm. long.	0.6 mm. long.

Farwell (Rep. Mich. Acad. Sci. xvii. 172, 1916) has attempted to show that the name *Mespilus canadensis* L. should be applied to what the writer has called *A. laevis*. The status of this name was discussed at length in Rhodora (xiv. 121). The writer there held that it is at present impossible to say what Linnaeus meant in the *Species Plantarum*. The description and the reference to Gronovius (as far as Gronovius's critical statement is concerned) refer to different plants. We are first able to place the name definitely in the *Systema*, ed. 12, where it clearly applies to the arborescent hairy-leaved form.

Cornell University, Ithaca, New York.

A TERATOLOGICAL SPECIMEN OF ARALIA HISPIDA

Harold St. John.

In certain genera and species as, for instance, in several species of *Trillium*, monstrosities are of frequent occurrence[1]. On the other hand most plants develop with a remarkable trueness to type and teratological forms are very uncommon. *Aralia hispida* Vent. is one of the latter class. Neither the Gray Herbarium nor the Herbarium of the New England Botanical Club contains any such forms, nor has a prolonged search revealed any published records of the discovery of any such specimens in America.

Consequently, a specimen collected by Miss I.W. Anderson on the side of Rattlesnake Mt., Tyrone, Blair Co., Pa., Aug. 20, 1915, is of decided interest. It is a vigorous plant 8 dm. tall with a normal root-system and abundant normal foliage. Its inflorescence, however, is very far from normal. From a distance, instead of the round-topped umbels with white flowers or dark angular fruits, one sees the umbels, but these are crowned by tufts of green leaves. A closer examination reveals that the ovaries instead of being semi-globose urceolate as in the normal flower, are wrinkled slender clavate affairs scarcely distinguishable from the peduncles. Some of the flowers at first sight appear nearly normal except for their brownish or greenish tone and undeveloped ovaries. If, however, these are dissected, it will be seen that the sepals are in many cases normal, are short triangular lobes; that the petals are brownish and shriveled or developed into green leaves, instead of clear white oblong-lanceolate petals, 2.5 mm. long; that the filaments are dark and shriveled, 1 mm. long, instead of light-colored, 2 mm. long; that the anthers are dark yellowish brown, .75 mm. long, instead of light yellowish, 1.5 mm. long; that the stylopodium is conical, 1 mm. long, instead of 1.5 mm. long.

Many of the flowers, especially the central ones of the umbels, show, instead of this dwarfing and slight malformation, a very abnormal development. One of them has the perianth slightly foliaceous. The stamens are shrunken and abnormal as described above. From the center of the flower, instead of a stylopodium, springs a prolongation of the axis, which 4 mm. above, bears a tuft of green serrate

[1] For a summary of the recorded facts and a bibliography, see Gates, R. R.: Ann. Mo. Bot. Gard. iv. 69 (1917).

normal leaves, each of the lowest being subtended by an abortive stamen. This flower illustrates phyllody of the perianth and median leafy and floral prolification.

Another flower has its perianth green and leaf-like and the stamens similarly abnormal. From the center of the flower the axis is prolonged, bearing 4 mm. above a pair of opposite bracts, then 3 mm. above these a proliferous flower having its perianth foliaceous and bearing on the disc a tuft of green leaves, most of which subtend an abortive stamen.

Still another flower had the perianth enlarged and foliaceous and within it the same type of abortive stamens. From the center of the flower the axis is prolonged and 7 mm. above bears normal involucral bracts subtending 7 rays. These are about 4 mm. long and each bears a flower with a foliaceous perianth subtending abnormal stamens and on the center of the disc a tuft of green leaves. It is probable that dissection of more of the flowers would show still other types of abnormality, but those already described illustrate sufficiently the abnormal infloresence of this monstrosity in *Aralia hispida.* Nowhere does the plant show any sign of an injury that might have been the cause of such an abnormal development.

Gray Herbarium.

A NORTHEASTERN VARIETY OF PANICUM

H. K. Svenson.

For several summers there has been found on the sandy shores of ponds in Plymouth County and Cape Cod, Massachusetts, a *Panicum* which seems to bridge the gap between the sections *Dichotomiflora* and *Capillaria* as these groups are treated in Hitchcock & Chase's "North American Species of Panicum." Although showing undoubted connection with *P. dichotomiflorum* Michx., it has the low, slender habit, diffuse ovoid panicles, and small, long-pedicelled spikelets, that are characteristic of *P. Tuckermanni* Fernald[1] and *P. Gattingeri* Nash. There is furthermore a tendency toward pubescence, although many specimens are glabrous. Transitional forms show distinctly the relation to the typical *P. dichotomiflorum.* Both *P. Tuck-*

[1] Rhodora, XXI, 112 (1919).

ermanni and *P. Gattingeri* have a much denser pubescence, more pointed spikelets, and pubescent nodes. The form under discussion has glabrous nodes. From *P. capillare* it can be distinguished by the glabrous pulvini.[1]

Fig. 1. P. dichot. v. puritanorum × 0.3

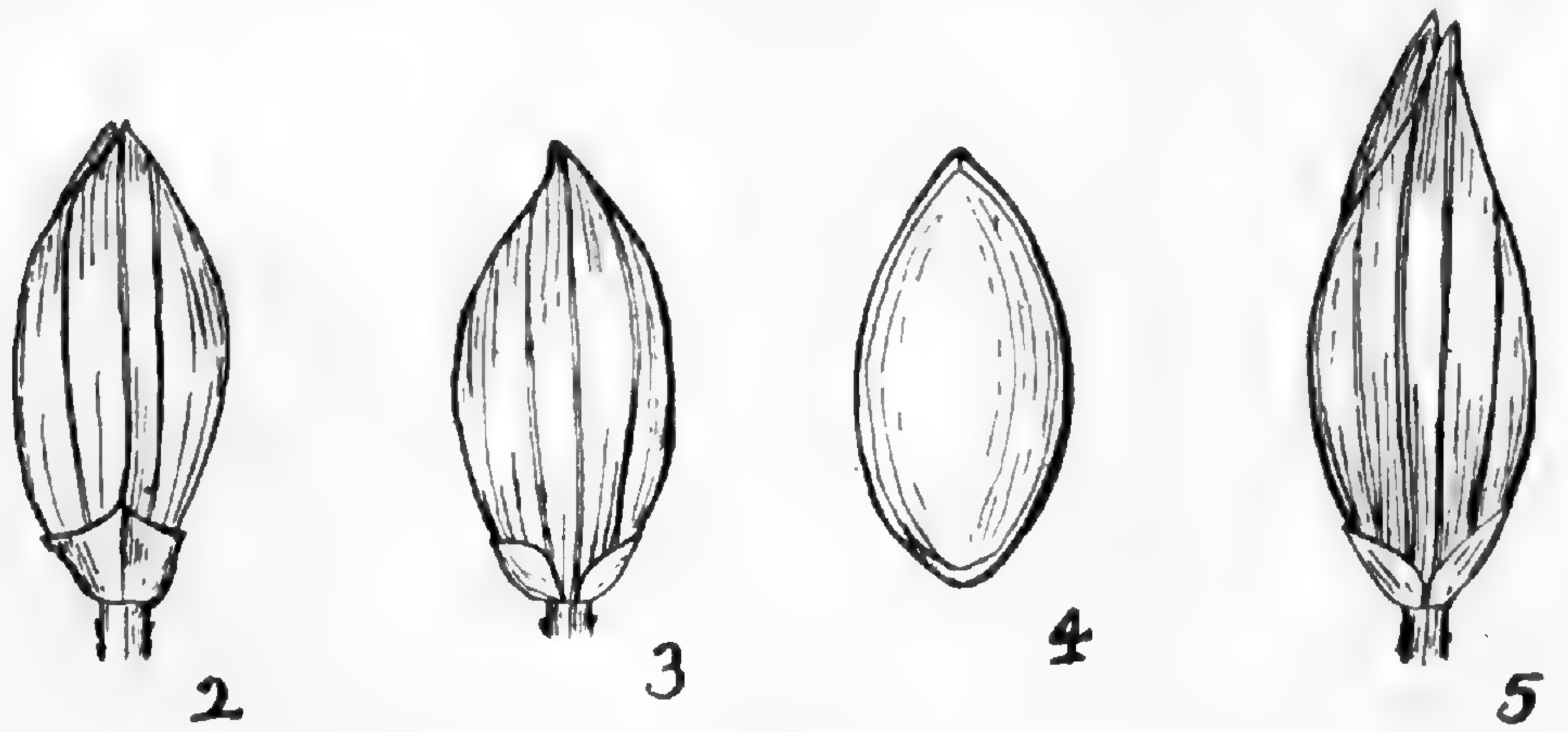
So far as is known this plant occurs only on the sandy pond-shores of southeastern Massachusetts. It is distinguished from the typical *P. dichotomiflorum* by low habit, and scattered inflorescence of small, *blunt* spikelets with long pedicels. Most characteristic are the second glume and sterile lemma which are somewhat membranaceous, and have a tendency to spread and wither at maturity, exposing the fruit. This plant is worthy of varietal separation as:

Panicum dichotomiflorum Michx., var. **puritanorum**, n. var., annuum, culmis plerumque erectis rare decumbentibus vel solitariis vel numerosis furcatisque, 0.5–6 dm. longis ubique foliosis; vaginibus glabris vel pilosis, laminis 2–40 cm. longis, 0.1–8 mm. latis longe acuminatis laxe adscendentibus glabris vel hispidis; paniculis numerosis vel solitariis, primariis breviter exsertis, late ovoideis, 3–25 cm. longis; ramis primum adscendentibus deinde divergentibus vel rare reflexis, pulvinis glabris; spiculis ovoideis, longe pedicellatis, 1.8–2.2 mm. longis, 0.8–1.1 mm. latis obtusis vel acutiusculis, gluma prima deltoideo-orbiculare spiculo quater vel quinquiens breviore; gluma altera et lemmate sterili 5–7-nervatis, submembranaceis caryopsin vix superantibus plerumque flaccidis vel ad maturitatem marcescentibus et caryopsin denudantibus.

Culms usually erect, solitary or numerous, simple or branching from base and nodes, 0.5–6 dm. long, leafy throughout: sheaths glabrous or pilose, blades 2–40 cm. long, 0.1–8 mm. broad, long-acuminate,

[1] For elucidation of this character see Rhodora, l. c. III.

loosely ascending, glabrous or hispid: panicles solitary or many, short-exserted, broadly ovoid, 3–25 cm. long; branches at first ascending, later divergent, rarely reflexed: pulvini glabrous; spikelets long-pedicelled, ovoid, 1.8–2.2 mm. long, 0.8–1.1 mm. broad, blunt or somewhat pointed: first glume deltoid-orbicular, one-fifth to one-fourth the



Figs. 2–4. P. dichot. v. puritanorum. Spikelets × 15.
Fig. 5. P. dichot. typical. Spikelet × 15.

length of the spikelet; second glume and sterile lemma equal, 5–7-nerved, slightly exceeding the fruit, submembranaceous, usually withering and exposing the fruit at maturity.—Plymouth and Barnstable counties, Massachusetts. The following specimens are characteristic: Massachusetts: Plymouth, *Oakes* (in Gray Herb.); damp sandy beach, Boot Pond, Plymouth, Sept. 6, 1913, *Fernald et al.*; damp sandy beach, Great South Pond, Plymouth, Sept. 6, 1913, *Fernald;* gravelly and sandy beach, Little Sandy Pond, Plymouth, Aug. 7, 1918, *Fernald & Clark;* sandy shore, Bang's Pond, Harwich, Sept. 16, 1916, *Clark & Hunnewell;* dry sandy and gravelly beach, Half-way Pond, Barnstable, Sept. 13, 1919, *Fernald* (type in Gray Herb.); sandy beach, Crooked Pond, Falmouth, Aug. 23, 1919, *Fernald & Long;* sandy beach, Long Pond, Falmouth, Oct. 4, 1919, *Fernald.*

Occasional specimens, with small pointed spikelets, which are clearly transitional forms, are found in eastern Massachusetts and at one or two stations in the Connecticut Valley.

Harvard University.

Gaultheria procumbens, L., forma **suborbiculata**, n. f. foliis suborbiculatis vel late ovatis vel late obovatis basi apiceque rotundatis plerumque 2.5–4 cm. latis.

Leaves suborbicular, broad-ovate or broad-obovate, rounded to base and apex, mostly 2.5–4 cm. broad.—Massachusetts: damp thicket and border of woods, Harwichport, Harwich, May 11, 1919, *Fernald*, no. 18,921 (TYPE in Gray Herb.), July 18, 1919, *Fernald & Long*, no. 18,922.

A striking extreme of *Gaultheria procumbens* in its large rounded leaves. The form occupies an area of several square rods where it is uniform but at the upper margin of the area abruptly gives way to the ordinary form of the species with narrower more elliptic leaves narrowed to base and apex.—M. L. FERNALD, Gray Herbarium.

MARSILEA QUADRIFOLA IN MAINE.—In September 1919 I found a quantity of *Marsilea quadrifolia* on the surface of the little pond in our public park in Skowhegan. This pond has been artificially shaped and enlarged, but is kept filled by natural springs. It has been planted with water-lilies, but no new planting has been done for three years. As I am a constant visitor to the Park and to the shore of the pond, this unusual little plant could not have escaped me if any of it had been there the year before. Yet when first observed it had already covered so much of the pond as to raise the question whether it would not choke out our water-lilies if not summarily dealt with. This spring, as the water is lowering, the Marsilea has already appeared on the surface in company with the lily pads.

Prof. M. L. Fernald informs me that he knows of only one previous record of Marsilea from Maine,—at Maranocook, where it was found in 1896[1]—LOUISE H. COBURN, Skowhegan, Me.

LACTUCA HIRSUTA Muhl., forma **calvifolia**, n. f., foliis subtus glabris.

Leaves glabrous beneath.—MAINE: slightly open places in dry sandy pine woods, frequent, Norway, August 1, 1919, *Eames & Godfrey*, no. 9657 (TYPE in Gray Herb.). MASSACHUSETTS: Falmouth, July 13, 1911, *Williams*. CONNECTICUT: Waterbury, August 27, 1912, *Blewitt*, no. 1428; Canton, August 14, 1901, *Driggs*.

Typical *Lactuca hirsuta*, as the name implies, has the midrib of the leaves (particularly the lower ones) hirsute beneath. The plants here set off are strictly glabrous and the Eames & Godfrey plant has the leaves extremely thin and membranous.—M. L. FERNALD, Gray Herbarium.

[1] H. Metcalf, RHODORA, iii. 237, (1901).

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SCIENTIFIC NAMES APPLICABLE TO OUR PURPLE-FLOWERED EUPATORIUMS

Kenneth K. Mackenzie

In a very interesting article in a recent number of Rhodora (**22**: 57) Prof. K. M. Wiegand deals at length with "Eupatorium purpureum and its Allies." His conclusion that there are four distinct and well-marked species in this group will, I believe, find ready acceptance among those who have devoted field study to it. In the vicinity of New York we are well acquainted with three of the species, carefully described in the various editions of Wood's Botany; and from herbarium material had judged there was an additional species of northern range not known in our immediate neighborhood.

But when it comes to applying names occurring in botanical literature to the various species recognized, one does not find himself at all in agreement with the application of names made by Prof. Wiegand. As the plants dealt with are very conspicuous and abundant members of our flora, it seems worth while to go into the questions involved at some length and to consider in detail the evidence available as to the identity of some of the species proposed by the earlier botanists.

In order to lead to a clear discussion of the problems involved let us give the four species numbers in the same way as done by Prof. Wiegand and give to each its distinguishing characters taken from his paper.

1. Leaves ovate to ovate-lanceolate, abruptly contracted into the petiole, more or less 3-nerved; plant somewhat viscid, scabrous-puberulent, with a strong odor when fresh: stems finely purple-specked, not glaucous: inflorescence convex: leaves in 3's or 4's, very rarely in 2's or 5's: florets 6–9, rarely 5–12. Along the Coastal Plain from eastern Massachusetts and southern New Hampshire to South Carolina. A plant of wet soil.

2. Leaves elliptic-ovate or elliptic-lanceolate or ovate-oval, tapering at the base, 3-nerved or pinnately veined; plant not viscid and not odorous; stem speckled or sometimes deep purple all over, not glaucous: inflorescence or its divisions flat-topped; leaves in 4's or 5's, rarely in 3's or 6's: florets 9–15, rarely 8–20, scarcely exserted. Newfoundland through Northern New England to western Connecticut and central Pennsylvania, westward to Illinois and Colorado, New Mexico and British Columbia. A plant of wet soil.

3. Leaves elliptic-lanceolate, tapering at the base, pinnately veined; plant not viscid and not odorous; stems rarely speckled, fistulose, purple, plainly glaucous; inflorescence convex; leaves in 4's to 6's, rarely in 7's, bluntly toothed; florets 5–7, rarely 3–8, scarcely exserted; corollas 3.5–4.8 mm. long, very rarely longer. Southern Maine and Rhode Island to Florida, Texas and Oklahoma; also in western Pennsylvania and Ohio. A plant of damp woods and pastures on the Atlantic Coast and Uplands.

4. Leaves lanceolate, ovate-oval or ovate, tapering at the base, pinnately veined; plant not viscid and not odorous; stems rarely speckled, solid, green with purple nodes, faintly glaucous; inflorescence convex; leaves in 3's or 4's, very rarely in 2's or 5's, sharply toothed; florets 5–7, rarely 3–8, much exserted; corollas 5.5–7.5 mm. long; heads paler than in the other species. Eastern Massachusetts and southern New Hampshire westward to Wisconsin and southward to Pennsylvania, Kentucky, Oklahoma and Nebraska; also in the mountains from Virginia to Georgia. A plant of rich upland woods, rarely found near the coast.

Eupatorium purpureum L.

Let us first take up the problem of the identity of *Eupatorium purpureum* L. itself. The original Linnaean description (Sp. Pl. 838) is as follows:

"EUPATORIUM foliis subverticillatis lanceolato-ovatis serratis petiolatis rugosis.

"Eupatorium foliis verticillatis. *Cold. noveb.* 180.

"Eupatorium foliis ovato-lanceolatis obtuse serratis in petiolos desinentibus. *Gron. virg.* 93.

"Eupatorium enulae folio. *Corn. canad.* 72. *t.* 72

"Eupatorium canadense elatius, longioribus foliis rugosis integris & caulibus ferrugineis. *Moris. hist.* 3. *p.* 97. *s.* 7. *t.* 13. *f.* 4.

"β. Eupatorium foliis lanceolato-ovatis serratis petiolatis, caule erecto. *Hort. cliff.* 396. *Roy. lugdb.* 155.

"Eupatorium novae angliae, urticae foliis. floribus purpurascentibus, caule maculato. *Herm. par.* 158. *t.* 158. *Moris. hist.* 3. *p.* 97. *s.* 7. *t.* 18. *f.* 3. *Raj. suppl.* 187.

"*Habitat in* America *septentrionali.* ♃

"Caulis *teres, erectus, viridis, punctis linearibus longitudinalibus purpurascentibus.* Folia *terna, quaterna, s. sena, lato-lanceolata s. lanceolato-ovata, serrata, rugosa, scabriuscula, petiolata, utrinque viridia.* Corymbus *terminalis.* Calyces *florum incarnati.* Flosculi *octo, Corollis albidis, Antheris purpureis, stylis longissimis.*"

Before taking up the diagnosis of Linnaeus let us consider in their order the citations from the older works given by him.

1. Colden's description (not seen by Prof. Wiegand) calls for a very tall plant with leaves in sixes, sometimes in fours or fives, growing "in humidis" and having light purple corollas. I would identify this with Species No. 3.

2. Clayton's plant is described by Gronovius as having ovate-lanceolate leaves obtusely serrate tapering into the petiole. This is identified by Prof. Wiegand as Species No. 3, and in this identification I agree.

3. Cornut's description and plate is next cited by Linnaeus. The plate represents the complete plant and shows rather wide strongly serrate leaves in fours. It presumably came from Canada like the rest of Cornut's plants. Prof. Wiegand identifies this plant with No. 3 because in the description Cornut says "caules rubescentes (cineres tamen colore suffusi) * * inanes intus," although, as he states, Species No. 3 is not known in Canada.

The plate is most certainly not one of Species No. 3, and I can see nothing in the words quoted from Cornut not applicable to the common Canadian plant No. 2. I would therefore identify this plant as Species No. 2.

4. The next citation by Linnaeus is from Morrison. As stated by Prof. Wiegand his plate seems to have been copied from Cornut and

his description is copied from Cornut. His plant is therefore also identified by me as Species No. 2.

5. Coming next to the first plant referred to under β. we find a plant from New England with serrate lanceolate-ovate leaves called for. This specimen is in the British Museum and a photograph has been identified by Prof. Wiegand as Species No. 1. This identification would seem to me to be correct.

6. Hermann's plate next cited by Linnaeus is likewise identified by Prof. Wiegand as Species No. 1. The description certainly strongly points towards Species No. 1, and the plate also seems to me undoubtedly to belong to that plant.

7. Morrison's figure is to me much more doubtful, but I would agree with Prof. Wiegand that it also probably belongs to Species No. 1.

8. The citation from Ray is also here referred by Prof. Wiegand because of the number of leaves shaped like a nettle and the spotted stem. In this reference to Species No. 1 I would also agree.

So summarizing the references given by Linnaeus, we find the first two refer to Species No. 3, the second two refer to Species No. 2, and all under β refer to Species No. 1. If we were left here we would have a rather bad problem to solve, as to the proper application of the name of Linnaeus; but fortunately Linnaeus supplied a description of his own and from it we can be sure that he had an actual specimen before him. The more one reads this description the more one feels sure that it is based almost entirely on Species No. 1. Surely the phrases "caules * * * punctis linearibus longitudinalibus purpurascentibus. Folia terna, quaterna * * lato-lanceolata s. lanceolato-ovata, serrata, scabriuscula. Calyces florum incarnati Flosculi octo," can only refer to this plant. The only part of the description not applicable is the one word that the leaves are sometimes in sixes. It can be surmised however that Linnaeus inserted this phrase from Colden in the desire to make his description complete and not being aware that he had more than one plant to deal with. It would seem that Linnaeus had the Hortus Cliffortianus plant before him when he drew his description as surmised by Prof. Wiegand. I must confess that with this description before us, and about the applicability of which to Species No. 1 Prof. Wiegand has no more doubt than have I, it is not possible for me to follow Prof. Wiegand in applying the name *Eupatorium purpureum* to Species No. 3.

He is led to do this because in the second edition of the Species Plantarum (p. 1173) Linnaeus gave a partially new description of *Eupatorium purpureum,* the changes self-evidently being based on a specimen of Species No. 4. It is to be noted that certain phrases quoted by Prof. Wiegand from the description in the second edition as being particularly applicable to Species No. 3, are in truth copied from the description in the first edition and are based on Species No. 1.

But to me it seems absolutely immaterial what Linnaeus did after he published his species. It seems to me that we can identify the plant which he had before him and on which his own description was based. This being the case we are not justified in disregarding his description and resorting to the works of the earlier botanists to determine the application of his name, merely because in a later work he confused the first plant studied by him with another. As I see it the type, as we now call it, of *Eupatorium purpureum* was the plant from which he drew his own description, quite probably the Hortus Cliffortianus plant; and it is this plant to which the name should be applied. This plant is the Species No. 1 of this paper, and is the plant commonly identified in botanical manuals as *Eupatorium maculatum.* It is illustrated as such in Addisonia (pl. 132).

Eupatorium maculatum L.

Let us next consider the above species. The original description (Amoen. Acad. **4**: 288. 1755) is as follows:

"76. EUPATORIUM (*maculatum*) foliis quinis tomentosis lanceolatis aequaliter serratis petiolatis venosis.

"Eupatorium foliis lanceolato-ovatis serratis petiolatis, caule erecto. *Hort. cliff.* 396.

"Eupatorium novae angliae, urticae foliis, floribus purpurascentibus, caule maculato. *Herm. parad.* 158. *t.* 158. *Moris. hist.* 3. *p.* 97. *s.* 7. *t.* 18. *f.* 3. *Raj. suppl.* 187.

"*Habitat in* America *septentrionali.* ♃

"*Descr. Folia* quinque vel sex ad genicula, lanceolata, aequaliter serrata. *Caulis* tenuissime maculatus. Varietas *Eupatorii purpurei* ad hoc, ut & ejus synonyma & descriptio spectant. Eupatorium enim *purpureum* foliis quaternis, lanceolato-ovatis, inaequaliter serratis, rugosis est."

The above is certainly a very sad mixture. Linnaeus is evidently attempting to remove from *Eupatorium purpureum* the plant with equally serrate, veiny, lanceolate leaves occuring in 5's or 6's at the nodes; as contrasted with this he describes *Eupatorium purpureum* as having lanceolate-ovate leaves in 4's and says the leaves are unequally serrate and rugose. Unfortunately he transferred the wrong citations. The first two of those kept by him under *Eupatorium purpureum* answer his description of *E. maculatum*, while none of the citations transferred by him to *E. maculatum* answer his description of that species, but all answer his description of *Eupatorium purpureum*. These citations have already been discussed at length above, and it is undoubtedly on the basis of the disposal by Linnaeus of these citations that the name *Eupatorium maculatum* has come into use for Species No. 1 of this paper.

It would therefore seem plain that in making this transfer Linnaeus got things mixed. Certain it is that his description of *Eupatorium maculatum* more nearly accords with the descriptions of previous authors left by him under *Eupatorium purpureum* than it does with the descriptions from previous authors cited by him under *Eupatorium maculatum*. Under these circumstances, I would follow Prof. Wiegand and be governed by the description of Linnaeus rather than his citations.

But this being done we have to solve the even more troublesome problem of what Linnaeus was describing. Prof. Wiegand applies his description to Species No. 2, based on a photograph of a specimen collected by Kalm from the herbarium of Linnaeus. He says this "shows six leaves in the whorls (though unusual even for this species) and in every way answers the description of *E. maculatum* given by Linnaeus."

It seems very doubtful to me whether Linnaeus was describing this plant at all. It seems to me that what he was attempting to do was to eliminate from *Eupatorium purpureum* everything which had more than four leaves in a whorl and which were equally serrate. At least this is what he says. I find nothing in his description which would lead one to believe that it is based on some particular specimen. The description is too general for that.

The plant which his description answers the best is Species No. 3 —a plant which always has lanceolate leaves equally serrate in 5's or 6's and also has stems very slenderly spotted. Therefore I am applying the name to Species No. 3—the plant so well described by Barratt under the name *Eupatorium fistulosum*.

EUPATORIUM TRIFOLIATUM L.

The first species of this group described if page priority is taken into consideration is the above species. The description (Sp. Pl. 837) reads as follows:

"9. EUPATORIUM foliis ternis.

"Eupatorium caule erecto, foliis ovato-lanceolatis serratis petiolatis ternatis. *Gron. virg.* 178.

"Eupatorium cannabinum, foliis in caule ad genicula ternis, marilandicum. *Raj. suppl.* 189.

"*Habitat in* Virginia."

Nothing of value is to be found in the description of Ray, but the description of Gronovius deserves full quotation. It is as follows:

"*EUPATORIUM caule erecto: foliis ovato-lanceolatis, serratis, petiolatis, ternatis.*

"Eupatorium floribus albis, in panicula laxa terminatrice dispositis: foliis ovato-lanceolatis, petiolatis, ad genicula semper ternis, per intervalla haud semipedalia a se invicem distantibus: caule singulari non ramoso. In solo pingui & umbrosis locis inter Verbesinas et Serratulas initio Augusti floret. *Clayt. n.* 620."

Prof. Wiegand identifies the above rather doubtfully with Species No. 3, basing his identification on a photograph of Clayton's 620 from the British Museum. He says "the leaves are lanceolate, bluntly and finely toothed; and so far as can be made out from the print, the stem is purple and glaucous and not darker at the nodes. The stem is also cracked in one place in a manner more likely to occur if it were hollow. Also, as has already been stated, No. 3 is more likely to have been found by Clayton than No. 4. However, no species normally has leaves of this form in 3's. The specimen seems abnormal, but is more reasonably placed in No. 3."

It seems to me that this identification is unfortunate and that in making it the description from Gronovius has not been given due consideration. When it is considered that Species No. 3 is the largest of all our purple-flowered Eupatoriums and is characterized by its narrow leaves in 5's or 6's and that it rarely has leaves in 3's and then only near the flowers—never in my experience in the main whorls—one can well understand the dislike I feel to applying the name *Eupatorium trifoliatum* to this plant. But this does not seem to me to be the proper course. As far as I can see the name applies to Species No. 4 or possibly a closely allied species. In support of this view the following points are to be noted.

(1) The leaves are said to be "semper ternis"; this phrase well applies to specimens of Species No. 4, but it is not applicable to Species No. 3 at all.

(2) The leaves are further described as ovate-lanceolate and serrate, words thoroughly applicable to Species No. 4, and to be contrasted with the description of Clayton's No. 162 by Gronovius "foliis ovato-lanceolatis obtuse serratis, in petiolos desinentibus" (Gron. Virg. 93). It is of course to be remembered that this plant last referred to has been identified both by Prof. Wiegand and myself as Species No. 3. and it is cited by Linnaeus under *Eupatorium purpureum*. I would think it more probable that Clayton and Gronovius had two different species in mind rather than that the two descriptions referred to the same plant.

(3) The flowers are described as white. Prof. Wiegand himself states that the flowers of No. 4 are lighter in color than the flowers of the other species. They are in fact often very light colored indeed as I am acquainted with the plant.

(4) In the Torrey herbarium there are certain excellent specimens from the southern mountains. These are complete specimens of a slender plant with all the leaves in 3's and the floweers very light colored. They to my mind exactly answer the description from Gronovius, and I think the name *Eupatorium trifoliatum* should apply to them. I am not sure that they are quite the same as Species No. 4, but they are certainly very close to it.

(5) Clayton's plant grows "in solo pingui and umbrosis locis"—words quite applicable to the habitat given by Prof. Wiegand for Species No. 4 "a plant of rich upland woods;" but scarcely applicable to the habitat given by him for Species No 3 "a plant of damp woods and pastures."

It seems to me that Prof. Wiegand lays too much stress on the photograph of what is said to be a specimen of Clayton's 620 in the British Museum. One cannot say that it agrees with the description given in Gronovius, which seems to have been taken from living plants. It is noticeable, however, that the description given by Prof. Wiegand of the plant shown in this photograph does agree with the description under Clayton's 162 referred to above, and the query naturally arises whether the specimen photographed did not get mixed up by some one and whether it does not really represent Clayton's 162 instead of his 620. In this connection it is to be noted that Prof. Wiegand does not seem to have been able to discover material of Clayton's 162.

In any event, as has often been pointed out (S. F. Blake, Rhodora **20**: 21), one is not justified in laying stress on a specimen preserved in an old herbarium and taking it as the type of a species, unless it agrees with the diagnosis of the species given by the author. In the present case as the specimen preserved does not accord with the description I think it should not govern and as the description does exactly answer a plant now known from Virginia I think it should be applied to it.

In conclusion then I would use the following names:

(1) Species No. 1. *Eupatorium purpureum* L.
(2) Species No. 2. *Eupatorium Bruneri* A. Gray (probably)
(3) Species No. 3. *Eupatorium maculatum* L.
(4) Species No. 4. *Eupatorium trifoliatum* L. (provisionally)

New York City.

LIGHT CORRELATED VARIATIONS OF THE STERILE STEM OF EQUISETUM SYLVATICUM.

N. M. Grier, Ph. D.

A fairly abundant growth of *Equisetum sylvaticum* L. was observed at Bellevue, Pennsylvania. One section of the growth was constantly well shaded, while the other had the benefit of sunlight throughout the day. In corroboration of the differences appearing at first sight between the plants of these two sections, one hundred plants from each were collected and the following tabulations made.

Number of estimated Whorls per Plant

Classes	7	8	9	10	11	12	13	14	15
Sun			5	4	14	25	23	15	12
Shade	1	2	3	8	18	23	28	13	4

A conclusion derived from the above is that plants of this species growing in the sun have on the average a larger number of whorls than those growing in the shade; 11–13 whorls to the stem being commonest under the conditions.

Next, it was attempted to determine the relative number of lateral branches on the verticils of the plants from these sources. For this purpose, there was chosen the verticil next to the lowest one on the stem, as probably having had the fullest protected growth.

Number of Branches in next to lowest Verticil

Classes	7	8	9	10	11	12	13	14
Sun		7	7	18	14	24	22	8
Shade	1	10	20	24	24	10	6	5

The inference which may be taken from this table is that plants growing in the sun have more leaves on this particular whorl, and on probably all the others also. The mode in this case is also from 11–13. Whether coincidences like the latter could be made a diagnostic feature of the plant could be more certainly determined from a larger number of specimens than was available to the writer. Of course maturity may play a part, since these specimens were collected the last week of June. Gray's New Manual (p. 52) gives 8–14 ridges as being characteristic for the plant. The whorls in shade specimens, while possessing a smaller number of leaves were usually spread over a greater space than those fully exposed to the sun. In efforts to adjust to the light relation, many specimens lost their characteristic storied or conical shape and assumed a one-sided form a great deal like that of an ostrich plume. This was entirely due to the bending upwards of the leaves on the less illuminated side of the whorls.

While sun specimens were observed to be uniformly longer than those growing in the shade, a convenient indicative measure of this was the comparative number of defoliated nodes in each group as counted from the lowest verticil to the rootstock.

Number of Nodes from Lowest Verticil to Rootstock

Classes	1	2	3	4	5	6	7	8
Sun		9	5	5	22	32	14	13
Shade	1	8	22	22	23	19	5	

From the last table it appears that stems growing in the light are longer, or at least have their whorls of leaves growing higher on the stem than those growing in the shade.

WASHINGTON AND JEFFERSON COLLEGE, Washington, Pennsylvania.

A NEW STATION FOR GAYLUSSACIA BRACHYCERA.—Until recently there have been but two known stations of the box huckleberry, one near New Bloomfield, Perry County, Pennsylvania, of about eight acres in extent, and the other at Indian River, Sussex County, Delaware, which covers an area of roughly ten feet square.

To these stations may now be added a third, discovered by me on July 18, 1920, near Losh's Run, Perry County, Pennsylvania. Specimens compared at the herbaria of Harvard University and of the New York Botanical Garden with herbarium sheets from the two stations already known show without doubt the identity of the plant.

So far as observed this stand was fruiting freely in open portions, whereas in the shade little fruit was seen.

On August 22nd I again visited the colony, accompanied by Dr. John K. Small and Dr. Edgar T. Wherry. We found the plant growing over a larger area than I had at first supposed. It covers the northern slope of a mountain ridge for at least a mile, the width of the colony averaging about two hundred feet. At some points it reaches the top of the ridge. Its boundaries seem to be clearly defined, on the west by the river, on the north by a mountain stream, on the east and south by cultivated fields and streams. The theory that the whole patch has spread by the root from a single plant seems to be substantiated, as at no point has the plant been found on the opposite side of the stream. This colony differs slightly from the one at New Bloomfield, the leaves of the new colony being narrower and the berries more nearly round.

On November 5, I explored the neighboring ridges and found three additional colonies of the *Gaylussacia,* covering a large area. The growth is confined to the northern slopes, the ridges running east and west; I failed to find a single plant on the southern slopes The growth is very dense, forming a perfect mat where the conditions are favorable. At only one place was there any indication of the plant having crossed a stream, and this may prove to be a separate colony.

That the box huckleberry is of interest to others besides botanists is shown by the numerous attempts on the part of nurserymen and others to transplant or grow the plant from seed, because of its brilliant evergreen foliage. These attempts for the most part have met with failure.—H. A. WARD, Sec. of Harrisburg Natural History Society, Harrisburg, Pennsylvania.

RUBUS RECURVICAULIS Blanchard, var. **armatus** n. var., pedicellis setosis, setis acicularibus.

Pedicels with bristly setae.—Newfoundland, Miquelon and Cape Breton. NEWFOUNDLAND: sandy and gravelly banks, with the typical form, Whitbourne, August 8, 1911, *Fernald & Wiegand*, no. 5711 (TYPE in Gray Herb.): sandy and gravelly shores, Whitbourne, no. 5710 (in part); gravelly brookside, Brigus Junction, August 5, 1911, *Fernald & Wiegand*, no. 5709. MIQUELON: dry soil, Colline du Chapeau, Aug. 21, 1882, *Delamare*. CAPE BRETON: bog at Grand Lake, Sydney, July 31, 1904, *J. R. Churchill*.

In its bristly inflorescence strongly simulating *R. tardatus* Blanchard, which occurs from Prince Edward Island and Nova Scotia to Cape Cod, but with the leaflets broader and rounded at base as in typical *R. recurvicaulis*, which occurs with var. *armatus* and to which it intergrades: with prickles on the canes sparse as in *R. recurvicaulis*, not crowded as in *R. tardatus*; and with the pedicels glandless as in *R. recurvicaulis*, not glandular as in *R. tardatus*.

M. L. FERNALD, Gray Herbarium.

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STUDIES OF SOME BOREAL AMERICAN CERASTIUMS OF THE SECTION ORTHODON.

M. L. Fernald and K. M. Wiegand.

In attempting to make out the exact identities of our Newfoundland and Labrador collections of *Cerastium* we have found it necessary to study closely the perennial species of northern range and in so doing have drawn up a key to the boreal American species of the section *Orthodon*, the plants which have passed in America under the composite species, *C. alpinum* L., *C. vulgatum* L. and *C. arvense* L.

Our conclusions from the study of *C. alpinum*, *C. vulgatum*, and their allies are somewhat unlike those in other recent American publications and they are here recorded as the best we are able to reach with our present understanding of the group. In this work we have had the advantage of studying, besides the material of the Gray Herbarium and of the New England Botanical Club, the collections of the Geological Survey of Canada kindly loaned us by the late J. M. Macoun and those of the Philadelphia Academy of Sciences placed at our disposal by Mr. Bayard Long.

Key to Boreal American Species of Section Orthodon.

a. Bracts herbaceous or only the uppermost slightly scarious-margined *b*.

b. Seeds small, 0.6–1(rarely –1.3) mm. in diameter *c*.

c. Pubescence, at least of the basal tufts, long and more or less entangled especially at the tips of the leaves, or even lanate; plant obviously glandular above or with glands obscured by the tomentum: cyme not conspicuously dichotomous; pedicels usually long and ascending: sepals large, in anthesis 5.5–9, in fruit 6–10 mm. long: capsule 9.5–20 mm. long: seeds 1–1.3 mm. in diameter . . . . 1. *C. alpinum.*

c. Pubescence short, pilose to hirsute, often scanty; plant usually glandular at least above: cyme (when well developed) rather conspicuously dichotomous (as in *C. vulgatum*): sepals in anthesis 3.5–7.5, in fruit 4.2–9 mm. long: capsule 5–12 mm. long: seeds 0.6–1 mm. in diameter.

Petals 6–8(–9) mm. long: leaves (not the bracts) linear- to elliptic-oblong, mostly obtuse . . . . 2. *C. Beeringianum.*

Petals 9–12 mm. long: leaves broadest near the base, lanceolate to lance-oblong or lance-linear, or even narrowly ovate, acutish . . . . 3. *C. Fischerianum.*

b. Seeds large, 1.3–3 mm. in diameter *d.*

d. Plants low, 0.2–1.8 dm. high, glandular-pubescent at least above or very rarely only short-hirsute: median leaves 0.5–2 cm. long, 1–4(rarely –8) mm. broad, linear-oblong, rarely oval or the bracteal ovate: flowers 1–7: pedicels ascending or slightly spreading: mature capsule 8.5–13 mm. long *e.*

e. Leaves of the season 2–5 pairs below the inflorescence: seeds with a close testa, rather regularly blunt-papillose, not angled.

Leaves oval-elliptic, obtuse: flowers 1–3: sepals ovate-lanceolate to oval: seeds 1.5–3 mm. in diameter . . 4. *C. arcticum.*

Leaves ovate-lanceolate to linear-oblong, acute or acutish: flowers 1–7: sepals lanceolate to ovate-lanceolate: seeds 1.3–1.8 mm. in diameter . . . . 5. *C. Earlei.*

e. Leaves of the season 5–10 pairs below the inflorescence: seeds with a loose testa, rather sharply papillose on some surfaces, with rows of linear or oblong transverse ridges on other surfaces, angled . . . . 6. *C. terrae-novae.*

d. Plants tall, 2–4 dm. high, densely sordid-hirsute especially above; glands if present not obvious: leaves large, the median 1.5–4 cm. long, 0.8–2.5 cm. broad, ovate to oblong, mostly rounded at base: flowers 3–13; pedicels soon reflexed or recurved: mature capsule 1.7–2.3 cm. long . . . . 7. *C. unalaschkense.*

a. Bracts broadly scarious-margined or only the very lowest wholly herbaceous.

Basal leafy branches and offshoots herbaceous, with few axillary tufts of oblong leaves: petals about equalling to ½ longer than the sepals, with ascending lobes and pubescent or ciliate claw.
Sepals 7–10 mm. long: capsule 1.7–2.3 cm. long: seed 1.3–1.8 mm. in diameter . 7. *C. unalaschkense.*
Sepals 4–7 mm. long: capsule 7–11 mm. long: seed 0.5–0.7 mm. in diameter . . . 8. *C. vulgatum.*
Basal branches and offshoots becoming dry and marcescent, bearing conspicuous axillary fascicles or leafy tufts: petals 2–3 times as long as the sepals; the broad lobes spreading during anthesis; the claw glabrous . . 9. *C. arvense.*

1. C. ALPINUM L. Densely or loosely matted; the flowering stems weak, 0.1–3 dm. long, hirsute, glandular or lanate; the basal offshoots lanate or at least their leaves with the pubescence entangling at tip: leaves of the season oval, oblong, lanceolate or narrowly ovate, 0.5–2 cm. long; bracts similar or the uppermost slightly scarious-margined: flowers 1–6: pedicels straight, strongly ascending, finally spreading, much longer than the calyx, in fruit becoming (except in extremely dwarfed forms) 1.5–5 cm. long: sepals ovate-lanceolate, in anthesis 5.5–9, in fruit 6–10 mm. long: petals cuneate-obovate, about twice as long as the calyx; the 2 oblong lobes ascending: capsule nearly straight, 0.95–2 cm. long: seeds tuberculate, 1–1.3 mm. in diameter.—Sp. Pl. i. 438 (1753).—A very variable arctic-alpine species, represented with us by the following varieties.

Var. LEGITIMUM Lindblom. Summit of stem, pedicels and calyx with straight short glandless pubescence.—Physiogräph. Sallsk. Tidskr. i. 336 (1837)—reprinted in part in Flora (1841) 591. *C. alpinum* L. sensu stricto. *Centunculus alpinus* (L.) Scop. Fl. Carn. ed. 2, i. 321 (1772). *Stellaria alpina* (L.) S. F. Gray, Nat. Arr. Brit. Pl. ii. 660 (1821). *C. mutabile alpinum* (L.) Gren. Mém. Soc. Émul. Doubs, i. 71 (1841). *C. alpinum*, var. *hirsutum* Fenzl in Ledeb. Fl. Ross. i. 411 (1842).—Arctic regions, south on granitic, schistose or silicious rocks and gravel to Labrador, Ungava and Keewatin. The more southerly stations are as follows. LABRADOR: Kangalaksiorvik Bay, September 1–10 1908, *Owen Bryant;* 20 miles north of Nachvak, August 28, 1908, *H. S. Forbes;* near Hopedale, *Knuth;* Indian Harbor, Hamilton Inlet, August 2, 1891, *Bowdoin College Exped.*, no. 175; St. Francis Harbor, July 20, 1891, *Bowdoin College Exped.*, no. 112; Dumpling Harbor, July 7, 1864, *B. P. Mann.* UNGAVA: Port Burwell, Hudson Straits, July 18, 1910, *J. M. Macoun*, no. 79,081; Digges Island, September 16, 1884, *R. Bell;* Great Whale River, Hudson Bay, July 5, 1899, *A. P. Low*, no. 63,164, in part. KEEWATIN: Churchill, August 15, 1879, *R. Bell*, no. 4216, August 18, 1910, *J. M. Macoun*, no. 79,082; Cape Henrietta Maria, August 18, 1904, *Spreadborough*, no. 62,328.

Forma PULVINATA Simmons, Vasc. Pl. Ellesmerel. 122 (1906).—A condensed arctic form with succulent glabrous leaves.

Var. glanduliferum Koch. Similar to var. *legitimum* but pubescence gland-tipped or mixed with glands: plant greenish.—Syn. Fl. Germ. 124 (1835).—Of similar range, south to southeastern Labrador and Hudson Straits. The following are the more southerly stations. Labrador: Rama, August, 1897, *J. D. Sornborger*, no. 205, in part; Hebron, August 4, 1908, *H. S. Forbes;* Caribou Island, August 6–13, 1911, *C. S. Williamson*, no. 571.

Var. glutinoso-lanatum Facchini. Inflorescence villous and conspicuously glutinous or with dark gland-tipped hairs: plant lurid: calyx dark.—Facchini in Reichenb. Deutsche Fl. der Nelkengew. iii. 110 (1842–43). *C. atratum* Lapeyr. Hist. Abr. Pl. Pyr. 265 (1813). *C. squalidum* Ram. Act. Acad. Paris, vi. 158 (1826). *C. mutabile alpinum* ε. *squalidum* (Ram.) Gren. Mém. Soc. Émul. Doubs. i. 72 (1841). *C. alpinum* δ. *atratum* (Lapeyr.) Rouy & Foucaud, Fl. Fr. iii. 205 (1896).—Greenland and the northwest side of Hudson Bay: Wager Inlet, lat. 65° 15′, September 8, 1910, *J. M. Macoun*, no. 79,084.

Var. lanatum (Lam.) Hegetschw. Plant covered with long entangling pale often flocculent tomentum, not glandular.—Reisen. 154 (1825). *C. lanatum* Lam. Encycl. i. 680 (1783–84). *C. villosum* Baumg. Enum. Stirp. Transs. i. 424 (1816). *C. eriophorum* Kitaib. in Rochel, Plant. Banat. Rar. in ind. (1828). *C. lanuginosum* Willd. ex Reichenb. Fl. Germ. Exc. 797 (1832). *C. mutabile alpinum* δ. *lanatum* (Lam.) Gren. Mém. Soc. Émul. Doubs, i. 72 (1841). *C. alpinum*, d. c. *villosum* (Baumg.) Kittel, Taschenb. Fl. Deutschl. ed. 2, 975 (1844).—The most southerly variety, reaching the Straits of Belle Isle and the foot of James Bay. The southern specimens examined are as follows. Labrador: Eclipse Harbor, September 6, 1908, *H. S. Forbes;* Rama, August 20–24, 1897, *J. D. Sornborger*, no. 202; Makkovik, August, 1896, *A. Stecker*, no. 197; Nain and Ford's Harbor, August 1, 1884, *R. Bell;* Nain, August 11, 1897, *J. D. Sornborger*, no. 52; Tub Harbor, July 11, 1892, *J. D. Sornborger*, no. 211; Gready Island, August 8, 1908, *Owen Bryant;* Indian Harbor, July 28, 1892, *Waghorne;* Battle Harbor, *Bowdoin College Exped. et al.;* Chateau Bay, July 14, 1891, *Bowdoin College Exped.* no. 57; Forteau, 1870, *S. R. Butler;* very abundant on dry, exposed crests, Blanc Sablon, July 30, 1910, *Fernald & Wiegand*, no. 3392. Ungava: Fort Chimo, September 8, 1896, *Spreadborough*, no. 34,357; along the Koaksoak River, August 16, 1896, *Spreadborough*, no. 16,290; Digges Island, Hudson Strait, August 16, 1884, *R. Bell;* Great Whale River, Hudson Bay, July 5, 1899, *A. P. Low*, no. 63,164, in part; South Twin Island, James Bay, August, 1887, *J. M. Macoun*, no. 34,356; Charlton Island, James Bay, July 8, 1887, *J. M. Macoun*, no. 4616.

2. C. Beeringianum Cham. & Schlecht. Plant densely or loosely matted, with spreading or ascending glandular-pilose stems 0.4–2 dm. long; upper internodes (1.5–)2.5–7.5 cm. long: leaves of the season 2–5(–7) pairs, linear to elliptic-oblong, mostly obtuse, pilose on both

faces; the median 0.7–2.4 cm. long, 1.5–7 mm. broad: bracts ovate to oblong-lanceolate, acutish; margins not scarious: inflorescence simple or dichotomous, 1–14-flowered; pedicels usually slender, mostly ascending, rarely nodding at the tip, in maturity 0.5–3 cm. long: sepals in anthesis 3.5–7, in fruit 4.2–8 mm. long, broadly lanceolate to oblong-ovate, obtuse, the inner conspicuously scarious-margined: petals bluntly 2-lobed, 6–8(–9) mm. long, ascending, only slightly exceeding the calyx: capsule 8.5–12 mm. long: fruiting calyx campanulate, 4–6.5 mm. broad at summit: seed 0.6–1 mm. in diameter, bluntly papillose, not angled.—Linnaea, i. 62 (1826). *C. vulgatum*, δ. *Beeringianum* (Cham. & Schlecht.) Fenzl, in Ledeb. Fl. Ross. i. 409 (1841). *C. alpinum*, α. *Beeringianum* (Cham. & Schlecht.) Regel, Plant. Radd. i. 434 (1862). *C. Buffumae* A. Nelson, Bull. Torr. Bot. Cl. xxvi. 239 (1899). *C. variabile* Goodding, Bot. Gaz. xxxvii. 54 (1904). *C. pilosum* Greene ex Rydb. Fl. Col. 129 (1906), not Ledeb.—Calcareous rocks, western Newfoundland and Straits of Belle Isle to Rimouski Co., Quebec; Keewatin; Alaska to Arizona; also northwestern Asia. The more easterly stations are as follows. NEWFOUNDLAND: dry, rocky limestone barrens, near sea-level, Ingornachoix Bay, August 4, 1910, *Fernald & Wiegand*, no. 3391; damp calcareous rocks and talus, entrance to Port Saunders Harbor, August 1, 1910, *Fernald & Wiegand*, no. 3391½. QUEBEC: rocky crest, Ile Herbée (Grassy Island), Archipel du Vieux-Fort, Saguenay Co., July 24, 1915, *St. John*, no. 91,817; turfy ledges, Ile Triple, Archipel Washicoutai, Saguenay Co., July 7, 1915. *St. John*, no. 90,819; rocky limestone headland, Pointe aux Eskimaux, Seigniory de Mingan, Saguenay Co., June 28, 1915, *St. John*, no. 90,818; crests of cliffs, Cap Blanc, Percé, Gaspé Co., August 17, 1904, *Collins, Fernald & Pease;* limestone detritus, Cap Blanc, Percé, July 26, 1905, *Williams, Collins & Fernald;* red limestone detritus, Les Murailles, Percé, August 17, 1904, *Collins, Fernald & Pease;* along the cliffs below Ste. Anne des Monts, Gaspé Co., August 12, 1882, *John Macoun;* mossy sea-cliffs, Tourelle, Gaspé Co., August 21, 1905, *Collins & Fernald*, no. 73; calcareous ledges and cliffs at various stations, Bic, Rimouski Co., *Collins & Fernald et al.;* crevices and talus of limestone-conglomerate sea-cliffs, altitude 200–275 m., east of St. Fabien, Rimouski Co., July 16, 1907, *Fernald & Collins*, no. 1032.

Var. **capillare**, n. var., caulibus capillaribus, pedicellis filiformibus plerumque 1.5–5.5 cm. longis; foliis lineari-oblongis; calycibus maturis 3–4 mm. diametro; capsulis 5–7 mm. longis breviter exsertis.

Stems capillary: pedicels filiform, mostly 1.5–5.5 cm. long: leaves linear-oblong: mature calyces 3–4 mm. in diameter at summit: capsule 5–7 mm. long, very slightly exserted.—ALBERTA: broken rocks, head of Lake Louise, July 22, 1904, *J. Macoun*, herb. Geol. Surv. Can. no. 64,720 (TYPE in Gray Herb.); Lake Louise, July 14, 1906, *Stewardson Brown*, no. 715.

The sheet of no. 64,720 in the Herbarium of the Geological Survey of Canada contains also typical *C. Beeringianum.*

3. C. Fischerianum Seringe. Loosely matted, with spreading or ascending glandular-hispid flowering stems 0.7–4 dm. long; upper internodes (except in dwarfed arctic specimens) becoming 0.4–1.2 dm. long: leaves of the season 3–7 pairs, broadest near the base, lanceolate to lance-oblong or lance-linear, rarely ovate, mostly acutish, pilose on both faces; the median 1–4.2 cm. long, 0.3–1.6 cm. broad: bracts lanceolate to ovate, acutish, herbaceous: inflorescence dichotomous, (1–)3–27-flowered: pedicels at first ascending, after anthesis nodding at tip or strongly divergent, in maturity 1.5–4 cm. long: sepals in anthesis 4.5–7.5, in fruit 5.5–9 mm. long, lanceolate to oblong, acute or acuminate: petals bluntly 2-lobed, 0.9–1.2 cm. long, ascending: capsule 0.9–1.2 cm. long: seeds 0.7–1 mm. in diameter, bluntly papillose.—Seringe in DC. Prodr. i. 419 (1824). *C. alpinum, γ. Fischerianum* (Seringe) Torr. & Gray, Fl. i. 188 (1838). *C. vulgatum, δ. grandiflorum,* lusus 1, Fenzl in Ledeb. Fl. Ross. i. 411 (1841).—Siberia to Japan and Alaska; southern Labrador to the Gaspé Peninsula, Quebec. The eastern specimens examined are as follows. Labrador: waste places near dwelling, Battle Harbor, August 16–18, 1911, *C. S. Williamson,* no. 695; springy banks and damp hillsides, Forteau, July 30, 1910, *Fernald & Wiegand,* no. 3388; abundant in damp runs and on mossy banks, limestone and calcareous sandstone terraces, Blanc Sablon, August 1, 1910, *Fernald & Wiegand,* no. 3389 (also noted on the Quebec side of Blanc Sablon River). Quebec: Blanc Sablon (see preceding note); Bonaventure conglomerate (calcareous) sea-cliffs, Bonaventure Island, Gaspé Co., August 7 & 8, 1907, *Fernald & Collins,* no. 1034; limestone detritus along outer bases of Les Murailles, Percé, Gaspé Co., August 10, 1907, *Fernald & Collins,* no. 1035.

4. C. arcticum Lange. Plant very low and densely tufted; the stems 0.3–1 (rarely –2) dm. long, viscid and pilose; internodes short, the median 0.3–2 cm. long: leaves of the season 3–5 pairs, 0.5–1 cm. long, oval or elliptical, rarely oblong, obtuse or acutish, pilose, those of the sterile shoots sometimes villous: bracts broadly ovate, scarcely scarious: inflorescences 1–3-flowered: pedicels erect or spreading, slender, sometimes nodding at tip: sepals in anthesis 4–7 mm. long, ovate or ovate-lanceolate, obtuse or acutish, scarious-margined: petals broad, 0.9–1.3 cm. long: capsule once and a half to twice as long as the sepals: seeds 1.5–3 mm. in diameter, papillose.—Fl. Dan. Fasc. 50, p. 7, t. 2963 (1880), in part. *C. latifolium, β. Edmondstonii* H. C. Watson in Edmonst. Fl. Shetl. 29 (1845). *C. Edmondstonii* (H. C. Watson) Murbeck & Ostenf. Bot. Notiser (1898) 246. *C. nigrescens* Edmondston ex Ostenfeld, Med. om Grönl. xxxvii. 224 (1920).—Northern Europe and perhaps arctic America. Here are doubtfully referred two immature collections as follows. Mel-

VILLE ISLAND: Parry's 1st Voyage, 1819–20. ALASKA: Point Barrow, July 3, and 7, 1883, *John Murdoch.*[1]

Ostenfeld has recently taken up *C. nigrescens*, ascribing it to Edmondston and dating it from the Flora of Shetland (1845). It was there published, however, in synonymy only, as a synonym of *C. latifolium*, *β. Edmondstonii* and therefore, published merely as the synonym of a name in the varietal rank, cannot be cited as a valid binomial of that date. The name *C. arcticum* Lange originally covered a mixture, part of it generally conceded to be a hybrid. The true species involved was the present plant. Many authors are inclined to drop the name *C. arcticum* or to restrict it to a hybrid, but we follow Druce in Moss, Cambr. Brit. Fl. iii. 47 (1920).

5. C. EARLEI Rydberg. Plant low, 0.5–1.8 dm. high, varying from slender to rather stout, more or less densely glandular-puberulent especially above: upper internodes rather long (2–4.5 cm.): leaves narrowly oblong to elliptic, obtuse or subacute, glandular-pubescent, those of the season 2–5 pairs; the median 1–2 cm. long, 2–6(–8) mm. broad: bracts ovate to lanceolate, the upper sometimes slightly scarious-tipped: inflorescence 1–7-flowered, usually not conspicuously dichotomous: pedicels in maturity slender, erect or somewhat spreading, often arching at tip, 1.2–2.8 cm. long: sepals commonly fuscous or purplish, in anthesis 5–9, in fruit 7–10 mm. long, lanceolate to ovate-lanceolate, acute or sub-acute, glandular-puberulent, with a broad scarious margin: petals rather showy, once and a half to twice the length of the sepals, ascending: capsule 8.5–13 mm. long: seeds 1.3–1.8 mm. in diameter; the close testa bluntly but strongly and uniformly papillose —Bull. Torr. Bot. Club, xxx. 249 (1903).—Calcareous regions of the Rocky Mountains, Alberta and British Columbia to Arizona. The following specimens mostly distributed as *C. Beeringianum*, are characteristic. ALBERTA: mountains at Kicking Horse Lake, August 14, 1890, *J. M. Macoun;* back of Tunnel Mt., Banff, June 13, 1899, *J. Macoun*, no. 22,349 in part; Vermillion Mt., Banff, July 9, 1891, *J. M. Macoun;* Bow River Pass, September 13, 1879, *J. Macoun*, no. 99; Forget-me-not Mt., Elbow River, July 16, 1897, *J. M. Macoun*, no. 18,249; Lake Louise, July 14 and 25, 1906, *Stewardson Brown*, nos. 702, 706. BRITISH COLUMBIA: Upper Loup Creek, near Glacier, July 29, 1914, *E. W. D. Holway;* summit of Wapta, alt. 3050 m., July 10, 1906, *Stewardson*

[1] Ostenfeld reports from King William Land an extreme arctic species, *C. Regelii* Ostenfeld, Vid.-Selsk Skrift. Math.-Naturv. Klasse, 1909, no. 8, 10 (1910), a very slender, nearly glabrous plant with filiform branches; elliptic short leaves; filiform pedicels and rounded sepals 4.5–6 mm. long, with membranous violet-tinged margins. He does not describe the seed; and the only material we have seen (from Siberia and a very young and doubtful plant from Cape Nome, Alaska, *Blaisdell*), is too immature to show seed-characters.

Brown, no. 446; Little Yoho Valley, July 13, 1906, *Stewardson Brown*, no. 465; Fraser River, Yellowhead Pass, July 16, 1898, *W. Spreadborough*, no. 19,284. MONTANA: Upper Marias Pass, August 3, 1883, *W. M. Canby*, no. 40; Mt. Stanton, August 1, 1894, *R. S. Williams*. COLORADO: Sawatch Range, alt. 3660 m., 1880, *T. S. Brandegee;* Cumberland Basin, La Plata Mts., alt. 3600 m., July 15, 1898, *Baker, Earle & Tracy*, no. 621; head-waters of Clear Creek, 1861, *Parry*, no. 138 in part. ARIZONA: Mt. Agassiz, alt. 3050 m., August, 1884, *J. G. Lemmon*, no. 3288; Humphrey's Peak, San Francisco Mt., August, 1898, *MacDougal*, no. 406.

6. C. **terrae-novae**, n. sp., planta fusca vel purpurascens; caulibus ascendentibus vel suberectis glanduloso-hirsutis valde foliosis 0.6–1.5 dm. altis; internodiis brevibus, mediis 0.5–2.5 cm. longis; foliis novellis purpurascentibus 5–10-jugis elliptico-oblongis obtusis basi paullo angustatis dense glanduloso-hirsutis 0.5–1.4 cm. longis 1.5–3.5 mm. latis; bracteis ovato-lanceolatis acutiusculis vel obtusis vix scariosis; floribus 1–3; pedicellis gracilibus plerumque erectis deinde 1.5–2.5 cm. longis apice vix nutantibus; sepalis ovato-oblongis obtusis vel subacutis fuscis glandulosis late scarioso-marginatis 5.5–6.5 deinde 6–7 mm. longis; petalis obtuse 2-lobatis ascendentibus calyce duplo longioribus; capsulis rectis 0.9–1.3 cm. longis; seminibus 1.3–1.7 mm. diametro angulatis, testa vesicula aliis faciebus argute papillosis aliis cum liris parvis transversis seriatim dispositis instructis.

Plant fuscous or purple: stems loosely ascending or suberect, densely glandular-hirsute, very leafy, 0.6–1.5 dm. high: internodes short; the median 0.5–2.5 cm. long: new leaves purplish, 5–10 pairs, elliptic-oblong, obtuse, slightly narrowed at base, densely glandular-hirsute, 0.5–1.4 cm. long, 1.5–3.5 mm. wide: bracts ovate-lanceolate, acutish or obtuse, scarcely scarious: flowers 1–3: pedicels slender, mostly erect, becoming 1.5–2.5 cm. long, scarcely or only rarely nodding at apex: sepals ovate-oblong, obtuse or subacute, fuscous, glandular, broadly scarious-margined, 5.5–6.5, becoming 6–7 mm. long: petals obtuse, 2-lobed, ascending, twice as long as the calyx: capsule straight, 0.9–1.3 cm. long: seeds 1.3–1.7 mm. in diameter, angulate; the vesicular or loose testa with some faces prominently papillose, others covered with rows of small transverse ridges.—Serpentine barrens of western NEWFOUNDLAND: serpentine tablelands, altitude about 380 m., Bonne Bay, August 27, 1910, *Fernald, Wiegand & Kittredge*, no. 3387½; serpentine tableland and slopes back of Woody Point, Bonne Bay, August 5, 1919, *R. H. Kimball*, no. 150; serpentine tableland, altitude about 550 m., northeastern region of the Blomidon Mts., July 24, 1910, *Fernald, Wiegand & Kittredge*, no. 3390 (TYPE in Gray Herb.) and August 21, 1910, *Fernald & Wiegand*, no. 3390½.

In its large seed with loose testa *C. terrae-novae* is very different from other American species, in this character showing a relationship to the European *C. latifolium* L.

Forma **Waghornei,** n. f., caulibus et foliis et sepalis villoso-hirsutis nec glandulosis.

Stems, leaves and sepals villous-hirsute, not glandular.—NEWFOUNDLAND: sandy plains, Coal (or Serpentine) River, June 26 and 28, 1898, *A. C. Waghorne*, nos. 10 (TYPE in Gray Herb.) and 27.

7. C. UNALASCHKENSE Takeda. Flowering stems stout, 2–4 dm. high, rather densely sordid-hirsute throughout, except rarely at the extreme base; internodes long (median 2.5–10 cm.): leaves of the season 4–6 pairs, ovate to ovate-lanceolate, rarely lance-oblong, acute or acutish, hirsute on both surfaces; the median 1.5–4 cm. long, 0.8–2.5 cm. broad: bracts broadly ovate; the upper with very narrow scarious margins: inflorescence (3–)4–13-flowered, forming a terminal rather small dichotomous cyme, at first congested, in fruit with divaricate or reflexed stout scarcely arching pedicels: sepals in anthesis 7–10 mm. long, in fruit scarcely longer, lanceolate to lance-ovate, acute; the margins narrowly scarious: petals broad, about 1 cm. long, a third longer than the sepals: capsule very large (1.7–2.3 cm. long), twice to thrice the length of the calyx: seeds large, 1.3–1.8 mm. in diameter with long marginal papillae passing on the sides to oblong ridges.—Kew Bull. 1910, 381 (1910). *C. vulgatum*, γ. *macrocarpum* Fenzl in Ledeb. Fl. Ross. i. 409 (1841). *C. alpinum* β. *Fischerianum*, lusus *C. macrocarpum* (Fenzl) Regel, Pl. Radd. i. 439 (1862).—Coast of British Columbia to Kamtchatka and eastern Siberia. The following American specimens have been examined. BRITISH COLUMBIA: thicket, Long Arm, Skiddegate, Queen Charlotte Isl., July 16, 1897, *C. F. Newcombe*, no. 18,252 (in part), Geol. Surv. Can. ALASKA: Shumagin Islands, 1871–72, *M. W. Harrington;* banks, Unalaska, September 25, 1871, June 13, 1872, *M. W. Harrington;* among grasses, etc., on the flats at sea-level, Dutch Harbor, Unalaska, June 29, 1907, *E. C. Van Dyke*, no. 71; Nazan Bay, Atka Island, July 28, 1907, *E. C. Van Dyke*, no. 284; Amchitka Island, July 25, 1873, *W. H. Dall;* Kyska Island, June 30, 1873, *W. H. Dall.*

8. C. VULGATUM L. Flowering stems rather slender, 1–6.5 dm. high, simple or slightly branching, hirsute or rarely glandular; internodes elongate, the median becoming 2–12 cm. long: leaves of the season 3–7 pairs, oblong to narrowly oval, hirsute on both surfaces; the median 0.5–4 cm. long, 1.5–15 mm. broad: bracts similar but smaller, broadly scarious at margin and summit: inflorescence 3–about 60-flowered, forming a terminal finally very dichotomous cyme, at first rather congested, in fruit with the lower pedicels divergent or reflexed and 2–4 times as long as the calyx: sepals 4–7 mm. long, ovate-lanceolate, acute, hirsute, the margin scarious: petals 4–8 mm. long, about equaling or very slightly exceeding the sepals, cleft to the middle, with ciliate claw: capsule 7–11 mm. long: seed 0.5–0.7 mm. in diameter, reddish, tuberculate.—Fl. Suec. ed. 2, 158 (1755),

Syst. Nat. ed. 10, 1039 (1759), Sp. Pl. ed. 2, 627 (1762), not L. Herb. *C. viscosum* L. Herb.; Sm. Fl. Brit. 497 (1800), not L. Sp. Pl. i. 437 (1753). *C. caespitosum* Gilib. Fl. Lith. v. 159 (1781). *C. triviale* Link, Enum. Hort. Berol. i. 433 (1821).—Our plants all belong to

Var. hirsutum Fries. Inflorescence hirsute with glandless hairs. —Nov. Fl. Suec. ed. 2, 125 (1828). *C. triviale α. hirsutum* Neilreich, Fl. Nied.-Oesterr. 798 (1859). *C. triviale*, var. *α. genuina* Syme, Engl. Bot. ii. 83 (1873). *C. vulgatum, α. typicum* Beck. Fl. Nied.-Oesterr. i. 367 (1890). *C. caespitosum*, var. *hirsutum* (Fries) Briq. Prod. Fl. Corse, i. 506 (1910).—An abundantly naturalized weed of roadsides, fields, cultivated grounds, and banks of streams, in all inhabited regions of temperate North America, flowering from early spring to late autumn (and exceptionally throughout winter).

Var. hirsutum, forma glandulosum (Boenn.) Druce. Inflorescence with gland-tipped hairs.—Druce in Moss, Camb. Brit. Fl. iii. 50 (1920). *C. viscosum, β. glandulosum* Boenn. Prodr. Fl. Monast. 133 (1824). *C. triviale*, var. *viscosa* Mert. & Koch in Roehl. Deutschl. Fl. ed. 3, iii. 336 (1831). *C. triviale, γ. glandulosum* (Boenn.) Reichenb. Fl. Germ. Excurs. 796 (1832). *C. vulgatum, ε. glandulosum* (Boenn.) Grenier, Mém. Soc. Émul. Doubs, i. 39 (1841). *C. glandulosum* (Boenn.) Schur, Oest. Bot. Zeit. xix 306 (1869). *C. caespitosum, β. glandulosum* (Boenn.) Wirtg. Fl. Preuss. Rheinl. 315 (1870). *C. vulgare*, subsp. *triviale*, forma *glandulosum* (Boenn.) Murbeck, Bot. Notiser (1898) 253.—Apparently local in North America. The following specimens belong here. Massachusetts: Provincetown, June 10, 1912, *F. S. Collins*. Michigan: Turin, Marquette Co., May 31, 1901, *Barlow*. Illinois: Urbana, May 27, 1899, *Gleason*. British Columbia: Revelstoke and Downie Creek, July, August, 1905, *C. H. Shaw*, nos. 846 and 1118.

In recent years many continental European writers have abandoned the names *C. vulgatum* L. and *C. viscosum* L. as hopelessly confusing and have adopted in their stead later and professedly clear names on the ground that the Linnean names are "sources of permanent error and confusion." The Linnean names, however, have long been used in America as well as in Great Britain and Austria with complete definiteness, and in conformity with one of the leading principles (Art. 5) of the International Rules ("When the consequences of rules are doubtful, established custom becomes law"), they may properly be maintained.

9. C. arvense L. Matted or tufted perennial, with depressed or trailing tough basal branches bearing marcescent leaves and abundant axillary fascicles or leafy tufts: flowering branches ascending, simple to freely branched, 0.2–6 dm. high; glabrous to densely villous, glandless to densely glandular: leaves linear-subulate to narrowly

ovate, flaccid to rigid, acute to obtuse, glabrous to velutinous, glandless or glandular, 1–6 cm. long, 0.5–13 mm. broad, mostly confined to the lower two-thirds of the branch: inflorescence few- to many-flowered, its bracts scarious-margined: sepals 4.5–8.5 mm. long, glabrous, pilose or glandular: petals 2–3 times as long as the sepals; the broad lobes spreading in anthesis; the claw glabrous: capsule cylindric, equaling to much exceeding the calyx: seeds reddish, 0.35–0.7 mm. in diameter, the testa close and tuberculate.—Sp. Pl. i. 438 (1753).—Rocky, gravelly or sandy habitats, chiefly in somewhat calcareous or magnesian soils, widely dispersed in boreal regions, extending south in varying forms to Georgia, the Great Lake region, New Mexico and California; Eurasia and South America.

We attempt no statement of bibliography and synonymy at present, since all our attempts to reduce the species-complex to definite species or varieties with natural ranges have proved futile. After carefully measuring sepals, capsules and seeds, and closely examining pubescence and foliage during two different periods of nearly two weeks each we are forced to the conclusion that in North America the group is as unstable in these characters as in Europe where Willkomm found "varietates constantes vix distingui possunt." For instance, a characteristic plant of Pennsylvania and southern New York, which is variously treated as *C. arvense*, var. *oblongifolium* (Torr.) Holl. & Britt., *C. oblongifolium* Torr. and *C. velutinum* Raf., is commonly separated by its long capsule; but abundant collections, which by their discriminating collectors have been referred to this plant, show capsules no longer than in much of the material from Newfoundland or the Canadian Northwest, while many sheets of material collected as one plant show both long and short capsules; and many specimens uniform as to capsules show the greatest diversity in the size and remoteness of the leaves. In some areas essentially all the plants of the *C. arvense* series are quite glandular, in other closely adjacent areas glandless but villous, so that within a limited region it would be possible to subdivide *C. arvense* into variants of seeming stability, but throughout the broad range around the northern hemisphere these variable characters interchange so perplexingly that the writers find themselves at present unable to determine which of these fickle tendencies have real taxonomic value. They accordingly are leaving *C. arvense* as a perplexing, polymorphous species, not wholly abandoned but cheerfully commended to others who care to attack it and who by a new approach and prolonged study may perhaps reduce it to a series of tangible entities.

THE SO-CALLED GENERIC NAMES OF EHRHART'S PHYTOPHYLACIUM.

John Hendley Barnhart.

In discussing the generic names available for *Alsinopsis* (Rhodora **21**: 10. 1919), Fernald remarked: "*Leptophyllum* Ehrh. Beitr. iv. 147 (1789), was based on *Arenaria tenuifolia* L." In an extended footnote he added: "Surely if *Dryopteris* satisfies the American Code as good publication of a genus, *Leptophyllum* Ehrh. Beitr. iv. 147 (1789) based, as stated, on *Arenaria tenuifolia* L., is admirably published. Some other generic names similarly published on the same or adjacent pages, which by the American Code, but not by the International Rules, should be taken up are

> Phaeocephalum Ehrh. l. c., 146 (1789), based on *Schoenus fuscus* L. = Rynchospora Vahl (1806).
>
> Hydrophila Ehrh. l. c. (1789), based on *Tillaea aquatica* L., which was also the type of Tillaeastrum Britton (1903).
>
> Trichophyllum Ehrh. l. c. 147 (1789), based on *Scirpus acicularis* L. = Eleocharis R. Br. (1810).
>
> Monanthium Ehrh. l. c. 148 (1789), based on *Pyrola uniflora* L., which was the type of Moneses Salisb. (1821).
>
> Helictonia Ehrh. l. c. (1789), based on *Ophrys spiralis* L., which was also the type of Ibidium Salisb. (1812).
>
> Aetopteron Ehrh, l. c. (1789), based on *Polypodium aculeatum* L. = Polystichum Roth (1799)."

Acting upon this hint, but without referring to it, House has more recently, in two papers.[1] taken up a number of these so-called "generic" names of Ehrhart and for the first time combined specific names with them. He remarks in his earlier paper, "This article deals with a set of generic names published by Friedrich Ehrhart in 1789," and in the later one, "The genus Aetopteron forms No. 78 in Ehrhart's list of new genera." On the strength of these assertions, some seven new generic names and above a hundred new combinations have been added to the increasing burden of plant synonymy, without the slightest possible excuse.

[1]A consideration of certain genera proposed by Ehrhart. Am. Midl. Nat. **6**: 200-207. My 1920.—The genus Aetopteron, Ehrhart. Am. Fern Jour. **10**: 88: 89. S 1920.

Briefly stated, the plain facts are these. Ehrhart prepared for distribution certain sets of exsiccatae of flowering plants, which he issued in "decades" under the title "Phytophylacium." When ten of these decades had appeared, he published in his Beiträge (**4**: 145–150. 1789), under the title "Index Phytophylacii Ehrhartiani," a list of the hundred species contained in them. To each species is assigned a single name, followed by its current binary one. For example, the first five in the list are as follows:

"1. P h a e o c e p h a l u m. Schoenus fuscus Linn.
2. L e u c o c o m a. Eriophorum alpinum Linn.
3. O r t h o s t a c h y s. Elymus europaeus Linn.
4. S t y g i a r i a. Juncus stygius Linn.
5. D i c o d o n. Linnaea borealis Linn."

At first glance these look much as if they were intended as generic names accompanied by the designation of a type species for each, but even a superficial examination of the list would suggest to almost any one the need of extreme caution in adopting such an interpretation. For instance, it is a conspicuous fact that every species of the hundred is assigned a mononomial designation. Fourteen are species of *Carex,* which neither Ehrhart nor any one else has ever attempted to separate generically; five were species of *Ophrys,* five of *Serapias,* four of *Bromus,* and ten of *Lichen,* without anything to indicate that Ehrhart considered them generically distinct. Furthermore, the apparent substitution of *Dicodon* for *Linnaea, Hippopodium* for *Buxbaumia,* and *Quaternella* for his own *Mönchia,* were wholly at variance with the nomenclatural practice even of that day. How inexcusable, then, is it for any one to assume that these were generic names without even reading what Ehrhart himself has to say about them.

To the list is appended this note (here freely translated): "I must here omit, for lack of space, the locality where each plant was collected. I have reprinted, however, my 'nomina usualia.' Not that it seems to me to be of very much consequence, since they are nothing but an attempt to assign to each plant a name that may be used for it alone, without an accompanying generic one, as suggested by Oeder in his 'Einleitung zur Kräuterkenntniss' § 141; but that a certain man by the name of Dahl, who is a particular friend of the idea, might derive some amusement from it, and that I might accomodate him."

The suggestion of Oeder,[1] to which Ehrhart refers, is (also freely translated) as follows: "There may be proposed, for common non-botanical conversational use, names which we may call nomina 'usualia,' always independent names, having no connection or relation to classification, to genus, or to specific relationship, but one for each species, relating to itself alone. It will be permissible, then, for species known by these 'nomina usualia' to be arranged freely by botanists in their respective systems and transferred at will, to be associated in genera and to be reclassified, for under all these changes of methods each name would remain unchanged."

Had Ehrhart foreseen the confusion in botanical nomenclature that might be caused by his innocent "nomina usualia," he would probably have refrained from his attempt to amuse and accommodate his friend Dahl. But surely he did all that could be expected from him in the way of explaining his intent, and warning later botanists away from the pitfall into which some have blindly walked. It is evident, however, that a fresh warning is needed, particularly as many of Ehrhart's "nomina usualia" have found their way as generic names into modern nomenclators, and we have with us many who are willing to accept without question the thousands of errors that are inevitable in works of that character.

Of course the preceding discussion should not be misinterpreted as a criticism of the validity of the various generic names proposed as such by Ehrhart in his other writings. His concept of genera and species, and the nomenclature of these categories, was by no means hazy or erratic.

New York City.

Panicum albemarlense in Connecticut.—Only two stations are given for *Panicum albemarlense* in the Connecticut Catalogue, namely Waterford and Southington. It therefore seems worth while to report the species from Franklin. The particular locality where it was found is a short, low gravel ridge. This is in fact a veritable Panicum "garden." There are a few Lecheas there, it is true, (*L. villosa, L. intermedia, L. tenuifolia* and *L. maritima interior*), but Panicums make up the bulk of the vegetation. The following species occur here: *P. tennesseense, P. albemarlense, P. implicatum,*

[1]Elem. Bot. 137. 1764.

P. huachucae, *P. villosissimum*, *P. linearifolium*, *P. depauperatum*, *P. sphaerocarpon*, *P. columbianum* and *P. tsugetorum*, the last being the exceptionally hairy form once described as *P. lanuginosum* var. *siccatum*.[1] Of the above, *P. albemarlense* and *P. implicatum* are the more abundant, but all the other species mentioned are well represented, no species, of which merely one or two plants were seen, being included in the list. Specimens of *P. albemarlense* and *P. tsugetorum* have been verified at the United States National Museum by Prof. A. S. Hitchcock.—R. W. Woodward, New Haven, Connecticut.

Ranunculus Purshii in Iowa.—Last July, while doing field work along the east shore of Spirit Lake in northern Iowa, I had the good fortune to find an interesting aquatic crowfoot, namely *Ranunculus Purshii* Richards, which does not appear to have been heretofore recorded from the state. It was growing quite plentifully in what had been a small pond, but at that time was entirely dried up, though the soil was still somewhat moist. The plants, though weak, all grew quite erect and were from six to ten inches high, the small flowers being a very bright yellow. Having never seen a specimen of *R. Purshii* I sent some material of the plant to Dr. B. L. Robinson, who kindly examined it and pronounced it to be this species. Its previously recorded range is thus extended several hundred miles southward in the Mississippi Valley.—R. I. Cratty, Curator, Iowa State College.

A rare Variety of Vitis labrusca.—About the first of October of the present year (1920) I observed on sale in public market in New Bedford two varieties of our native grapes: *Vitis labrusca* L. One of these was of the usual dark purple color but the other was entirely green. The purple colored grapes were not wholly ripe but very nearly so, this being the usual condition of such grapes when used in the household for making grape jelly.

I asked the salesman what the unripe green grapes were used for, there being about half a bushel of this variety. He replied that the green grapes were ripe and sweet and used for the same purpose as the purple ones. I learned that these green grapes were brought in by a

[1]North American Panicum, Hitchcock & Chase, Contrib. U. S. Nat. Herb. xv. 245 (1910).

farmer from the town of Rochester. I visited this farmer and ascertained that he picked the grapes from a vine growing wild in the woods. In further conversation with the store keeper, he said that he had for several years picked a peck of similar "white grapes," as he called them, from woods in Westport, and that they were especially esteemed in jelly making, their jelly being of a much lighter color and requiring no more sugar.

This variety of grape is undoubtedly rare in this part of the state although some vines may have been mistaken for the common variety. Botanists may be interested to investigate this subject further. —E. WILLIAMS HERVEY, New Bedford, Massachusetts.

[Mr. Hervey's green grape may be referable to the "WHITE FOX. . Vitis *labrusca*, v. *alba*," Price, Treatise on the Vine, 181 (1830), found wild in woods at York, Pennsylvania, and described as having the fruits "not perfectly white, but tinged with a pale russet or amber colour."—ED.]

THE WINTER MEETING OF THE VERMONT BOTANICAL CLUB will be held in Burlington, Friday and Saturday, January 28 and 29, 1921, at Williams Science Hall, University of Vermont. Those desiring a detailed announcement should apply to NELLIE F. FLYNN, Secretary, Burlington, Vermont.

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RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price, $2.00 per year, postpaid (domestic and foreign); single copies (if available) 20 cents. Volumes 1-8 or single numbers from them can be supplied at somewhat advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

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BRAINERD & PEITERSEN'S BLACKBERRIES OF NEW ENGLAND.[1]

M. L. Fernald.

During more than a decade Mr. W. H. Blanchard stirred American botanists as they had not before been aroused to the importance of closely studying the native blackberries, and set an example of marvelous devotion and self-sacrifice: in his declining years abandoning his remunerative pursuits and spending his meagre savings and complete energies in an attempt to throw light upon the hitherto hardly appreciated complexities of the American blackberries. In Blanchard's own words, "This search has continued and is now ten years old. I have searched throughout the whole of the eastern part of the United States and Canada as far west as blackberries are found, or from St. John's, Newfoundland, to Lake Winnipeg in Manitoba, and south to Florida . . . . . making the search as complete as my time and limited means would allow." As a result of his unprecedented activity twenty-two papers on the blackberries were published before impaired eyesight and age forced him to relinquish his keen and untiring studies of an amazingly difficult problem. Fortunately, however, before giving up active work he was able to summarize his conclusions in a very valuable paper[2] in which he recognized in northeastern America the following 16 as true species: *Rubus canadensis* L., *R. allegheniensis* Porter, *R. Andrewsianus* Blanchard, *R. hispidus* L., *R. procumbens* Muhl., *R. trivialis* Michx., *R. recurvans* Blanchard, *R. cuneifolius* Pursh, *R. frondosus* Bigelow, *R. setosus* Bigelow, *R. semisetosus* Blanchard, *R. vermont-*

[1] Ezra Brainerd & A. K. Peitersen. Blackberries of New England—their Classification. Vermont Agric. Expt. Sta. Bull. 217. June, 1920.

[2] Blanchard, Rubus of eastern North America. Bull. Torr. Bot. Cl. xxxviii. 425–439 (1911).

anus Blanchard, *R. amicalis* Blanchard, *R. glandicaulis* Blanchard, *R. multiformis* Blanchard and *R. recurvicaulis* Blanchard.

Following Blanchard's stimulating example, scores of active field-botanists, who had not previously appreciated the need of close observation and unlimited collections and notes, have been studiously watching and painstakingly collecting the blackberries—painstakingly, since the collection and preparation of hundreds or thousands of specimens of *Rubus* in a single season is a painful and monotonous task. As a result of this alert interest many New England botanists had long awaited the publication of the present paper by Brainerd & Peitersen, for they had learned to have profound regard for Brainerd's work on the genus *Viola*. Furthermore, some years prior to Blanchard's phenominal activity, Brainerd had published a synopsis[1] of the New England blackberries, in which he recognized 11 species, 1 variety and 1 hybrid; and subsequently he has been our most positive exponent of the theory that nearly all of our blackberries are hybrids. In the present paper, which is his latest statement on this question, 12 true species are recognized in New England and 46 plants are treated as hybrids, suspected hybrids or blend species and 5 as doubtful. And, although the "New England" of this paper is chiefly Vermont (reversing the early usage when Vermont declined to be a part of New England), various plants unknown outside New York or New Jersey are included, thus displaying the authors' present liberality of interpretation, especially toward the west and southwest.

The attempt to draw a definite line between the species and the hybrids and blend species has led to separate keys and treatments for these plants. This is unfortunate for the user, for no one, not specially forewarned or gifted with remarkable intuition, finding *Rubus frondisentis* ("*R. pergratus* × *setosus*") superabundant in Coos County, New Hampshire, *R. glandicaulis* ("*R. allegheniensis* × *setosus*") in the thickets of Prince Edward Island where *R. setosus* is unknown, or *R. arenicola* ("*R. Baileyanus* × *frondosus*") dominant on dry barrens of Nova Scotia where *R. Baileyanus* is unknown and where *R. frondosus* is represented only by *R. recurvans*, can guess in which key to trace his species.

As stated, *Rubus glandicaulis* (cited by the authors on p. 61 as if found at only 3 stations—1 each in Maine, New Hampshire and Vermont) occurs on Prince Edward Island where, during three seasons of conscientious observation and collecting of *Rubus* by such careful field-botanists as Blanchard, Bartram, Long, St. John and the present reviewer, no *R. setosus* (reputed parent of *R. glandicaulis*) has ever been found. Similarly, *R. arenicola* (cited on p. 75 as found at 3 stations—1 in Maine, 2 in eastern Massachusetts) is common in Nova Scotia (where long since collected and identified by Blanchard),

[1]Brainerd, The Blackberries of New England, RHODORA, ii. 23–29 (1900).

but one of its supposed parents reaches its eastern limit in eastern Massachusetts (or possibly southern Maine), at least 200 miles across the Gulf of Maine from the nearest point of Nova Scotia. Again, *R. tardatus* (p. 83), treated as a hybrid of *R. flagellaris* (*R. procumbens*) and *R. setosus* and cited as if found only at Kennebunk, Maine, is a dominant shrub of boggy thickets and lake-margins on Prince Edward Island and Nova Scotia and it is characteristic of some bogs and peaty shores of central Cape Cod. Yet of its alleged parents, *R. flagellaris* (even in its most inclusive sense) is not known east of the Kennebec valley and *R. setosus* is quite unknown on much-explored Cape Cod. Is it not, then, somewhat strange, if these are no more than local and very recent hybrids, that they should abound over such wide areas and hundreds of miles away from one or both of their supposed parents?

It is, in fact, very difficult to make out the principle by which the hybrids of Brainerd & Peitersen's treatment are differentiated from the true species. *R. elegantulus* (p. 37) with "Pollen about 70% imperfect" and a restricted range (the uplands of New Hampshire and Vermont), and *R. vermontanus* (p. 39) with "Pollen about 85% imperfect" and a distribution said to be confined to New Hampshire and Vermont, are treated as true species. But *R. frondisentis* (p. 63) of similar range and with "Pollen about 10% imperfect," a plant with seedlings which "are very uniform and seem to breed true to the type," and *R. abbreviens* (p. 65) again of similar range, and *R. permixtus* (p. 69), extending from New Hampshire to New York and New Jersey, the former with "Pollen about 10% imperfect" and seedlings which "vary very little from the mother plant," the latter with "Pollen about 50% imperfect" and seedlings which "do not revert to the parent types," are treated merely as hybrids. If these characteristic and easily recognized plants are indeed hybrids they are notable refutations of the much overworked theory, that hybrids have imperfect pollen and do not breed true.

A further refutation is found in the fact, that two of the universally recognized species, admitted without hesitation by the present authors and by every other competent systematist, have as poor pollen as is found in the genus. These are the "Thornless Blackberry," *R. canadensis* (p. 35), ranging from Newfoundland to Wisconsin and the mountains of North Carolina and Tennessee and the "Running Swamp Blackberry" (which often grows on dry sand plains), *R. hispidus* (p. 43), with an almost equally broad range, from Nova Scotia to southern Ontario, Michigan and North Carolina, the former with "Pollen about 85% imperfect," the latter with "Pollen about 90% imperfect." Furthermore, *R. frondosus* (p. 31), not treated as a hybrid, has seedlings which "show quite a range of variation as to shape of leaves, serration of leaflets, etc."

In the discussion on p. 11 the statement is made, that "Seeds from the selfed flowers of a number of suspected hybrids have been grown and these plants in the majority of cases show a reversion to the supposed parent types, which of itself, to our mind, is a positive proof of hybrid origin." No one will dissent from such a conclusion and it is therefore disappointing that the authors failed to tell us just which of the suspected hybrids gave these figures. They do report on 9 cases, the 3 above referred to in which seedlings "do not revert to the parent types" and 6 others in which they show variation. But the thesis would be more convincing if reports had been included for the remaining 37 reputed hybrids.

A serious doubt as to the finality of the conclusions in the paper must inevitably occur to those who have an intimate field-knowledge of the abundance in some of the upland districts of New Hampshire and Vermont of such thoroughly characteristic blackberries as *R. frondisentis* and *R. abbrevians*, shrubs with almost abnormally perfect pollen for a *Rubus*, with seedlings true to type and both with finely developed fruit, for although the plate before us (Plate xxviii) shows woe-begone and discouraged little fruits on *R. frondisentis*, the large and abundant colonies in the swamps of northern New Hampshire bear splendid plump berries (as shown by many sheets of specimens indentified by Dr. Brainerd). If these are to be treated respectively as "*R. pergratus* × *setosus*" and "*R. frondosus* × *setosus*," while *R. elegantulus* and *R. vermontanus*, of closely similar range and with amazingly imperfect pollen, are good species, why do not the hybrids occur generally throughout the coincident ranges of their supposed parents? *R. pergratus* is an abundant and much prized blackberry in many regions from Prince Edward Island to Cape Cod, Connecticut and Minnesota and *R. setosus* abounds in most regions from Nova Scotia and New Brunswick to western New England and the uplands of Pennsylvania. Yet in more than a quarter-century of intensive field-study and collecting of blackberries in New England and eastern Canada the reviewer (who has collected in a single season as many as 4000 sheets of *Rubus* and may perhaps be counted something more than an "ordinary herbarium systematist," to quote Brainerd & Peitersen's phrase) had never seen *R. frondisentis* until he turned his attention for two summers to the blackberries of the White Mountain region. Similarly he had never before met *R. elegantulus*, *R. vermontanus* and *R. abbrevians*. But all four are dominant and very distinct shrubs of the White Mountain region, although the reputed parents of the latter, *R. frondosus* and *R. setosus*, like the supposed parents of *R. frondisentis*, have much wider ranges. Brainerd & Peitersen assign *R. frondosus* to "Open fields and hillsides in southern New England. The form *R. recurvans* . . . . . north into Maine, New Hampshire and Vermont," but they include in *R. frondosus* not only *R. recurvans* but also *R. philadelphicus*. The comprehensive species would thus have a range from Nova Scotia at least to western New England and Virginia, while reputed hybrids of it are cited from as far west as Illinois. The range of *R. setosus*, the other supposed parent of *R. abbrevians*, has been stated above. If, then, *R. abbrevians* and *R. frondisentis*, with nearly perfect pollen, with full and handsome berries, with seedlings true to type and with ranges coincident with those of the unquestioned species, *R. elegantulus* and *R. vermontanus*, both of which have distressingly imperfect pollen,—if the constant *R. abbrevians* and *R. frondisentis* are modern hybrids of widely dispersed parents, why have they not been found somewhere else in the vast area where their parent species abound and where thousands of collections of *Rubus* have been made?

The reviewer is not arguing that wild hybrids do not occur in *Rubus*, for he believes that they do. His own experience as well as some of the data given by Brainerd & Peitersen seem conclusive on that point. He is simply emphasizing that in such instances as those just discussed the paper fails to make a convincing case. In another paper which is announced perhaps the authors may do so.

The reviewer is also puzzled, as others must be, to know why that most definite of coastal plain shrubs, *R. cuneifolius*, ranging all the way from Alabama and Florida to Connecticut and distinguished even by the novice on characters not found in any other northeastern species, is recognized only by its inclusion in a list of "Additional Forms of Doubtful Status" (p. 83). If, by chance, the authors have doubt as to the proper name for this shrub, there can be no question whatever about the shrub itself. Other points which may well puzzle or surprise those who have learned to expect care in Dr. Brainerd's work are the statement about the altitudinal range of blackberries, the item regarding the publication of *R. sativus*, and the omission from the citations of literature at the end of the paper of every one of Blanchard's 22 papers, including his highly important and authoritative epitome already referred to, one of the most significant if not, indeed, the most valuable series of critical notes we have upon our native blackberries, their ranges and constancy.

Those who are familiar with our alpine districts would be amazed to see any of the blackberries far above timber-line, yet Brainerd & Peitersen tell us, that "The blackberries of New England are distributed from the highest mountain peaks to the lowest valleys" (p. 14). Nevertheless, the reviewer, who with Professor Arthur Stanley Pease has taken pains to trace the altitudinal limits of blackberries on "the highest mountain peaks," is confident that few if any true blackberries are known in New England from far above 3500 feet, the upper limit in the forests of Mt. Washington of our most northern species, *R. canadensis*. To be sure, *R. Chamaemorus*, the only member of a unique subgenus which is often considered a monotypic genus, occurs on the highest mountain peaks of New England, but it surely is not a blackberry, although this ancient, circumpolar monotype has quite as poor pollen as do many other monotypes and most of the supposed hybrid blackberries.

In February, 1900, Dr. Brainerd published in Rhodora the following paragraph:

"**Rubus sativus.** This is *Rubus nigrobaccus*, var. *sativus*, Bailey, which we are confident should be regarded as a distinct species. As we find it in western Vermont it is farther removed from *R. nigrobaccus* than any of the four forms last mentioned . . . . The name chosen by Professor Bailey is most appropriate, as the species is the parent of some of our best garden varieties."[1]

In December of the same year he recognized it as "**R sativus,** Brainerd. (R. nigrobaccus, Bailey, var. sativus, Bailey). In dry alluvial soil; Weybridge, *Brainerd;* West Rutland, *Eggleston*."[2] But in April, 1914, Dr. Brainerd said: "the Vermont plant identified as 'a small form of *R. nigrobaccus* var. *sativus*' by Prof. Bailey (see Rhodora **2**: 24, Feb., 1900 [i. e., p. 26, where he forgot to state that Bailey had so determined it]), and described as *R. sativus* in the Gray Manual, and as *R. Brainerdii* by Dr. Rydberg . . . is hardly more than a dwarf form of *R. pergratus* Blanchard."[3] Only one year later, in April, 1915, in the Vermont Botanical Club's *Flora of Vermont* (the introduction signed: Ezra Brainerd) the Weybridge shrub was listed (p. 215) without even a question as a perfectly valid species, "**R. Brainerdi** Rydb. (R. sativus Gray's Man,. ed. 7)." But in the paper now before us the little Weybridge shrub, this time conceded to be neither *R. pergratus* nor a valid species, but merely an uncharacteristic and underdeveloped form of *R. frondosus* Bigelow, is given a full-page plate and a special page (33) of discussion as *R. Brainerdi* Rydberg (1913).

The authors state that "*R. brainerdi* Rydb. is a marked illustration of the confusion which has existed in the taxonomic literature," but it is obvious that the *confusion* is not wholly restricted to the literature. And, although the Weybridge shrub was one year "a distinct species," *R. sativus,* another year "a dwarf form of *R. pergratus,*" still later a valid species, *R. Brainerdi*, and at last report "a form of *R. frondosus,*" it is amazing that at no time has the wayward plant been accused of being a hybrid!

Since the name *R. sativus* Brainerd, which, when published in February, 1900, was a "name . . . . most appropriate," has now become objectionable, the following explanation is given: "Brainerd in a discussion of the plant to which Bailey had applied this varietal name [*sativus*] is accredited with the elevation of this variety to specific rank through a too liberal revision of his manuscript by the editors of Rhodora" (p. 33).[4]

[1] Brainerd, Rhodora, ii. 26. 27 (1900).

[2] Brainerd, Jones & Eggleston, Flora of Vermont, 53 (1900).

[3] Brainerd, Vt. Bot. Cl. Bull. no. 9, 15 (April, 1914).

[4] The actual passage reads somewhat strangely: "But based upon no definite type, Brainerd in a discussion," etc.

Such an unpleasant accusation, if based upon fact, would be serious but Dr. Brainerd has certainly forgotten that, less than two months before the publication of *R. sativus*, in a letter dated "Middlebury, Vt., Dec. 16, 1899" and written and signed by himself, he wrote the editors of RHODORA:

"If I get my article in by Jan. 1, will you publish it in Feb. Rhodora? ——— is preparing a 'monograph' of the genus. I should like to propose *R. sativus* as a species before he does, as I suspect he will."

Comment is unnecessary.

The plate (X) of *Rubus argutus* shows an inflorescence with no foliaceous bracts and there is no mention of such in the description opposite. Yet on p. 55 we are told that *R. Jeckylanus* is a hybrid which "Resembles *R. argutus* in having leafy-bracted inflorescence." This was presumably a misprint for *R. frondosus;* at least misprints are frequent in the publication. For instance, *R. glandicaulis* (p. 61) is treated as a hybrid of *R. allegheniensis* and *R. setosus* because it "Resembles *R. pergratus* in having pubescent leaves," etc.; *R. frondisentis* (p. 63) is called a hybrid of *R. pergratus* and *R. setosus* because it "Resembles *R. allegheniensis* in having pubescent leaves," etc. Two of these confusions have been corrected in manuscript in some of the copies issued; but the very fact that they passed unchanged through the final proof suggests indecision as to the parentage of the "hybrids." It would be quite unlikely that these inconsistencies would be due to mischievousness of the compositor or to "a too liberal revision of . . . manuscript by the editors" of the Experiment Station bulletins.

But despite the many points in which a difference of interpretation is inevitable and the unconvincing nature of much of the data presented, students of the perplexing genus *Rubus* will find much to commend in the paper. Of great importance, of course, are the records of apparently defective pollen (there is no statement of actual germination-tests) and constancy of seedlings; and everyone who uses the paper will regret that there are so few of the latter records for the 46 reputed hybrids. Finally, special praise should be given the illustrations of species, 31 exquisite full-page drawings, obviously by Schuyler Mathews. These drawings add tremendously to the value of the publication.

CREPIS SETOSA IN OREGON.—Mr. Long's interesting study of the occurrence of *Crepis biennis* (in RHODORA **21**: 209 ff.) calls forcibly to mind my own experience with the introduced species of this genus in Western Oregon. When I began to study the flora of the Willamette Valley in 1915, it soon became evident that *C. capillaris* deserved a place among our most abundant weeds, occurring everywhere in fields and waste places. Along with it, however, I soon began to notice a coarser, more bristly plant of the same genus, which I at first took for the native *C. barbigera* Leiberg. But this species, a lower and stouter plant, seems to be confined to the sage-brush plains of Eastern Oregon, while our plant had every appearance of being an immigrant. During the first season I saw but a few specimens; but each year has added to the number, until it is now almost as frequent as *C. capillaris*, with which it is associated in great abundance in waste places, fields, roadsides and river-banks throughout the entire region adjacent to Salem. Professor C. V. Piper, to whom I pointed it out in 1918, informed me that it was *C. setosa* Haller f., a native of that apparent paradise of weeds, the Mediterranean region, and that I would not be able to find a description of it in any American work. The fact that it has not found mention in any Western manual shows that it must be of comparatively recent introduction and restricted range; but a stranger in Western Oregon would infallibly conclude that it deserved to be enrolled among our most thoroughly established weeds. It would be interesting to know to what extent it has been observed by Eastern collectors. As far as *C. biennis* is concerned, my experience here has been identical with Mr. Long's. I have never seen the plant, or anything like it. Macoun's material from Vancouver Island is probably the basis for Henry's inclusion of the species in his recent Flora of Southern British Columbia, 329 (1915); but Mr. Long has shown Macoun's plant to be *C. nicaeensis*, and the existence of true *C. biennis* in the Northwest seems still to lack confirmation. Apparently no native species of the genus have found their way into the Willamette Valley, although *C. occidentalis* Nutt. and *C. monticola* Cov. both occur in the southwestern portion of the State.—J. C. Nelson, Salem, Oregon.

A Further Note on Crepis biennis.—In a recent article on the American occurrence of *Crepis biennis*[1] it was shown that most of the records for the species were based upon misidentifications, and that only three authentic specimens were found in the large collections of the Gray Herbarium, the New York Botanical Garden, the National Herbarium, the Missouri Botanical Garden, and the Philadelphia Academy. The only data on the occurrence and persistence

[1] Long, Rhodora, xxi. 209 (1919).

of the species at these stations consisted of the notation, "a casual" on one label. It was indicated, however, that the plant is probably not of a vigorously weedy nature and never became established in America—appearing to be distinctly a waif and not worthy of its general recognition in American manuals.

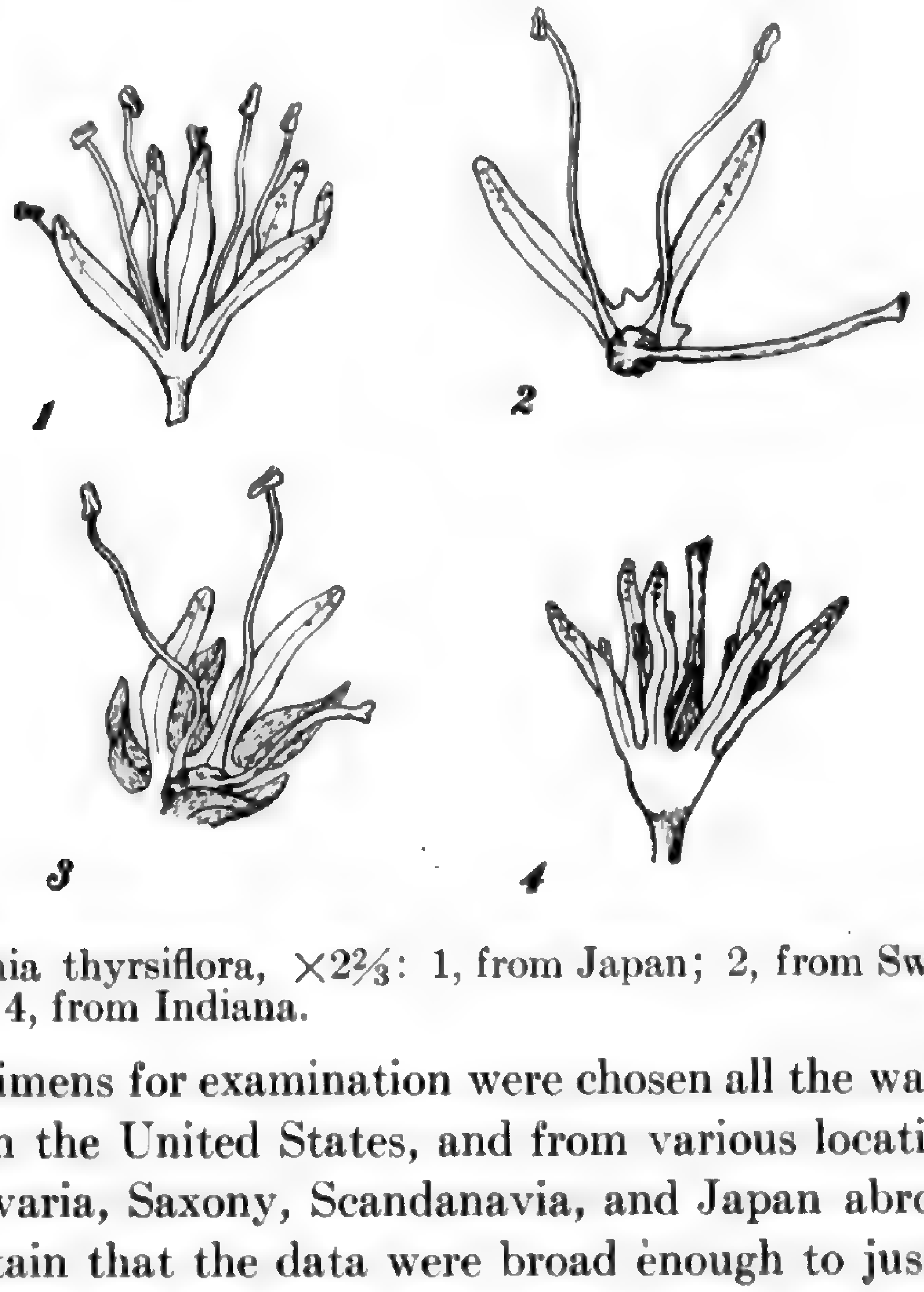
It is gratifying to be able to add a bit of definite evidence upon an occurrence of the species recently brought to light in the herbarium of Dr. H. B. Meredith. For many years Dr. Meredith was head of the State Hospital at Danville, Pennsylvania. His hobby has long been botany, and although probably enjoying most the collecting of the less familiar plants of more remote regions, he found a very fertile and fascinating field for observation and collection, during leisure moments, in the extensive lawns about the hospital. Here there appeared from time to time, after the seeding of the lawn, weeds of numerous kinds, some of more than usual interest. In this habitat *Ajuga genevensis*, for example, has become established. Most of the species noted, however, followed the more usual course of strange weeds in lawn-grass and failed to appear the second season, or at best lasted but a year or two.

On learning of my interest in these weeds, Dr. Meredith sorted out from his collection a number of them for my examination, and under "Sonchus arvensis" we found a good specimen of *Crepis biennis*. The label data reads: "State Hospital lawn, Danville, Penna., June 6, 1889. Probably from imported grass-seed." Dr. Meredith distinctly recalls the plant and assures me that it did not appear on the lawn a second year.

Through the generosity of the collector the specimen has been deposited in the Herbarium of the Philadelphia Academy.—Bayard Long, Academy of Natural Sciences of Philadelphia.

The supposed generic Character of Naumburgia.—Some botanists maintain *Lysimachia thyrsiflora* as a genus *Naumburgia*, distinguishing it from *Lysimachia* by the small, tooth-like staminodia in the sinuses of the corolla. On one of the specimens of *Lysimachia thyrsiflora* in the Gray Herbarium, however, is a note by the collector —"teeth in sinuses of corolla abortive."

At the suggestion of Professor M. L. Fernald, a number of dissections were made from both American and foreign material. It was found that the American specimens were consistently characterized by an absence of the staminodia. These were often wanting in the Eurasian, also, being the exception rather than the rule. The accompanying sketches illustrate these results. Thus *Naumburgia* Moench, as a genus distinct from *Lysimachia,* falls to the ground. The plant with teeth is probably a variation.



Lysimachia thyrsiflora, $\times 2\frac{2}{3}$: 1, from Japan; 2, from Sweden; 3, from Nova Scotia; 4, from Indiana.

Since specimens for examination were chosen all the way from Maine to Oregon in the United States, and from various locations in Switzerland, Bavaria, Saxony, Scandanavia, and Japan abroad, it is reasonably certain that the data were broad enough to justify this conclusion.

In the seventh edition of Gray's Manual the plant is described as having its corolla "very deeply 5 (or 6–7)-parted." As many as nine and as few as four divisions, however, have been found.—Marion E. Allen, Radcliffe College, Cambridge, Massachusetts.

Does saximontanus mean "Rocky mountain?"—In his article on "The American Varieties of *Pyrola chlorantha*" (Rhodora **22**: 49-53), Prof. Fernald has revived the word "*saximontana*" to designate one of these varieties, evidently intending thereby to emphasize the fact that the new form occurs in the Rocky Mountain region. This word seems to have gained an undisputed place in botanical nomenclature, dating back to Haussknecht's *Epilobium saximontanum*

(Oesterr. Bot. Zeitschr. **29**: 119. 1879). Since then we have had *Aquilegia saximontana* Rydb. (1895), *Potentilla saximontana* Rydb. (1896), *Salix saximontana* Rydb. (1899), *Saxifraga saximontana* E. Nels. (1899), *Draba saximontana* A. Nels. (1900), *Ribes saximontanum* E. Nels. (1900) and *Juncus saximontanus* A. Nels. (1902).

If these authors intended by the use of this specific adjective to convey the meaning that the plant was restricted to that part of the Rocky Mountain system lying north of the Laramie Plains, and called by Lewis and Clark the "Stony Mountains," in contradistinction to the Park Mountains lying to the southward in Colorado, New Mexico and eastern Utah, the word seems very well chosen: but if it was selected as the Latin equivalent of Rocky Mountains in general, it lacks the significance which it would have for one who knew no other language than Latin—unless indeed we are to assume that the Rocky Mountains are so called from the frequency of loose stone on their slopes!

But the universal belief in the West is that the name "Rocky" alludes to the predominance of bold cliffs and pinnacles of bare treeless rock, which might be described either as *rupes* or *scopuli*, but hardly as *saxa*, the latter word being only the prosaic designation for the material *stone*, thought of usually as occurring in detached fragments.

That this was the view of DeCandolle, a writer of correct and idiomatic scientific Latin, seems to be borne out by numerous passages in the Prodromus, e. g., under *Pentstemon secundiflorus* Benth.: "In montibus Scopulosis" (**10**: 325). To be sure, *scopulus* in the classics more frequently refers to rocks or ledges *in the sea*; but this is not uniformly the case (cf. the account of the cavern of Cacus in the Eighth Book of the Aeneid), and the fact of the bold and projecting character of the rock seems to be the root-idea.

But *saximontanus* has come into such general usage that it may now be regarded as a sort of *nomen conservandum;* there is no doubt that *we* know what it means, and it is hardly pertinent to inquire whether to a Roman it would have conveyed the same idea. Since scientific Latin has degenerated into a sort of conventional symbol, and seems no longer subject to the rules which govern the usage of a living language, priority and universality rather than idiomatic correctness will continue to be the chief desiderata, although an ineffectual squeak of protest may now and then be emitted by the few surviving classicists!—James C. Nelson, Salem, Oregon.

Vol. 22, no. 263, including pages 169 to 184, was issued 14 January, 1921.

ERRATA.

Additional for vol. 21:

Page 178, line 16, *for* n. comb. *read* Nieuwl. Am. Midl. Nat. ii. 278. 1912.

" 210, " 8, for *capillacea* read *capillaris.*

" 212, " 23, for *capillacea* read *capillaris.*

" 220, " 9, for **americana** (Fisch.) read **intermedia** (Muhl.).

" 220, " 9, for AMERICANA read INTERMEDIA.

" 220, " 10, *for* (Fisch.) *read* (Muhl.).

Vol 22:

Page 11, line 18, *for* 266 *read* 866.

" 51, " 23, for *clorantha* read *chlorantha.*

" 126, " 30, for **C.** read **V.**

" 126, " 33, for **C.** read. **V.**

" 135, " 34, *after* L. *insert* a comma.

" 136, " 12, *for* Robinsii *read* Robbinsii.

" 137, " 41, *for* Robinsii *read* Robbinsii.

" 156, " 37 *for* 259 *read* 260.

" 172, " 25, *for* d. c. villosum *read* d. C. villosum.

" 183, " 4, for *siccatum* read *siccanum.*

INDEX TO VOLUME 22.

New scientific names are printed in full face type.